

KA POWER
LIMITED

Forwarded please:
☒ For nec action ☐ for information

1. DG (Lic.)	2. DG (Admn./HR)
3. DG (M&E)	4. DG (CAD)
5. ADG (Trf.)	6. Dir. (Fin.)
7. Dir. (Tech.)	8. Consultant
9. LA	10. Addl. Dir. (IT)

For kind information please:
1. Chairman
2. M (Lic.)
3. M (Law)
4. M (Tech.)
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No. KA/PD/NEPRA/TP/00015/2023

Dated: 14 Mar., 2023

The Registrar,
National Electric Power Regulatory Authority (NEPRA),
NEPRA Tower Attaturk Avenue (East)
Sector G-5/1,
Islamabad.

TARIFF (DEPARTMENT)

Dir (T-I)..... Dir (T-II).....
Dir (T-III)..... Dir (T-IV).....
Dir (T-V)..... Addl. Dir (RE).....

Subject: **Resubmission of the Feasibility Stage Tariff Petition of 238 MW Kalam-Asrit Hydropower Project ("the Project"), District Swat, Khyber Pakhtunkhwa**

Dear Sir,

Please refer to NEPRA's Letter No. NEPRA/R/TRF-100/20102 dated October 18, 2022 returning Company's Tariff Petition submitted vide Letter No. KA/PD/NEPRA/TP/01/2022 dated July 6, 2022 due to not having a valid generation license while application dated July 4, 2022 for Generation License by the Company was kept on hold due to pending IGCEP-2022-31 for approval of Authority.

We would take this opportunity to highlight that income tax exemption vide Clause 132 of Part I of Second Schedule of Income Tax Ordinance 2001 is available only for the projects having LOS before June 30, 2023 and failure to achieve the milestone within above timeline will put this important foreign direct investment in very difficult situation or in jeopardy.

It is submitted that the Project is being sponsored by a premier generation company of South Korea namely Korea South-East Power Co. Ltd. ("KOEN") joining hands with multilateral development banks and is a committed/tested foreign investor to complete the Project on fast-track basis.

KOEN vigorously followed and achieved various requirements of Generation License, even optimized in NEPRA's approved IGCEP dated Feb 1, 2023 and was confident to achieve all milestones for issuance of LOS before June 30, 2023, however, inordinate delays by government entities especially the delay in IGCEP for around 7 months has made situation difficult for investors.

Based on above, the Company would request NEPRA to either waive off the requirement of feasibility stage tariff as envisaged in LOI (with the direction to file EPC Stage Tariff after LOS) or the process of FS Tariff Petition can be run in parallel on fast track so that targets may not be breached and the above referred tax incentive allowed under the policy can be passed on to investors who are at advance stage of development.

Through this letter and accompanying attachments, the Company resubmits its tariff petition with a specific request that the same may kindly be admitted and processed under the applicable Tariff Rules. This may enable the company to get the LOS before 30th June 2023 to avail the income tax exemption and to meet the deadline of COD provided in IGCEP.

Received along with 3X Documents.

REGISTRAR OFFICE
Diary No: 3096
Date: 15-3-2023

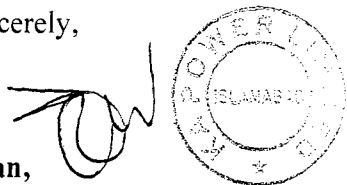
Tariff Division Record
Dy No: 1716
Dated: 16-3-2023

A bank draft # 15421694 dated 6 July 2022 in the sum of Rupees **1,869,444 (Pakistani Rupees One Million Eight Hundred Sixty-Nine thousand four hundred and forty-four only)**, being the applicable fee under NEPRA Tariff Standards and Procedure read with NEPRA (Fees Pertaining to Tariff Standards & Procedure) Regulations, 2002 is already with the NEPRA vide Tariff Petition dated July 6, 2022.

We hereby request the Authority for kind consideration and favorable approval of our tariff petition by the Authority in accordance. inter alia, with Section 31 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 read with Rule 3 of the NEPRA Tariff Standards and Procedure Rules, 1998 and other applicable provisions of NEPRA law.

We look forward for your help and support to successfully deliver the Project within the timelines envisaged in IGCEP.

Yours Sincerely,



Oh Inhwan,
Chief Executive Officer

Copy to:

- I. Managing Director, Private Power & Infrastructure Board, Emigration Tower, G 8/1, Islamabad.
- II. Chief Executive Officer, Pakhtunkhwa Energy Development Organization, Plot# 38, Sect B-2, Phase-5, Hayatabad Peshawar.
- III.

The Tariff Petition (including its Annexures) is submitted in triplicate together with:

S/No.	Details	Attachmen
1.	Board Resolution dated 29 April 2022	Appendix-A
2.	Affidavit of Mr. Oh Inhwan, CEO dated 5 April 2022	Appendix-B
3.	Bank Draft in favor of NEPRA for fee of Tariff Petition	Appendix-C
4.	Certified Certificate of Incorporation of Company	Appendix-D
5.	Certified Memorandum of Association of Company	Appendix-E
6.	Certified Articles of Association of Company	Appendix-F
7.	Letter of Interest of Project	Appendix-G
8.	Approval of Feasibility Study Report	Appendix-H
9.	Application for Grant of Generation License	Appendix-I
10.	NOC of EPA KPK	Appendix-J
11.	Approved Feasibility Study Report	Appendix-K
12.	Bill of Quantities & Cost Estimates – Volume 10 of FS	Appendix-L
13.	Quotations of E&M Equipment	Appendix-M
14.	Quotations of Project Insurances	Appendix-N
15.	Justification of 17% IRR	Appendix-O

No. KA/PD/NEPRA/TP/00015/2023

Dated: 14 Mar., 2023

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NEPRA Tower Attaturk Avenue (East)
Sector G-5/1,
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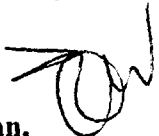
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Oh Inhwan,
Chief Executive Officer

Copy to:

- I. Managing Director, Private Power & Infrastructure Board, Emigration Tower, G 8/1, Islamabad.
- II. Chief Executive Officer, Pakhtunkhwa Energy Development Organization, Plot# 38, Sect B-2, Phase-5, Hayatabad Peshawar.
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10.	NOC of EPA KPK	Appendix-J
11.	Approved Feasibility Study Report	Appendix-K
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13.	Quotations of E&M Equipment	Appendix-M
14.	Quotations of Project Insurances	Appendix-N
15.	Justification of 17% IRR	Appendix-O



I, Oh, Inhwon, Chief Executive Officer of KA Power Limited, hereby solemnly affirm and declare that the contents of the accompanying Tariff Petition, including all supporting documents are true and correct to the best of my knowledge and belief and that nothing material has been concealed therefrom.

Islamabad

Date:

30

Deponent

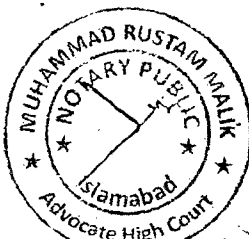
Oh, Inhwon

Chief Executive Officer

CNIC/Passport No. M35293154
KA Power Limited

Verified on oath at Islamabad on this 07 day of July 2022 that the contents of the above Affidavit are true and correct to the best of my knowledge and belief.

ATTESTED



[Handwritten signature]

Deponent

[•]

Chief Executive Officer

CNIC/Passport No. M3529354
KA Power Limited

**TARIFF PETITION
NATIONAL ELECTRIC POWER REGULATORY
AUTHORITY**

**FEASIBILITY STAGE TARIFF PETITION
IN RESPECT OF**

**KALAM-ASRIT HYDROPOWER PROJECT (THE
“PROJECT”)
238 MW (NET)**

LOCATED AT

KALAM TOWN, DISTRICT SWAT, KPK

**FOR AND ON BEHALF OF
KA POWER LIMITED (“COMPANY”)**

14 March 2023

Petitioner's Details:

KA POWER LIMITED
Plot # 3, Street # 9,
Mini Commercial, Fiaz Market,
G-8/2, ISLAMABAD
PH: +92512726703
EMAIL: info@kapower.com.pk

ABBREVIATION & ACRONYMS

ADB	Asian Development Bank
COD	Commercial Operation Date
Company	KA Power Limited
CPI	Consumer Price Index
E&M	Electrical and Mechanical
EPC	Engineer, Procure & Construct
EPP	Energy Purchase Price
ESIA	Environmental & Social Impact Assessment
EPA	Environmental Protection Agency
FY	Fiscal Year of GOP beginning 1st July to 30th June
GOP	Government of Pakistan
GOKPK	Government of Khyber Pakhtunkhwa
GWh	Giga Watt hour (1,000,000 kilowatt hours)
IDC	Interest During Construction
IFC	International Finance Corporation
IPP	Independent Power Producer
IRR	Internal Rate of Return
K-Exim	Korea Export Import Bank
KEPCO	Korea Electric Power Company
KIBOR	Karachi Interbank Offered Rate
KOEN	Korea South-East Power Company
KPK	Khyber Pakhtunkhwa
kWh	Kilowatt-hour
LIBOR	London Interbank Offer Rate
LOI	Letter of Interest
LOS	Letter of Support
MW	Mega Watt (1,000 kilowatts)
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission & Despatch Company Limited
OE	Owner's Engineer
O&M	Operation & Maintenance
Pakistan	The Islamic Republic of Pakistan

PEDO	Pakhtunkhwa Energy Development Organization
PKR/Rupees/Rs.	Pak Rupees, lawful currency of Pakistan
Power Policy 2015	The GOP's Policy for Power Generation, 2015
Power Policy 2016	GoKPK Hydropower Policy 2016
PPA	Power Purchase Agreement
PPIB	Private Power & Infrastructure Board
RFP	Request for Proposal
ROE	Return on Equity
ROEDC	Return on Equity during Construction
SBP	State Bank of Pakistan, the central banking authority of Pakistan
USAID	United States Agency for International Development
USD/\$	United States Dollars
US CPI	United States Consumer Price Index
WAPDA	Pakistan Water & Power Development Authority
WPI	Wholesale Price Index
World Bank	International Bank for Reconstruction and Development
WUC	Water Use Charges

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1. PETITIONER'S DETAILS:

Petitioner Name: **KA POWER LIMITED**

Project Name: 238 MW Kalam-Asrit Hydropower Project

Address: Plot # 3, Street # 9,
Mini Commercial, Fiaz Market, G-8/2, Islamabad.
Phone: +92512726703
Fax: +92512726703
Email: info@kapower.com.pk

Authorized Representative: Oh, Inhwan,
Chief Executive Officer

2. BASIS FOR TARIFF PETITION

2.1 NEPRA Act and NEPRA Rules:

This Petition is made under the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of) 1997 (the "NEPRA Act") to the National Electric Power Authority ("NEPRA" or "Authority") and the NEPRA Tariff Standards and Procedure Rules, 1998 (the "NEPRA Rules") made under the NEPRA Act; and other applicable laws.

NEPRA is responsible under the NEPRA Act to determine tariffs, rates and other terms and conditions for the supply of electric power services by the generation, transmission, and distribution companies and to recommend them to the Federal Government for notification. NEPRA is also responsible for determining the process and procedures for reviewing and approving tariffs and tariff adjustments.

2.2 Mechanism for determination of Tariff for Hydro Power Projects

In cognizance of importance, risks and cost uncertainty associated with the development of the hydropower projects, NEPRA has developed a Mechanism for Determination of Tariff for Hydropower Projects (the "Mechanism"). The Mechanism provides for determination of tariff and subsequent adjustments at different stages of development of hydropower projects. In this respect three distinct stages have been identified in the Mechanism:

- (i) Feasibility stage
- (ii) EPC stage; and
- (iii) Final cost stage (which is to be no later than Commercial Operations Date ("COD"))

2.3 Letter of Intent (LOI) and Feasibility Study Approval

As per terms of Letter of Interest (“LOI”), the Project Sponsors submitted the Feasibility Stage Tariff Petition before NEPRA on 6th July 2022 however was returned by NEPRA with the instructions to resubmit the same after issuance of Generation License by the Authority. It is pertinent to mention that Generation License Application of the Company, submitted on 4th July 2022, is pending before the Authority. The Feasibility Study report was approved by Panel of Expert on April 6, 2022.

3. GROUNDS AND THE FACTS FORMING THE BASIS OF THE PETITION

3.1 Project Background

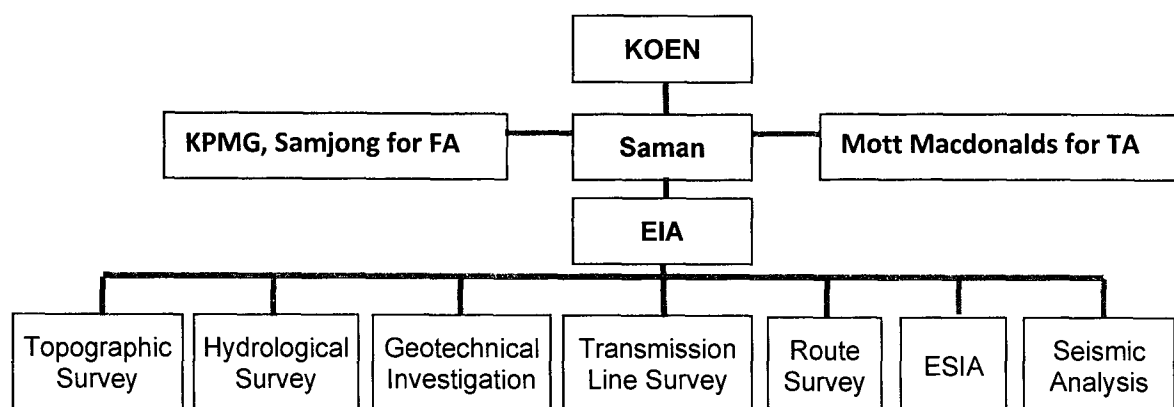
Comprehensive studies for the assessment of the hydropower potential of the Swat valley were carried out between 1990 and 1995 under a Program of Pakistan-German Cooperation. In June 2006 Mirza Associates Engineering services (PVT) Ltd. submitted a cascade study on the development of the hydropower potential in the Swat River. Four potential sites were identified by consultant in this study. The study proposed, among others, the development of the following run-of-river hydropower plants;

- Gabral-Kalam HPP : 101 MW (Gabral river)
- Kalam-Asrit HPP : 197 MW (Preliminary Feasibility Study)
- Asrit-Kedam HPP : 209 MW (Technical Due Diligence (TDD) by KOEN in 2016)
- Madian HPP : 148 MW (TDD by KOEN in 2016)

The Project namely Kalam Asrit hydropower project is located on Swat River in Khyber Pakhtunkhwa (KPK). The Project Sponsor (Korea South-East Power Co. Ltd. (“KOEN”)), following successful development of 102 MW Gulpur Hydropower Project in AJ&K, offered and initiated 100% foreign direct investment of around US\$ 1 Billion in hydropower sector of Pakistan including the Project and executed a Memorandum of Understanding on 15 May 2017 with KPK Government. Under the provisions of KPK Hydropower Policy 2016 and Guidelines issued thereunder, **KOEN** submitted Preliminary Proposal on May 24, 2017 and in response KPK through Pakhtunkhwa Energy Development Organization (PEDO) issued a Notice to Proceed to KOEN on 5 October 2017. Then, Saman Corporation completed a preliminary feasibility study in January 2018. KOEN submitted the detailed proposal against the Qualification Documents issued by PEDO under the provisions of KPK Hydropower Policy, 2016. Following detailed scrutiny of Proposal, KOEN was declared as successful Applicant for the development of 197 MW Kalam-Asrit Hydropower Project by (PEDO) through a no objection certificate (NOC) letter dated March 26, 2018 and **KOEN obtained Letter of Interest from PEDO on April 24, 2018 (Appendix-G).**

KOEN conducted a bidding process for selecting a renowned international engineering firm, for carrying out the bankable feasibility study of Project and selected SAMAN

Corporation of South Korea (“SAMAN”), Mott MacDonald of United Kingdom & KPMG Korea. The following organizations was implemented for conducting the feasibility study:



PEDO also appointed multi-disciplinary team of Panel of Experts representing Private Power Infrastructure Board, National Transmission and Despatch Company, Irrigation Department, Environmental Protection Agency of KPK, technical and financial experts from PEDO and private sector. During the LOI period, Panel of Experts conducted around eight Panel of Experts meetings and three site visits to observe, investigate and discuss the progress, design, layout, geology and witness investigations, costs, environmental concerns, neighboring facilities, hydrological calculations, e-flow, transmission and evacuation, verification of drawings, calculations of BoQs and especially the optimization of Project Costs and other important aspects of Project.

SAMAN conducted and completed feasibility study in 2020. Following extensive review and detailed scrutiny of the Project’s technical features and related costs, PEDO approved Feasibility Study report of the Project on April 6, 2022. KOEN simultaneously received approvals of Korean Government (Ministry of Industry & Ministry of Finance) after detailed due diligence conducted by Korean Development Institute for this important investment in Pakistan for the Project. KOEN established Special Purpose Company namely **KA Power Limited** under the laws of Pakistan on April 8, 2022 to develop the Project on fast-track basis and applied for a Generation License as a prerequisite to file Feasibility Stage Tariff Petition on July 4, 2022.

3.2 Executive Summary

3.2.1 Project Summary

Project Name	Kalam-Asrit Hydropower Project
Project Location	1 KM down stream of Kalam Town, District Swat
Project Capacity	238 MW (3 x 68.4 MW + 1 x 33.0 MW) (after turbine, generator & transformer efficiencies)

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

Plant Factor	45.79%
Annual Generation	945.8 GWh (Net after auxiliary consumption)
Auxiliary Consumption	1%
Construction Period	5 Years
Concession Period	30 Years from COD
Power Purchaser	Central Power Purchasing Agency
Project Cost	USD 489.333 million
Capital Structure	80:20 (Debt: Equity)
Long Term Debt	USD 391.47 million
Equity	USD 97.87 million
Reference Exchange Rate	PKR 178.5/US\$
Lenders	ADB, IFC & K-EXIM
Terms of Long Term Debt	Term: 17 Years including 5 Years Grace Period
	Repayment: 12 years
	Debt Repayment: Bi-annual
	Interest Rate: 6 month LIBOR + 460bps
Levelized Tariff	US Cents 7.1344 / kWh

3.2.2 Project Sponsors & Lenders

(a) Korea South-East Power Company

KOEN is a leading generation company of South Korea and owns 11.4% of total Korea's generation capacity amounting to 10,376 MW. Total asset base of KOEN is USD 10.342 billion with approx. USD 4 billion per annum revenue. KOEN is the wholly owned subsidiary of Korea Electric Power Company (KEPCO). KOEN has successfully implemented 102MW Gulpur Hydropower Project in Pakistan which is in its 3rd year of operation.

(b) Generation Portfolio Of KOEN

Plants in operation

Generation Portfolio as of 2020				
[As of Dec. 2020]				
Load Type	Plant Name	Fuel	Installed Capacity	Remarks
Base Load	Yeongheung	Bituminous	5,080MW	
	Samcheonpo		3,240MW	8,988.6[86.4%]
	Yeosu		668.6MW	
Peak Load	Bundang	LNG	922.1MW	922.1[8.9%]
Renewable	Biomass	-	489.6MW	489.6[4.7%]
	[Yeongdong #1,#2]			
	Wind Power,			
	Solar Photovoltaic, etc.			
Total			10,400.3MW	10,400.3[100%]

* Renewable : KOEN's Own Business(ESS excluded)

To contribute its part in the environmentally friendly and sustainable growth KOEN has devised and implementing "Vision 2030" under which KOEN is committed to

change its energy mix to include 20% electricity from Renewable Energy sources (estimated at about 13,187.8 GWh) by year 2030.

As part of Vision 2030, KOEN has successfully implemented 102MW Gulpur Hydropower Project in Pakistan which is in its 3rd year of operations. Currently KOEN owns 136.9 MW in renewables locally comprising of solar, wind, bio and small hydro.

Based on experience with 24 units power plant construction and operation, KOEN is expanding its business area in other areas of World such as Chile, Malaysia, Indonesia, Nepal, Hungary, Turkey, India, Kazakhstan, Sri Lanka, China, Thailand and Pakistan.

(c) Project Lenders

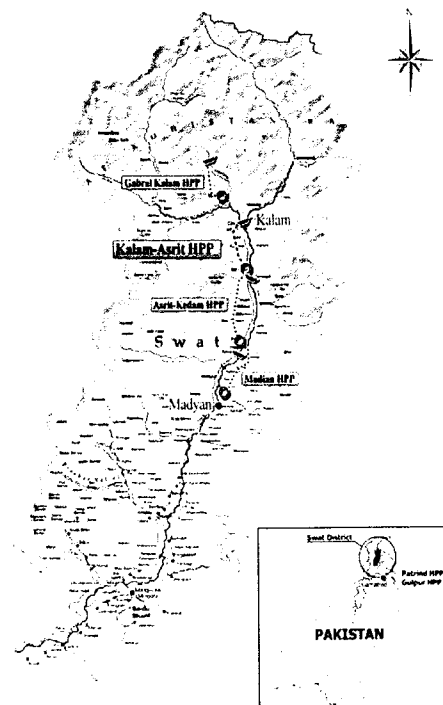
International Finance Corporation (“IFC”), Asian Development Bank (“ADB”) and Ninety One SA (Pty) Ltd (“Ninety One”) (acting for and on behalf of clients including The Emerging Africa Infrastructure Fund (EAIF) and a member of the Private Infrastructure Development Group (PIDG)) have issued their Letter of Interest (LOIs) in favor of the Project and would be the prospective lenders along with K-Exim Bank, Korea.

3.2.3 Salient Features of The Project

(a) Project Location

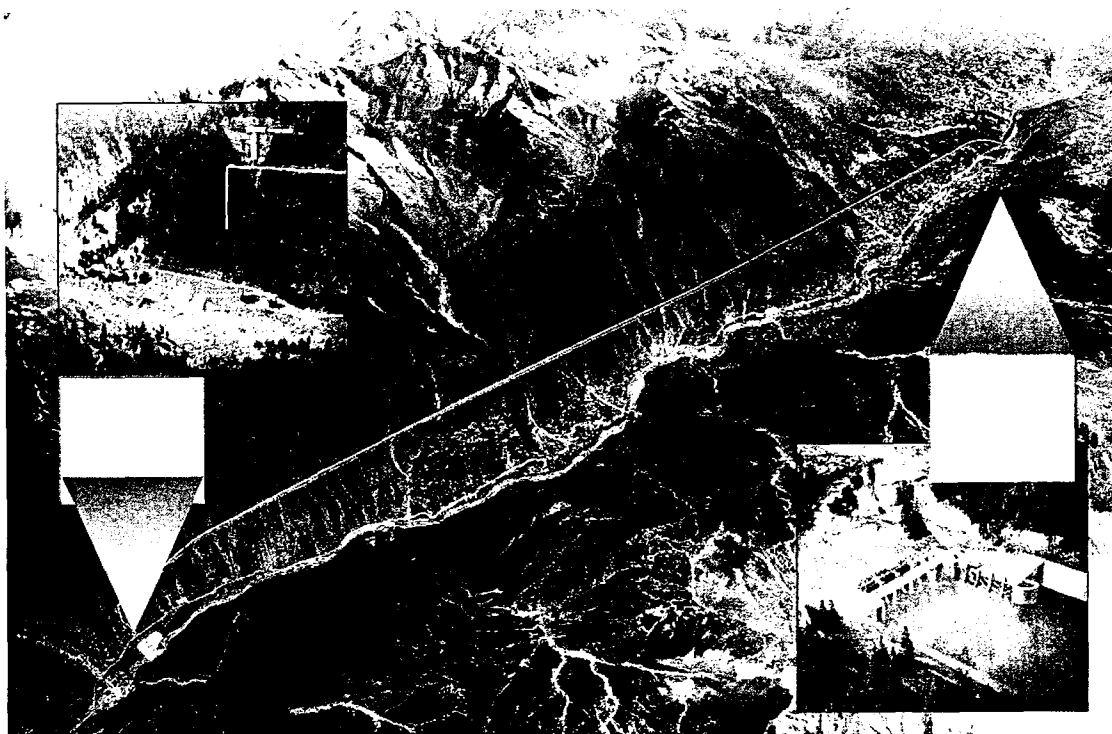
The Project is located on the Swat River across from the Kalam to the Asrit Villages in District Swat, Khyber Pakhtunkhwa Province, Pakistan. The project area is accessible from Islamabad by motorway M1 and then Swat Expressway M16 to Chakdarra then from Chakdarra to Site by N95 highway. Both N45 and N95 are metaled roads. The distance of the Project is approximately 350 Km from Islamabad.

The proposed dam and intake structure is located approx. 2 Km downstream of the confluence of Gabral River and Ushu River. The proposed location for the powerhouse is 500 m upstream of the Asrit village. The proposed headrace tunnel is proposed on the right side of Swat river, straight down to the village Asrit.



TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

(b) Project Aerial View



(c) Technical Features

	Item	Unit	F/S, 2022	Remark
Hydrology	Catchment Area	km ²	2,030	Weir Site
	Annual Average Run-off	m ³ /s	88.4	Weir Site
Power Generation & Energy Estimation	Plant Discharge	m ³ /s	130.0	
	Gross Head	M	222.1	
	Head Loss	M	18.1	
	Installed Capacity	MW	238 (4 Units) 68.4 MW x 3 Units 33.0 MW x 1 Unit	(after turbine, generator & transformer efficiencies)
	Annual Average Power Generation	GWh /year	945.8	
	Plant factor	%	45.79	

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

Item		Unit	F/S, 2022	Remark
Diversion Tunnel	Diversion Discharge	m ³ /s	400.4	2 Year return period
	Size	m	D-shaped, 7.5x 7.5x3.75	B x H x R
	Length	m	484.0	Excluding portal of Inlet & outlet
Upstream Cofferdam	Type		Concrete Dam with secant pile	
	Dam Crest Level	EL. m	1,944 (1,940)	During Construction (During Operation)
Downstream Cofferdam	Type		Rockfill Dam	
	Dam Crest Level	EL. m	1,935	
Weir & Spillway	Type		CGD	Concrete Gravity Dam
	Design Discharge	m ³ /s	1,258.3 (1,000yr)	
	Safety Check Discharge	m ³ /s	1948.0	10,000yr including GLOF
	Weir Crest Level	EL. m	1,947.0	
	Spillway Crest Level	EL. m	1,939.0	
	Length	m	90.3	
	Height	m	23.0	
	Spillway Gate	m	10.0 x 6.0 x 3	B x H x Nos.
	Sluiceway Gate	m	5.0 x 4.5 x 2	B x H x Nos.
Desander Basin	Type		Design Particle 0.2 mm	
	Width	m	Var.	Natural Desander Volume : 199,104 m ³
	Height	m	12	
	Length	m	230	
Intake	Type		Bellmouth circular	Box shape
	Invert Elevation	EL. m	1930.0	

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

Item		Unit	F/S, 2022	Remark
	Inlet Diameter	m	7.4	Trash-rack W 8.0 × H 10.9 for FS
	Length	m	29.2	
Headrace Tunnel	Type		Circular	Excavation : Modified Horse Shoe
	Diameter	m	7.4	
	Length	m	11,589.6	
Vertical Pressure Shaft	Type		Circular	
	Diameter	m	7.4 (Con'c)	
	Height	m	125.9	
Surge Shaft	Type		Restricted Orifice	
	Size	m	D18.0	
	Height	m	81 (incl. Orifice)	
	Orifice size	m	D5.0	
	Max. up-surging water level	EL. m	1,969.6	
	Min. down-surging water level	EL. m	1,903.8	
Penstock (Manifold)	Type		Circular Steel lined	Excavation : Modified Horse Shoe
	Diameter	m	5.6 ~ 2.1	
	Length	m	339.5 (straight distance) D5.6, L 296.9, D3.0, L 29.06, D2.1, L 10.45	
Powerhouse	Type		Surface	
	Size	m	41.7 × 100.65 × 50.9	W × L × H
	Turbine Type		Francis	
	Turbine Capacity	MW	238 MW 68.4 MW x 3 Units 33.0 MW x 1 Unit	(after turbine, generator & transformer efficiencies)
	Turbine-Center Level	EL. m	1,713.7	

3.2.4 Project Major Components

(a) Weir

The concrete gravity type was selected considering satisfactory foundation conditions, minimum environmental disruptions and structural stability. On top of the weir structure a road is planned to provide access to the intake structure and the control structures. The specifications for the designed weir are as shown below.

Type	: Concrete Gravity Dam
Max Flood Water level	: EL.1,946.0 m
Normal Operation Water Level	: EL.1,944.0 m
Weir Crest Elevation	: EL.1,947.0 m
Length of the weir	: 90.3m
Height of the weir	: 23.0m
Overflow spillway	
Size	: W10.0 m × H6.0 m × 3 nos
Crest	: EL.1,939.0 m
Sluiceway:	
Size	: W5.0 m × H4.5 m × 2 nos
Crest	: EL.1,931.0 m

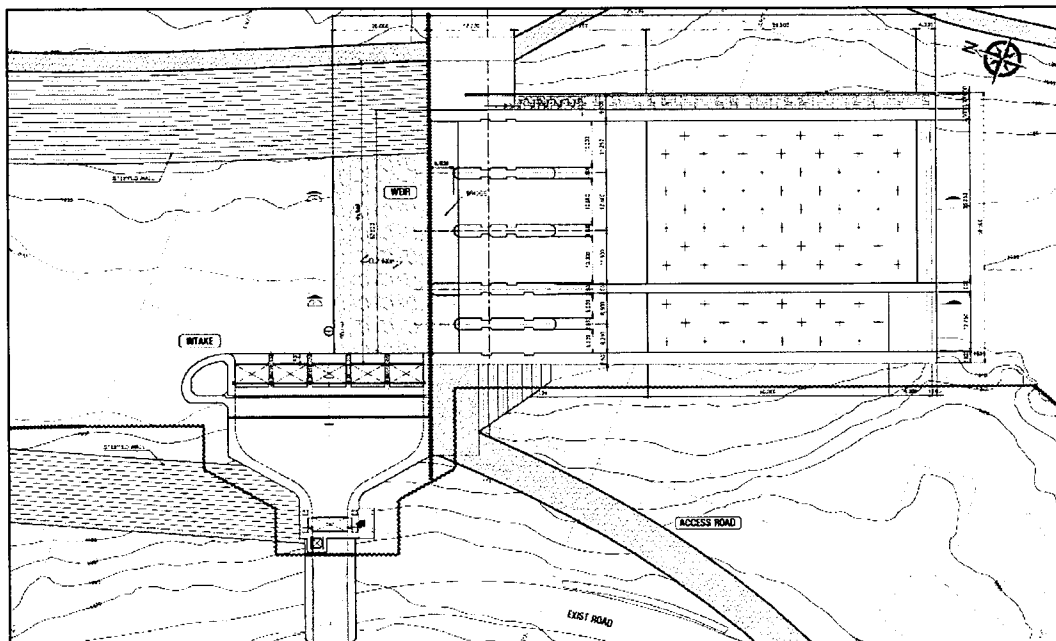


Figure 1 : Plan of Weir & Power Intake

(b) Natural Desander

The Hydropower Project like Kalam-Asrit HPP where amount of sedimentation is a little high, however it is very vital to ensure duration of power generation as well as to save maintenance and replacement cost due to damages on turbines through preventing amount of sediment flowing into the power intake. To reduce concentration of sediment, various sediment management measure such conventional sand trap constructed by the concrete has already been constructed for other projects. However, its trap efficiency is somewhat doubtful. The expert of sedimentation at Patrind HPP suggested that using natural pool between the upstream cofferdam and the weir as function of desander would be more efficient and economically feasible. Also, the expert of sedimentation mentioned that by constructing a bypass tunnel, flood discharge would be diverted through the bypass tunnel which would facilitate trapping function of natural pool as function of desander. Similar cases can be found in Upper Karnail project in Nepal as well as in Lhuri project in India, which the expert of sedimentation has been involve with.

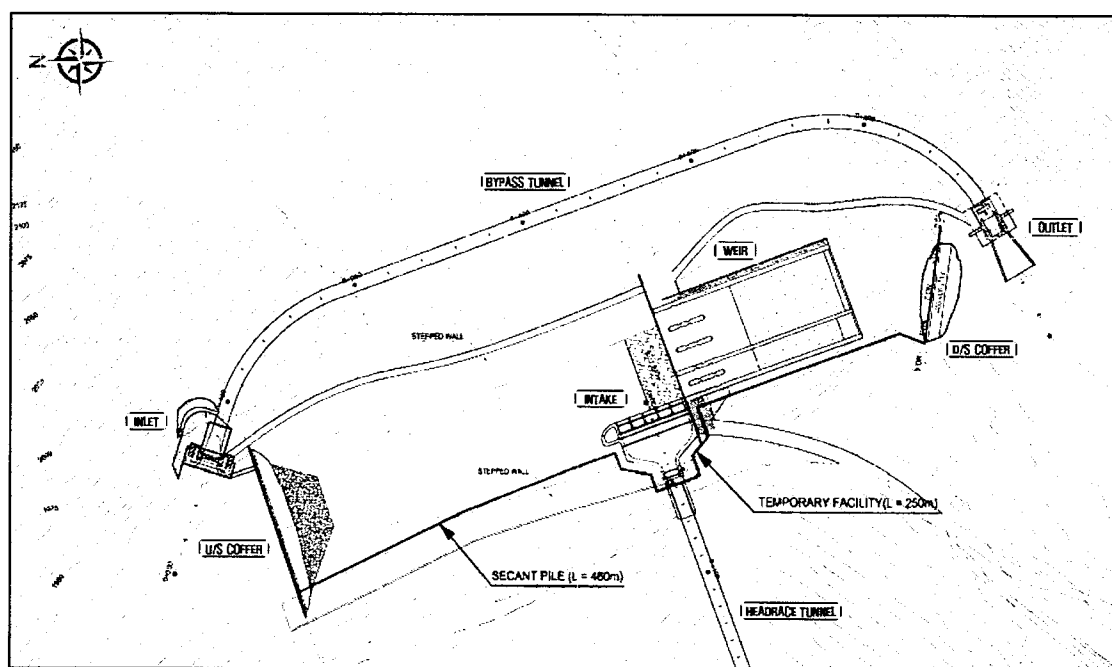


Figure 2 : Layout of weir site for Kalam-Asrit HPP

Accordingly, an attempt to improve trap efficiency has been made by applying concept of “Natural Desander which consists of;

- (a) A bypass tunnel, under normal operation diverting flow in excess of 130 m³/s and also acting as a flushing device for accumulation of sediments upstream of the concrete cofferdam in the reservoir.
- (b) A Natural Desander between the upstream concrete cofferdam and the Weir

The upstream coffer dam will be a permanent structure and will be used as a barrier for trapping large size boulders. The coffer dam will trap the sand, gravels & boulders and will flush through bypass tunnel. This scheme will also protect the intake structure and

associated mechanical installation in weir structure from rolling stones which may get damage in conventional sand trap scheme.

The basic concept of Natural Desander applied is to allow only the plant discharge to flow into the natural settlement pond in order to let the sediment be settled in the pond, during normal operation. The dimensions of natural desander are adjusted in a way that the velocity will be kept minimum i.e. 0.2 m/sec, enabling sediments to settle properly.

The inlet level of intake structure and under sluice gates of weir will be adjusted in a way that all the trapped sediments in the natural desander will be flushed without entering the headrace tunnel. In general, the level of under sluice gates of weir will be kept lower than the intake invert level.

(c) Intake

Through the intake, water flows into the waterway. Any sediment or debris has to be prevented by trash racks to avoid possible damages to the equipment in the powerhouse. The intake size and its configuration is designed to secure the inflow of the design discharge as well as to be satisfied with important hydraulic requirements for the intake such as equal distribution of the inflow velocities and prevention of vortex formation.

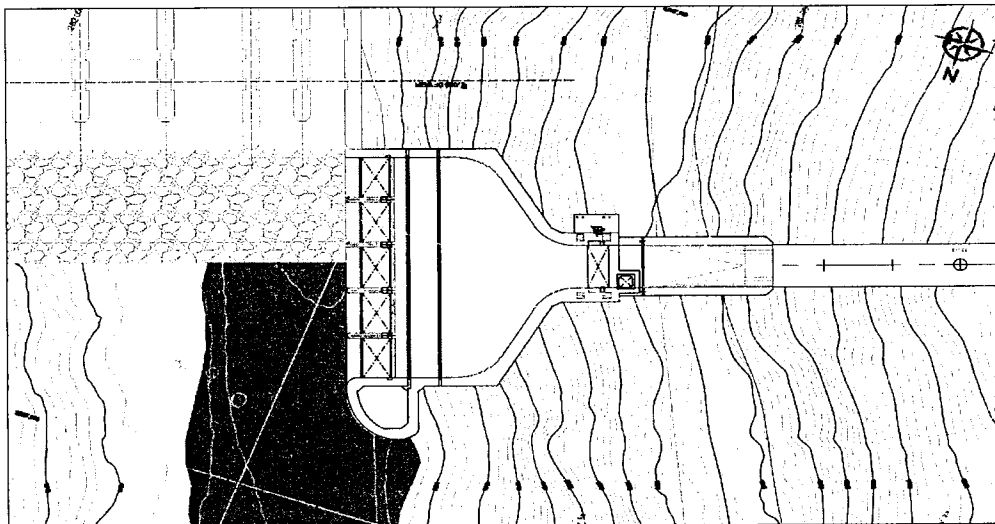


Figure 3 : Plan of Intake

1) Intake

- Type : Horizontal bell mouth type
- Sill Elevation : EL. 1,930.0 m
- Inlet Size : W7.0 m × H6.8 m × 5 Nos. ($A = 238 \text{ m}^2$)

2) Gates

- Type : Roller gate
- Size : W7.4 m × H7.4 m × 1 Nos.

Intakes are generally divided into two types, i.e., vertical morning glory and horizontal bell mouth type. The project area is situated between steep gullies so that the vertical morning glory type is not appropriate for this terrain. Therefore, the horizontal bell mouth type is preferred given the operation and maintenance issues.

Vortex formation in the intake could cause many problems such as reduction of power generation due to reduced inflow amount with entrained air, pressure pulsation phenomena due to discharge fluctuation, possible damages to the waterway structure and increase of head loss.

The invert elevation of the power intake was possible to be set from the elevation of EL.1,930.8 m. However, considering safety issues and making the invert elevation deeper to discharge the inflow towards powerhouse without any voids, the elevation of EL.1,930.0 m was carefully set as the invert elevation of the power intake.

In general, if the plant discharge is large, the approach velocity toward power intake is allowed up to around 1.0m/s, and the approach velocity of an intake with trash rack is around 0.6 ~ 1.5 m/s. Design approach velocity of power intake for Kalam-Asrit HPP is conservatively planned about 0.6 m/s to improve efficiency of natural settlement pool and to prevent inlet loss and vibrations to the trash racks. Its cross section has been designed in order to induce smoothly the discharge of 130.0 m³/s and to make the allowable velocity less than 0.6 m/s.

The calculation results brought the intake width of 7.0 m. The sill elevation is set at EL.1,937.5 m, and the average velocity is below 0.6 m/s so that water is fluently flown into power intake.

(d) Waterway Tunnel

The layout of waterway tunnel, connecting from the Power Intake at the reservoir to the powerhouse, should be first determined considering the location of the surge chamber and the powerhouse. The optimum design of the waterway tunnel was performed throughout review of the topographical and geometrical conditions, the powerhouse direction and the hydraulic conditions such as water hammer and surging phenomenon.

Table 1 : Waterway Tunnel Specification

Items		Length (m)	Cross Section (m)	Slope	Remark
Headrace Tunnel		11,589.6 m	D 7.4 m	0.47%	Modified Horse Shoe (Inner Circular)
Surge Chamber	Chamber	L50 m × B20.0 m	H10.0 m	-	
	Shaft	67 m	D 18.0 m	-	Circular
	Orifice	14 m	D 5.0m	-	Circular
Pressure Tunnel	Vertical	188 m	D 7.4m	-	Circular Incl. curvature lengths
	Horizontal	118 m	D 7.4m	-	Modified Horse Shoe (Inner Circular)

Items		Length (m)	Cross Section (m)	Slope	Remark
Steel Penstock	1 Line	296.9 m	D 5.6m	-	Steel Lined
	4 Line	106 m 19 m	D 3.0m D 2.3m	-	Steel Lined

The waterway tunnel is connected from the power intake at the reservoir to the powerhouse. It consists of power intake, headrace tunnel, vertical and horizontal pressure tunnel, and steel penstock and its total length is 12.1 km. The surge chamber is located between headrace tunnel and vertical pressure tunnel in order to reduce the hydraulic transient in the pressure tunnel. The steel penstock divides in front of the powerhouse to supply the plant discharge for 4 turbines.

The longitudinal alignment of waterway tunnel is satisfied with natural drainage, therefore, the maximum longitudinal slope will be below 1.5%. The steel penstock slope is level for workability.

The economical cross section of the waterway tunnel should minimize the sum of construction costs, maintenance cost and generation loss cost per unit length. The basic concept is that the wider cross section is, the less generation loss cost by friction loss of the headrace tunnel is, whereas the more expensive the construction cost is. Therefore, the optimum cross section is adopted as the cross section that can minimize the sum of the generation loss cost and the construction cost above mentioned. The diameter of the headrace tunnel and the steel penstock is determined by cost optimization design.

Table 2 : Optimum Cross Section of Waterway Tunnel

Items	Plant discharge (m ³ /s)	Diameter (m)	Velocity (m/s)	Remark
Headrace	130	7.4	3.0	Concrete Lined
Pressure Tunnel		7.4	3.0	Concrete Lined
Steel Penstock (1 Line)		5.6	5.3	Steel Lined
Steel Penstock (4 Line)		3.0	5.3	Steel Lined
		2.3	4.3	

Headrace Tunnel excavation methods should be selected considering workability and economic analysis. Analysis results are decided according to size and shape of the tunnel section, length, geological conditions, work adit conditions, construction period and costs as well as surroundings (access roads, social complaint, environmental issues). There are 2 types of tunneling methods. One is Drill & Blast (NATM) and another is Tunnel Boring Machine (TBM). Their advantages and disadvantages are below. TBM tunneling is reviewed with “Classification of Excavation Equipment as per Ground Condition, AFTES, 2000”. As a result of review, TBM is recommended. TBM method is chosen specially to Open-face gripper TBM.

In the case of TBM method, the construction period was reviewed with the concept of monthly excavated length according to the ground conditions. The critical path of this project is the headrace tunnel, so the construction period was reviewed for preparation work, adit excavation, and TBM assembling and construction. The review condition of 1 month applies to 25 days for the total construction period of 5 years (60 months). In the TBM construction phase, equipment ordering, fabrication and on-site delivery are prepared with the start of the project, which is not considered as a separate construction period. When excavating the headrace tunnel, 5% of the total headrace tunnel extension was considered in consideration of risks such as jamming.

The pressure tunnel starting at the end of the headrace tunnel connects to the steel penstock tunnel.

(e) Vertical and Horizontal Pressure Tunnel

The vertical pressure tunnel was planned as a circular type considering economic efficiency and workability. For ease of construction by means of the raise boring method the 7.4 m diameter pressure tunnel is designed vertical.

The longitudinal slope of the horizontal pressure tunnel was designed as no slope for construction vehicles movement and tunnel drainage during construction and tunnel maintenance during operation. In view of expected internal tunnel pressure and rock mass characteristics in the pressure tunnel, concrete lining is required.

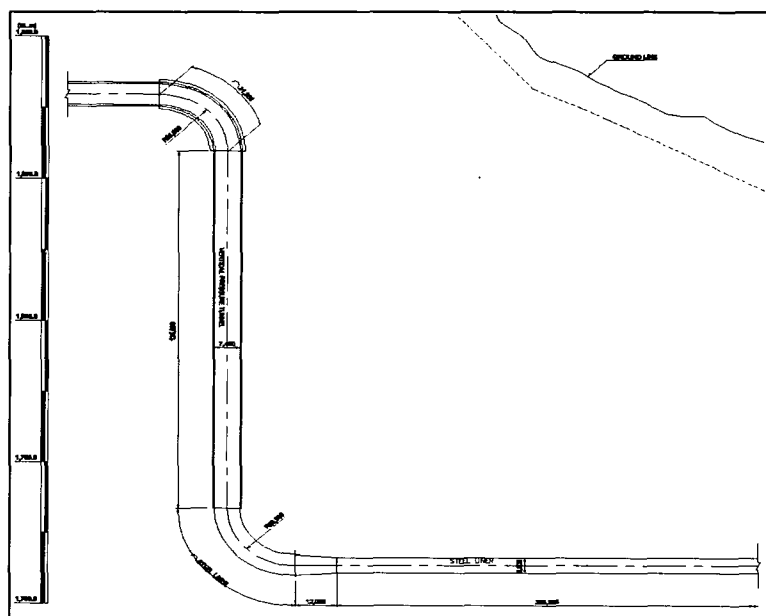


Figure 4 : Pressure Tunnel Profile

In the pressure tunnel, the surrounding rock of the pressure tunnel is in charge of cut-off role. However, in case that the minimum principle stress of the surrounding rock is smaller than the internal water pressure, seepage water to the rock causes Hydraulic Jacking at the surrounding rock. In order to assure the hydraulic and structural stability of the surrounding rock against Hydraulic Jacking, watertight liner that can prevent water

from leakage to the surrounding rock, should be considered. Reinforced concrete liner or steel liner can be applied according to the surrounding rock conditions.

In the section that the internal water pressure is high and the deformation modulus of the surrounding rock is small, tension crack could occur along the reinforced concrete liner. Therefore, steel liner backfilled with concrete should be adopted. Application of reinforced concrete liner or steel liner depends on the internal water pressure at the installed location and the deformation modulus of the surrounding rock. Especially, in case that the surrounding rock is permeable in pressure tunnel, steel liner should be considered.

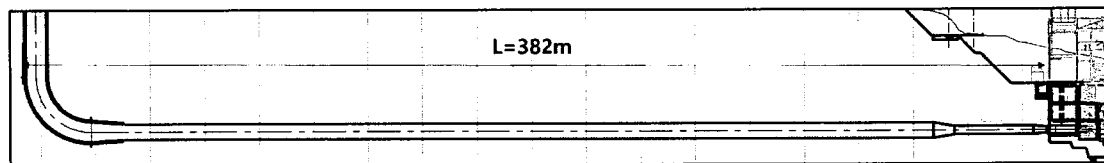


Figure 5 : Penstock Length

Though the calculation results in much smaller value, the length of Steel Penstock has adopted conservatively the length of 382 m reaching to the lower bend of the vertical shaft.

(f) Surge Shaft

Water hammer is caused by flow disturbances in a waterway tunnel from a steady state to another. To ensure the structural stability of the headrace tunnel against the water hammer due to pressure change, a surge tank is installed. It induces pressure rise or drop in the hydraulic systems, rotational speed variation in the turbines as well as level fluctuation in surge tanks and air chambers.

Transmission of pressure waves along waterway leads to high dynamics of loads on the power plant components during transient operation events such as rapid load acceptance and reduction or unit shutdown. The fluctuation of load changes on the surface within the surge tank decreases gradually by the friction of headrace and then damped to the water level corresponding to the load after change. This exchange of water surface is a U-tube type of fluctuation forms between a surge tank and pressure tunnel.

Controlling water hammer can be achieved by designing of flow-passage system layout, and diameter, length of the waterway tunnel and operation characteristics of generating units have effects on the attenuation in surge tanks for example, closing and opening laws and limitation of operating conditions.

The project applied Francis turbines, and guide vane positions have direct effects on inlet velocities. Figure 20 shows the profile of surge shaft.

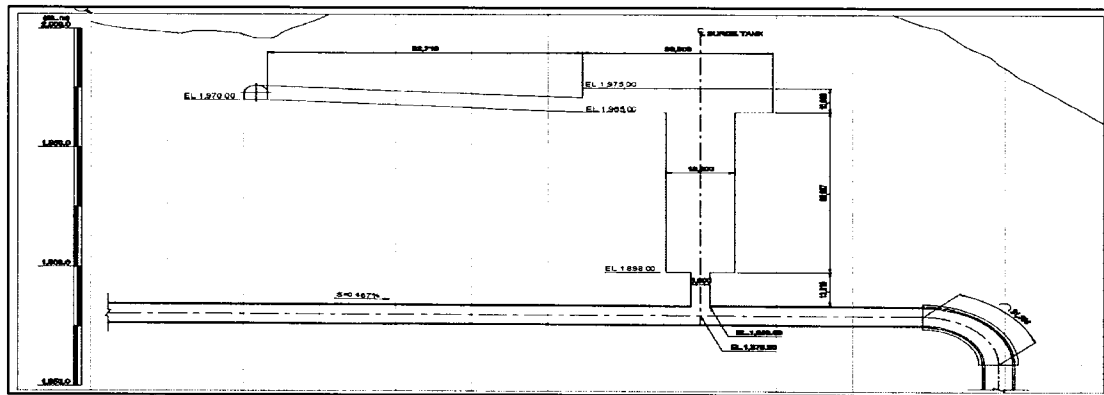


Figure 6 : Surge Shaft Profile

The scheme with the long headrace tunnel requires surge tank for stability of the power generation system, and its stability is evaluated from the ratio between mechanical start-up time and water column start-up time.

The calculation result using the formula above was $T_m / T_w = 3.704$, which is larger than the safety value of 3. The value needs cross checks once a turbine manufacturer defines WR2 value of the turbine.

The analysis used Wanda 4.5 to simulate the water level fluctuation within surge tank. The simulation applied 13 seconds of Closing time, and the load acceptance case applied 10 seconds of opening time for simulation of Francis turbines using the geometry developed for F/S. The dimension of surge tank with chamber and the guide vane operation conditions are summarized as follows.

- Boundary condition
 - 1) Type : Restricted orifice type
 - 2) Flow : 130 m³/s
 - 3) Analysis Method : Wanda 4.5 (Deltares)
 - 4) Dimension of Surge Shaft : D 18.0 m, L 67.0 m
 - 5) Orifice Size : D 5.0 m, L 14.4 m
 - 6) Chamber Size : W 20.0 m, H 10.0 m, L 50.0 m
- Operation condition
 - 1) Full load rejection within 13 seconds
 - 2) Full load acceptance within 10 seconds

Accordingly, adjustment of chamber size and the diameter of the surge tank brought a development of several cases, and the final results of surge analysis in an effort of reducing the excavation amount and easy access of equipment into the chamber. For securing the down surging level, the design performed adjusting slope of HRT reducing the vertical shaft. The results show that the maximum upsurging water level is occurring at EL. 1,969.61 m, and the maximum down surging water level is occurring at EL. 1,903.83 m in the surge tank.

(g) Powerhouse

Hydropower is the generated electricity using the potential energy of water. Powerhouse has turbines, and those are designed considering some conditions such as, heads, flow duration curves, topography, geology, conveyance, construction materials, drainage area, estimated electricity load and transmission facilities to make it as economic as possible. The surface type powerhouse has been adopted in this project.

Hydro-mechanical equipment was designed under the conditions as follows.

- a) Reservoir water level
 - Max Water Level (M.W.L) : EL. 1,946.0 m
 - Normal High-Water Level (N.H.W.L) : EL. 1,944.0 m
- b) Tailwater level
 - Return period of 100 years Flood : EL. 1,724.52 m
 - Return period of 1,000 years Flood : EL. 1,725.35 m
 - Tailwater Level (T.W.L) : EL. 1,719.7 m at small unit
 - : EL. 1,721.9 m at full units

The surface-type powerhouse is adopted in the feasibility study. Also, the size of the powerhouse was planned with 41.7 m width and 100.65 m length in the feasibility study. The powerhouse is a permanent structure so that it must be safe against the flood discharge from Swat River. Considering the 1,000 years frequency flood water level, the powerhouse shall be on EL. 1,730.90 m with clearance.

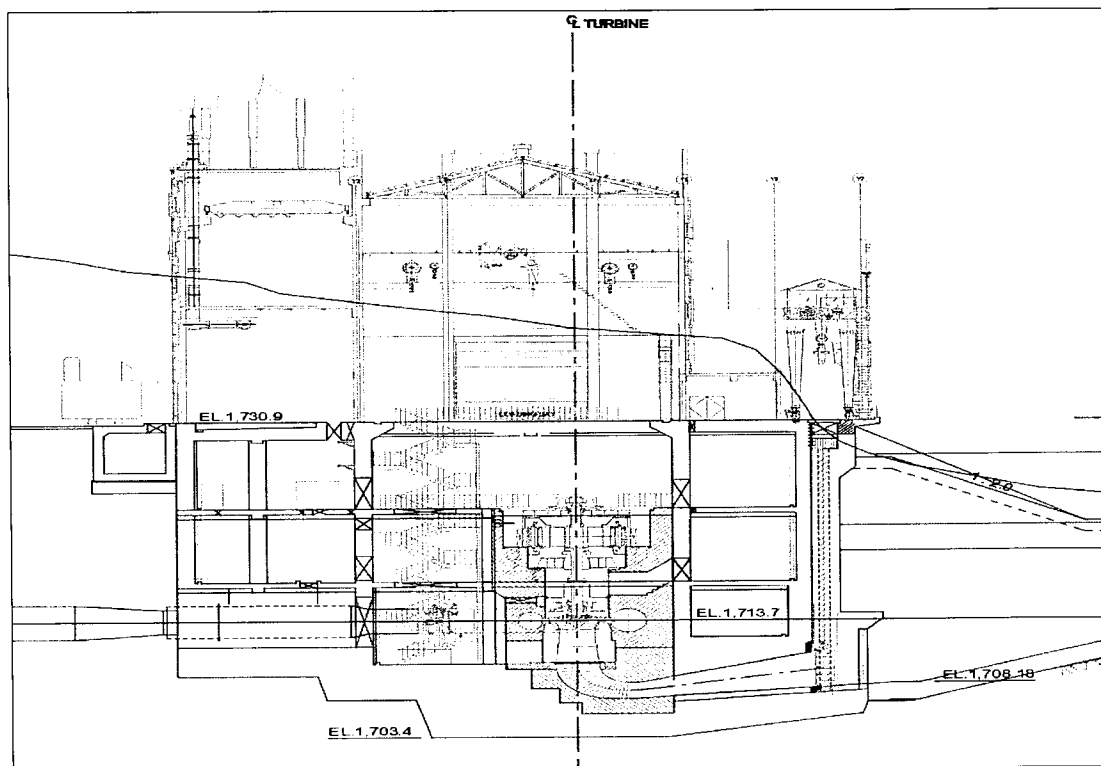


Figure 7 : Profile of Powerhouse

(h) Electro-Mechanical Equipment

The mechanical equipment and main mechanical auxiliaries in the powerhouse consist of following items:

- Turbine I: three (3) vertical shaft single-stage Francis-turbines including hydraulic/electronic turbine governors
- Turbine II: one (1) vertical shaft single-stage Francis-turbines including hydraulic/electronic turbine governors
- butterfly valve in front of each turbine with auxiliaries

Following table is the basic characteristics of the turbines selected.

Table 3 : Specification of Turbine

Division	Turbine I	Turbine II
Turbine output (MW, unit)	70.05	33.77
Number of units	3	1
Type of turbine	Vertical Francis	Vertical Francis
Design discharge (m ³ /sec, unit)	37.33	18.0
Plant discharge (m ³ /sec, all unit)	112	18
Rated net head (m)	204.0	204.0
Efficiency (%)	94.0	94.0
Selected Specific speed (m-kW)	114.2	102.0
Rotational speed (min-1)	333.3	428.6
Turbine setting elevation (EL.m)	1,713.7	1,713.7
Tail water level (Small Unit operation, EL.m)	1,719.7	1,719.7

The upstream side of each turbine, one Flow-through valve (Biplane type butterfly valve) is installed as emergency and repair shutdown valve of the turbine. The flow-through valve was selected since the alternative spherical valve type results according to common experience in significantly higher equipment costs and requires larger dimensions for access facilities and capacity of lifting equipment.

Table 4 : Specification of Main Inlet Valve

Division	Turbine I	Turbine II
Number of units	3	1
Type of valve	Flow-through valve (Biplane type butterfly valve)	Flow-through valve (Biplane type butterfly valve)
Nominal diameter (m)	app. 2.3	app. 1.6
Static head (m)	229	229

(i) Electrical Equipment

The power and speed of the generators are dictated by the turbine, with its calculated output at the shaft coupling at design heads and design flow. Considering the respective turbine power output, a typical generator efficiency of approx. 98.2% and a power factor of 0.8 lagging to 0.9 leading (which allows the generation of the necessary reactive power for voltage regulation at the 220 kV grid), the respective generator design data result as follows:

Table 5 : Design Parameter for Generator Design

Division	Specification
Capacity (Unit1,2,3 / 4)	68.8MW (86 MVA) / 33.2MW (41.5 MVA)
Power factor (PF)	0.8 lagging to 0.9 leading
Rated speed (Unit1,2,3 / 4)	333.3RPM / 428.6 RPM
Frequency	50Hz
Terminal voltage	11 \pm 10% kV
Stator coil connection	Y connection
Neutral point ground method	High resistance grounding method using Single-phase transformer for grounding and secondary resistor.

Step-up transformer characteristics are as following:

Table 6 : Design Parameter of Single-Phase Transformers

Division	Specification
Number of 3 phase transformer	3 / 1
Type	3-phase, two windings
Rated bank output of 3 phase transformer	86MVA / 41.5 MVA
Frequency	50Hz
Type of cooling	OFWF
Primary voltage rating	11kV
Secondary voltage rating	220kV

Each generator and line bay will be equipped with a SF6 circuit-breaker, combined isolating/earthing switches and required current transformers. Voltage transformers will

be installed on both bus bars as well as in the line bays. The technical characteristics of the GIS will be as follows:

Table 7 : Design Parameter of 220 kV GIS Switchgear

Division	Specification
Insulation medium	SF6
Maximum operation voltage	245 kV
Rated power frequency withstand voltage (rms value), across open switching device and/or isolating distance, at minimum operating gas-pressure	460 kV
Rated power frequency withstand voltage (rms value), phase to phase and phase to earth, at minimum operating gas-pressure	530 kV
Rated lightning impulse withstand voltage (peak), phase to phase and phase to earth, at minimum operating gas-pressure	1050 kV

(j) Hydro-Mechanical Equipment

The hydro-mechanical equipment for operation of Kalam-Asrit HPP is as following:

Table 8 : Hydro-Mechanical equipment for Kalam-Asrit HPP

Item	Description	Specifications
Spillway	Radial Gate	W10.0 m x H 6.0 m x 3 EA
Sluiceway	Under Sluice Radial Gate	W 5.0 m x H 4.5 m x 2 EA
Gantry Crane for Spillway & Sluiceway	Electrically operated gantry crane	20-ton x 1 EA
Bypass Tunnel	Inlet Fixed Wheel Gate (Roller Gate)	W 7.5 m x H 8.0 m x 1 EA
	Outlet Radial Gate	W 7.5 x H 7.5 m x 1 EA
Intake	Roller Gate	W 7.4 m x H 7.4 m x 1 EA
	Trash rack	W 1.0 m x H 10.0 m x 5 set
	Trash rack Cleaner	Moveable, Rake, Knuckle crane with gripper
Steel Penstock	Penstock and Manifold	D 5.6 m
Powerhouse	Draft Tube Gate (Slide Gate)	W 6.0 (4.7) m x H 3.3 m x 2 EA

3.2.5 Project Optimization

(a) Optimization of Installed Capacity

The analysis has found the optimal installed capacity is 238 MW with the design discharge of 130 m³/s.

The study finds the installed capacity of 238 MW, most suitable for the current terrain and the layout. The installed capacity enables delivering the annual energy generation of 945.8 GWh with a plant factor of 45.79%.

Table 1 : Comparison of Levelized Tariff (D 7.4 m)

Case	Plant Discharge	Installed Capacity	Annual Generation	Plant Factor	EPC Cost	Levelized Tariff
	m ³ /s	MW	GWh	%	USD '000	Cent/KWh
1	100	190	780.5	47.0	338,758	8.15
2	110	207	827.3	45.7	348,114	7.89
3	120	223	875.3	44.8	356,236	7.62
4	130	238	945.8	45.79	365,958	7.13
5	140	254	946.2	42.6	383,734	7.52
6	150	268	974.6	41.6	396,003	7.66

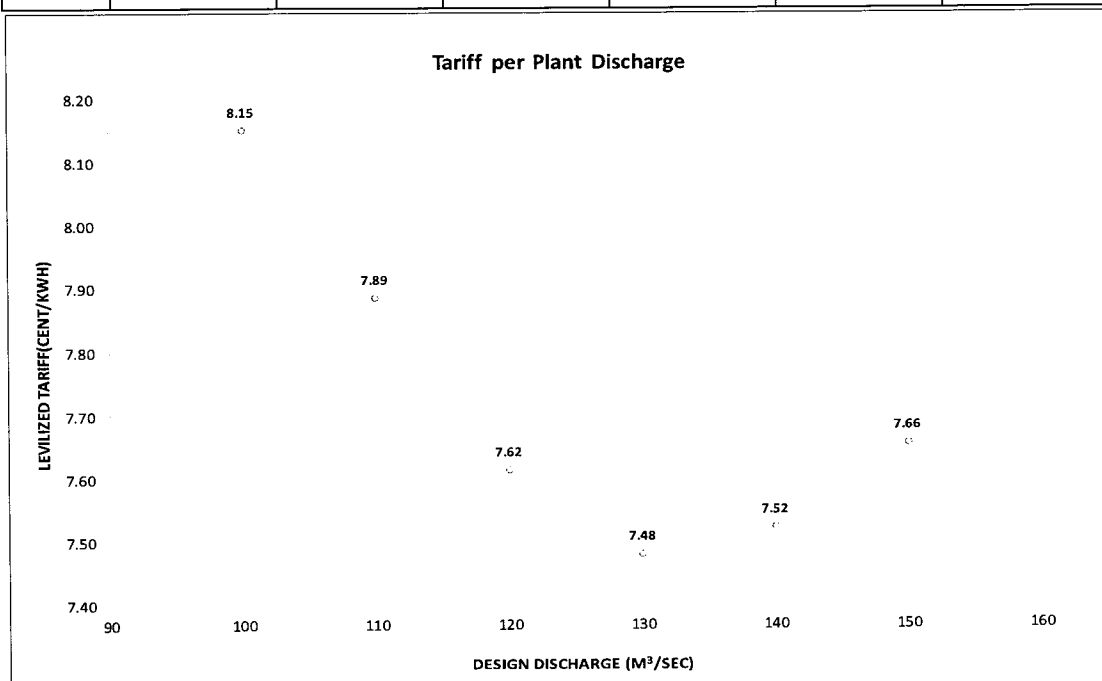


Figure 1 : Levelized Tariff per Discharge

Table 2 : Comparison of Levelized Tariff per Diameter (Q=130 m³/s)

Case	Diameter	Installed Capacity	Annual Generation	Plant Factor	EPC Cost	Levelized Tariff
	M	MW	GWh	%	USD '000	Cent/KWh
1	7.0	234	902.5	43.9	364,061	7.53
2	7.2	236	908.2	43.8	365,031	7.50
3	7.4	238	945.8	45.79	365,958	7.13
4	7.6	240	916.9	43.6	368,259	7.49
5	7.8	241	920.3	43.6	370,426	7.50

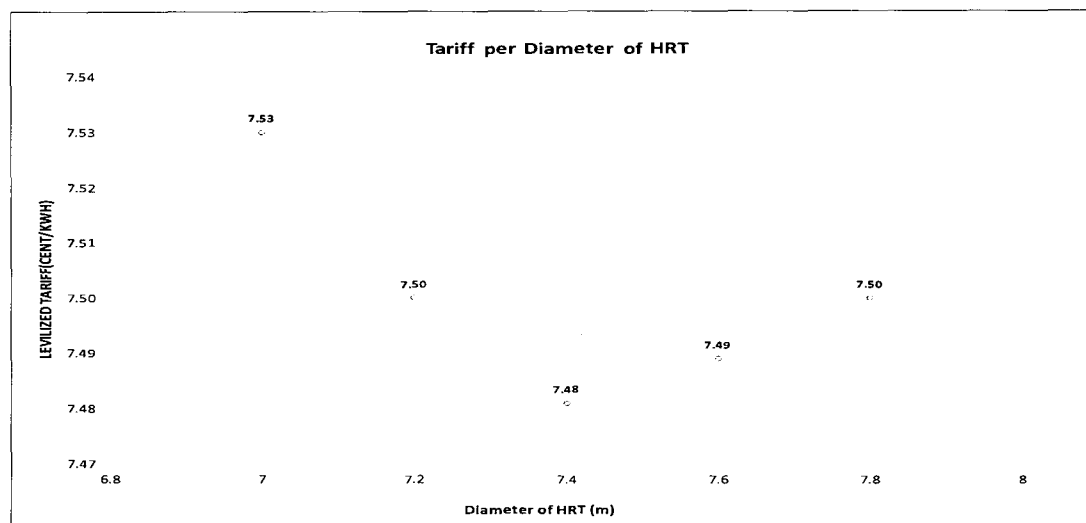


Figure 2 : Levelized Tariff per diameter of headrace tunnel

(b) Selection of Turbine Unit Numbers

The study draws a conclusion of installing three identical turbines with a smaller one having the installed capacity of 243.92 MW (3 x 70.05 MW+ 33.77 MW) for following reasons.

- Such combination is estimated to deliver better energy than the concept with three identical units results in the highest EIRR and the lowest specific generation costs;
- The concept with three identical units requires the minimum operation and maintenance costs. Annual generation for 3 units is estimated as 862.4 GWh/year. Power generation is not possible during the dry season when the minimum flow becomes below 40 % of 43.3 m³/sec. Therefore, the plant factor also became 40.8 %, which is lower than the scheme with 3 units with a small unit. E&M cost can be slightly lower but deficit in the annual generation brings a reduced economic benefit. The feasibility study has chosen the 3 units with a small unit for better economy.

3.2.6 Annual Energy Generation

Effective delivery of power using the available flows within the site needs to find the optimal plant discharge. The plant discharge is determined as 130 m³/s for full units, which is 28.57 % in the exceedance time of the flow duration curve. It appears full units are operated for 104 days in a year. By adopting the small unit of 18 m³/s, 76 % (277 days) of the year can produce the power.

(a) Reservoir Operation Level

Site visit found many habitants and houses locate near Swat River affecting the limitation in normal operating water level. The study determines the normal operating water level at EL.1,944 m at the weir site for optimal power generation along with maintaining the gross head of 222.1 m and the tail water level of EL.1,721.9 m, which is approximately 400 m upstream of the proposed weir site in Asrit-Kedam HPP. Such fact is reiterating the importance of well performed topographic and bathymetric survey. Then, the study should determine the normal operating water level with more detail.

- Normal operating level at the weir site: EL. 1,944.0 m

(b) Outages

The study applied the outage in the energy modeling. It is desirable that power plant shut down during 3 days should be considered for large amount of sediments and high sediment concentration during wet season.

Table 1 : Scheduled Outage

Outage	Unit	F/S
Flushing Period	day	3 days
Outage for the flushing	GWh	17.1
Powerhouse Service (Internal Consumption)	%	1.0
Internal consumption	GWh	9.73
Total Outage	GWh	26.83

(c) Operating Conditions

This run-of-river project has no usable storage in the reservoir for other than hydropower. The operating water level maintains the constant elevation. Furthermore, in a cascade project, the reservoir operation with seasonal storage is not allowed due to the possible downstream effects such as flow rate variation.

Table 2 : Operating Conditions

Outage		Unit	F/S
Gross Installed Capacity		MW	238 (3+1 Units) [68.4 MW x 3 + 33.0 MW] (after turbine, generator & transformer efficiencies)
Plant Discharge		m ³ /s	130
Min. Plant Discharge		%	40 % of unit
Annual Average Daily Flow		m ³ /s	88.4
Operating Water Level		EL. m	1,944
Gross Head		m	222.1
Head Loss (Full Units Operation)		m	18.1
Efficiency	Turbine	%	94.0
	Generator	%	98.2
	Transformer	%	99.5
Ecological Flow		m ³ /s	3.0
Internal Consumption		%	1.0

(d) Annual Energy Generation

The study estimates the annual energy as 945.8 GWh/year. Considering the minimum release for ecological flow to 3 m³/sec of river flow, the estimated annual energy seems reasonable.

3.2.7 Construction Schedule

Based on the project scope, bill of quantities, sequence of activities and their dependence on the expected hydrological conditions at the site, a construction period of approximately 5 years has been planned.

The construction sections for completing the Kalam Asrit Hydropower Project within the construction period of 5 years are largely classified into the upstream weir section, power waterway section and the lower powerhouse section to be planned for parallel construction.

4. PROJECT CAPITAL COST

The total Project Cost, expressed in United States Dollars, has been calculated after thorough analysis and understanding of the factors that affect the development, construction, and operation of a hydropower project. The reference exchange rates used to convert the relevant costs into United States Dollars are **USD 1 = PKR 178.5** as of 27th December, 2021.

CAPITAL COST ESTIMATES		AMOUNT (USD)
EPC COST		365,958,331
Civil Structures Cost	228,911,461	
Electrical & Mechanical Cost	105,398,764	
Preliminary Works & EPC Camps	31,648,106	
NON-EPC Cost		86,173,259
BASE PROJECT COST		452,131,590
Interest during Construction		37,201,428
TOTAL PROJECT COST		489,333,017

4.1 EPC COST (CONSTRUCTION COST)

The cost estimates, presented below, are established based on the feasibility level design of the Project. The Consultant has utilized its skills, experience, and international best practices in context of similar hydropower projects in Pakistan to surmise all the cost components of the proposed hydropower scheme.

The construction costs are composed of three (3) components, i.e., (i) Civil Works, (ii) E&M cost and (iii) the Other EPC Cost i.e. preliminary works, design and engineering & EPC camp establishment cost. The Civil works costs are estimated for civil works for around 20 packages of works. E&M cost is composed of three (3) work packages i.e., Electrical, Mechanical Works and Hydro Mechanical Works while Preliminary Works & EPC Camps relates to mobilization, buildings, camps, overheads, and engineering (basic and detailed design). EPC Cost is shown in below referred table:

CODE	DESCRIPTION	UNIT	Kalam-Asrit HPP POE Approved (15% reduction in Unit Rate by POE)		
			Qty	Unit Price (US\$)	Total (US\$)
	TOTAL EPC COST				365,958,331
A	Civil Works				228,911,462
1	ROADS				5,740,000
2	BYPASS TUNNEL & COFFERDAM				19,795,417
3	SPELLWAY				22,397,132
4	POWER INTAKE				5,957,105
5	WATERWAY				132,280,555
6	SURGE SHAFT				5,602,083
7	POWERHOUSE CIVIL				21,842,094
8	O&M STAFF COLONY				3,000,000
9	CONSTRUCTION MACHINERY & EQUIPMENT				1,396,531
10	CONTINGENCY FOR CIVIL WORKS	%	5%	218,010,917	10,900,545

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

B	ELECTRICAL & MECHANICAL EQUIPMENT				105,398,764
1	ELECTRICAL WORK				26,720,646
2	HYDRAULIC STEEL STRUCTURE EQUIPMENT				36,104,187
3	ELECTRO-MECHANICAL EQUIPMENT				42,573,931
C	PRELIMINARY WORKS & EPC CAMP ESTABLISHMENT COST				31,648,106
1	BUILDINGS (2.0 % of Civil)		2%	218,010,917	4,162,026
2	ESTABLISHMENT (6.0 % of Civil)		6%	218,010,917	12,486,080
3	ENGINEERING	LS	1	15,000,000	15,000,000
TOTAL EPC COST					365,958,331

NEPRA fully acknowledges the fact that EPC Cost cannot be firmed up without formal quotations and competitive bidding process due to cost uncertainty and risk involved in longer gestation period. To arrive at a reasonable EPC Cost for the sake of the feasibility stage tariff the said cost has been estimated based on the BOQs calculated from the drawings of FS. The Cost of major BOQs was calculated by applying unit rates calculated based on Market Rate System 2019 issued by government, market rates and based on experience of Consultant in similar projects. The actual construction cost of the Project will be finalized after receiving firm bids from EPC contractors through international competitive bidding at later stage as per guidelines of NEPRA.

It may please be noted that the Consultant proposed estimated cost of USD 385.38 million for Construction Cost of the Project, however, during the due-diligence process by POE, the Sponsor was forced to decrease the unit rates by 15%. Consequently, an amount of USD 20 million has already been extracted from the Construction Cost, therefore, any further reduction of Construction Cost by NEPRA would make project financially unviable.

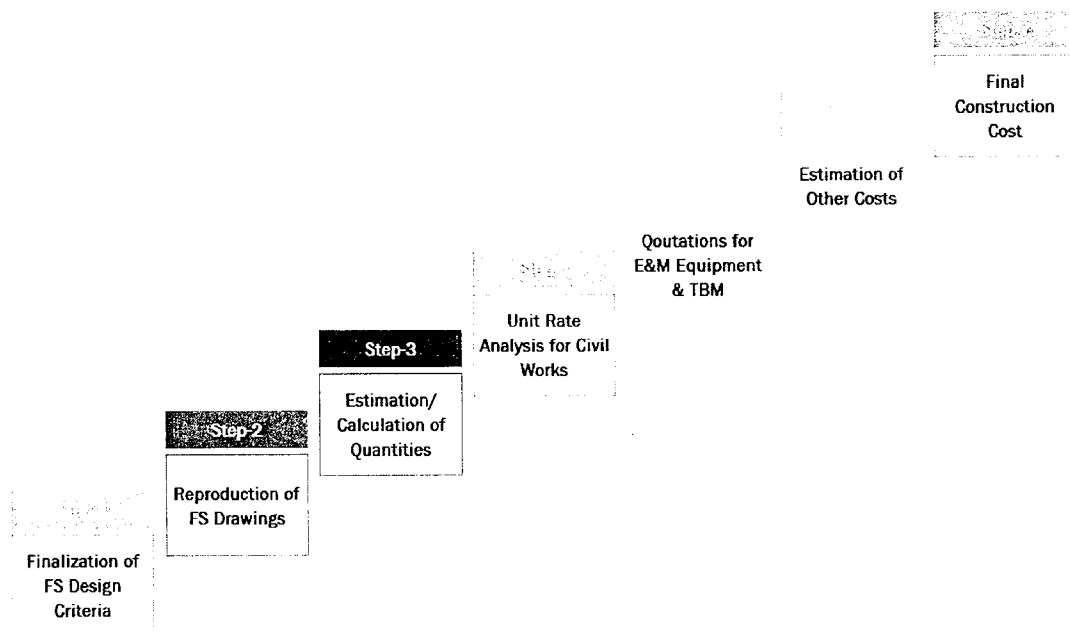
The assessment of Construction cost of USD 365.96 million for 238 MW Project at Feasibility Stage is quite reasonable which arrived at **US\$ 1.53 million/MW** and comparable with precedent approved projects by NEPRA:

Project Name	Capacity	EPC Cost USD Million	Cost per MW USD/Million	Year of Approval
New Bong HPP	84 MW	152.8	1.82	2009
Gulpur HPP	102 MW	236	2.34	2015
Patrind HPP	147 MW	290	1.97	2012
Karot HPP	720 MW	1278	1.775	2016
Kohala HPP	1124 MW	1792	1.594	2018
Suki Kinari HPP	861 MW	1314	1.53	2014
Kalam Asrit HPP	238 MW	365	1.53	TBA
Azad Pattan HPP	693 MW	1013	1.46	2018

The above referred projects are matured foreign investments who has reached to the construction or development phase.

4.1.1 Civil Works

The quantity and cost estimate are related to the feasibility design. Plans and sections were prepared for each major plant component, e.g., diversion works, coffer dam, bypass tunnel, dam with natural pool to work as desander, headrace tunnel, surge shaft, power and transformer, vertical and horizontal pressure tunnel, steel penstock, construction roads, access road, bridges, and disposal areas etc. For each component, the quantities were calculated based on the engineering drawings, by each work item. Following calculation of quantities, a comprehensive unit rate analysis was carried out. Consultant and verified by NESPAK, worked with Company as Owner's Engineer to help and verify the calculations of Unit Rates and other local technical facilities.



It would be noted that an amount of US\$ 43.6 million out of US\$ 228 million of Civil Work costs is foreign component which relates to certain offshore items like TBM, Conveyor Belts and spares, some special rock bolts and certain machinery and equipment costs.

Details of Civil Work costs are given below:

CODE	DESCRIPTION	UNIT	Kalam-Asrit HPP POE Approved (15% reduction in Unit Rate by POE)		
			Qty	Unit Price (US\$)	Total (US\$)
A	Civil Works				228,911,462
1	ROADS				5,740,000
2	BYPASS TUNNEL & COFFERDAM				19,795,417
3	SPILLWAY				22,397,132
4	POWER INTAKE				5,957,105
5	WATERWAY				132,280,555
5.1	ADIT TO HEADRACE TUNNEL (NATM)				6,535,952
5.2	HEADRACE TUNNEL (TYPE-II, NATM)				2,632,089
5.3	HEADRACE TUNNEL (TYPE-III, NATM)				1,932,113
5.4	HEADRACE TUNNEL (TYPE-IV, NATM)				1,246,765
5.5	HEADRACE TUNNEL (Very Poor Rock, NATM)				1,888,724
5.6	HEADRACE TUNNEL (100m PILOT TUNNEL)				6,600,116
5.7	HEADRACE TUNNEL (TBM)				99,439,644
5.8	VERTICAL PRESSURE TUNNEL				2,774,755
5.9	HORIZONTAL PRESSURE TUNNEL				1,805,640
5.10	ADIT TO HORIZONTAL TUNNEL				3,491,606
5.11	STEEL PENSTOCK TUNNEL				2,914,304
5.12	STEEL PENSTOCK TUNNEL (MANIFOLD)				1,018,847
6	SURGE SHAFT				5,602,083
7	POWERHOUSE CIVIL				21,842,094
8	O&M STAFF COLONY				3,000,000
9	CONSTRUCTION MACHINERY & EQUIPMENT				1,396,531
10	CONTINGENCY FOR CIVIL WORKS	%	5%	218,010,917	10,900,545

The Consultant has only assumed 5% of Civil Work Cost as contingency which is quite conservative keeping in view the risks associated with complicated hydropower construction and current market situation.

4.1.2 Electrical & Mechanical Equipment Cost:

The costs of the turbines, generators and the related electrical and mechanical equipment for the powerhouse was estimated based on the consultant broad experience of recent projects of similar size and design parameters. The E&M cost estimate includes the following works required as below:

- Turbines, Inlet emergency Valves, Draft Tube Gates and Generators;
- All Balance of Plant (BOP) Electrical Equipment;
- All BOP Mechanical Equipment;
- Powerhouse overhead Crane and Draft Tube Gates Hoist;
- Main Power Transformers;

E&M Cost of Kalam Asrit of US\$ 105.4 million relates to three main items i.e. Electrical Work, hydraulic steel structure and electromechanical equipment. The Price has been conservatively optimized following receipt of quotations from Suppliers based in Europe (Voith & Andritz). For estimation of Electrical & Mechanical (E&M) cost, the Consultant's data base relevant to Pakistani projects was applied and compared with the quotations from potential bidders who are active in Pakistani hydropower markets. The cost of HSS works and equipment was built up from the estimated weight of each piece and current manufacturing cost. The lowest of the estimates between those calculated by the consultants and quotations received from prospective suppliers is used in the feasibility study (**Appendix-M**). The estimated costs are as follows:

CODE	DESCRIPTION	UNIT	Kalam-Asrit HPP POE Approved (15% reduction in Unit Rate by POE)		
			Qty	Unit Price (US\$)	Total (US\$)
B	ELECTRICAL & MECHANICAL EQUIPMENT				105,398,764
1	ELECTRICAL WORK				26,720,646
2	HYDRAULIC STEEL STRUCTURE EQUIPMENT				36,104,187
3	ELECTRO-MECHANICAL EQUIPMENT				42,573,931

The Project has four Francis Units (three large & one small) and auxiliaries. The Cost assessed by consultant are based on quotations of 2019 while the recent quotation received has increased the costs by around 40% by all Supplier due to current market situation and inflation worldwide. The quotations received as of 2022 (copy also attached) has substantial increase in cost but we have not reflected it in the price of E&M Equipment and will be finalized during EPC Stage through international competitive bidding process.

The Consultant has only assumed 2.5% contingency for E&M portion which is quite conservative and NEPRA, in all precedent transactions, has been allowing to the other projects.

The E&M Cost arrived US\$ 0.44 million per MW which are even comparable with Chinese manufacturer using similar Francis Units in the most recent projects like Azad Pattan and Kohala HPPs where per MW cost is US\$ 0.552 and US\$ 0.412 per MW respectively.

The aforesaid justifications demonstrate and conclude that notwithstanding the larger Project size, the Company and the Contractor has added significant efficiency to bring the EPC Price at an acceptable level through optimization of the design and using lesser unit rates. Additionally, selection of European E&M Supplier will add considerable value to the Project resulting into significantly increase the useful life of the Project and making this investment worthwhile for the Government after the expiry of concession term.

4.1.3 Preliminary Works & EPC Camp Establishment Costs:

Preliminary & other Works include, inter alia, contractor mobilization, construction camps, construction plant & machinery, design cost, contractor insurance, staff salaries, overheads, and utility expenses. It also includes design and engineering conducted by EPC Contractor firstly a Basic Design and following that Detailed Design. These design and engineering must be submitted to the Company and subject to approval of Owner's Engineer and Lenders' Engineer as per requirements of robust contractual system.

The Consultant has very conservatively estimated costs related to such works of USD 31.65 million including US\$ 15 million to be spent for Engineering and Design by renowned consultant acceptable to both Project Company and Project Lenders. KOEN experienced around USD 9 million in Gulpur HPP case only for detailed engineering, incurred by EPC Contractor through M/s Nippon Koi of Japan while a cos to USD 4 million incurred for Basic Design by the EPC Contractor. Therefore, USD 15 million for Engineering is reasonable estimate after eight years.

The Consultant has estimated remaining cost of around USD 16 million for contractor mobilization, construction camps, insurance, security, staff salaries, overheads and utility expenses for a period of around 7 to 8 years. Split of these costs are provided herein while more detailed split can also be provided for such preliminary and other costs.

CODE	DESCRIPTION	UNIT	Kalam-Asrit HPP POE Approved (15% reduction in Unit Rate by POE)		
			Qty	Unit Price (US\$)	Total (US\$)
C	PRELIMINARY WORKS & EPC CAMP ESTABLISHMENT COST				31,648,106
1	BUILDINGS (2.0 % of Civil)		2%	218,010,917	4,162,026
2	ESTABLISHMENT (6.0 % of Civil)		6%	218,010,917	12,486,080
3	ENGINEERING	LS	1	15,000,000	15,000,000

The Company has graciously incorporated the recommendations of the POE to reduce the cost and therefore humbly requests the Authority, not to further reduce this cost.

4.2 NON-EPC COST:

Non-EPC Costs comprises of development costs other than EPC and Interest During Construction, incurred/expected to be incurred during project development and construction phases of the Project. The development costs include all non-construction costs which has been computed warily keeping in view the international and local best

practices. While calculating these costs NEPRA's tariff guidelines are observed and explanations are provided where required.

It is pertinent to mention that the said cost calculations are based on the estimates of seven (7) years of Project development and construction period (1 year of LOI, 1 year of LOS and 5 years of construction of the Project). Total Non-Construction cost is only 17.61% of the total cost and 23.55% of the Project's construction cost. On average, the per annum cost is US\$ 10.77 million, which is reasonably realistic, considering the scope of work, size, location, and complexity of the Project.

Keeping in view the above, the Company has an estimate of approx. USD 76.44m for non-EPC cost while approx. US\$8.53m and US\$1.21m have been estimated on account of Sales Tax on Services and Governmental fees & levies respectively and have been highlighted separately due to its quantum and peculiar in nature. Following costs represents non-EPC costs:

COST HEAD	AMOUNT (US\$)
Project Development Cost	24,038,347
Engineering & Supervision	20,614,546
Customs Duties	5,185,619
Insurance During Construction	9,148,958
Environmental & Ecology	1,999,440
Land Acquisition, Resettlement and Rehabilitation	5,052,367
Lenders' Fees and expenses	10,399,780
Sales Tax on Services	8,526,528
Government Fees and levies	1,207,674
Non-EPC including Sales Tax and Govt. levies	86,173,259

The above cost estimates are carefully evaluated at detailed level based on the rates prevailing during the year 2021, i.e., period of feasibility study finalization however these cost estimates may need revision based on conditions prevailing on EPC stage tariff of the Project. Company shall provide the revised costs if any, at EPC stage tariff proposal supported with comprehensive budgets and actual contracts negotiated and executed with advisors, consultants, and other stakeholders. Details regarding each cost head is provided in the succeeding paragraphs:

4.2.1 Project Development Cost

The cost items of general nature have been categorized under Project Development Cost and are estimated to the tune of US\$ 24.04m. The Project Development cost includes the following typical costs:

DESCRIPTION	TOTAL USD
Administration Cost	9,000,000
Project Advisors and Agents (Lenders and Owners)	7,430,372
Feasibility and Technical studies	3,000,000

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

DESCRIPTION	TOTAL USD
O&M Mobilization	2,500,000
E&M LC Charges	2,107,975
Total Project Development Cost	24,038,347

It is pertinent to mention that level of efforts and resources required for costs under the said head are not dependent on the size/capacity of the project whereas the variation in the Project Development cost is dependent on the length of gestation, development, and construction period. It has been noted that NEPRA has approved following Project Development Cost to various hydropower projects at EPC stage tariff:

PROJECTS	PDC (US\$ million)
Mahl	42.76
Suki Kinari	55.208
Kohala	58.361
Azad Pattan	47.54
Karot	55.236

The cost estimates of the Company are very reasonable in comparison of the above approved cost to other hydropower project.

4.2.1.1 Owner Administration/ Overheads

Owners Administration cost is a standard company's cost which represents including but not limited to head office & site office setup cost, local staff salaries and benefits, office rentals and other various administrative nature company expenses.

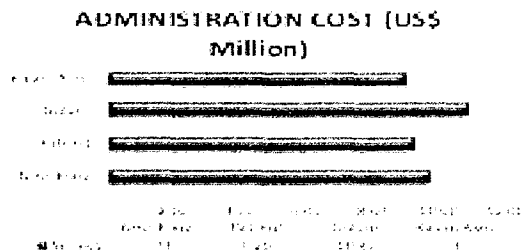
A cost of USD 9 million has been estimated on account of Owner Administration which is based on the assessment of monthly expenditure over the period of 7 years including construction period of 5 years. The monthly rates are assumed based on the market prices prevailing during the year 2021 i.e., period of feasibility study finalization. Major items have been classified as under:

OWNERS ADMINISTRATION OVERHEADS	US\$
Salaries, Wages & Benefits	5,007,374
Office Rental	1,292,472
Travelling, Boarding & Lodging	175,482
Head Office Setup	112,605
Vehicles, computers, office equipment & intangibles	563,675
Office Administration Costs	1,798,821
Training and Development Fee	36,852
Site Office Setup	12,720
Total	9,000,000

The cost is spread over 7 years of development and construction time. On average an amount of USD 1.28 million per annum is estimated.

The cost estimates are reasonable in comparison of the actual costs incurred by the previous completed hydropower projects which shows almost similar cost:

Administration Cost	(US\$ million)
New Bong	9.73
Patrind	9.20
Gulpur	10.82
Kalam Asrit	9.00



4.2.1.2 Project Advisors and Agents (Lenders & Owners)

Hydropower projects are supported by the experienced project advisors to the stakeholders for due diligence, negotiations, drafting, legal/technical reviews, and implementation etc. while standard services of auditors and tax advisors are sought in order to comply the applicable laws and regulations. The important stakeholders comprise of Lenders, Sponsors and owner company. The role of each advisor/consultant is important and specific according to its nature of job assigned by its reporting stakeholder.

The project advisors and agents have been sub categorized into Lenders Advisors & Agents and Owners Advisors. Overall, an amount of USD 7,430,372 have been estimated as in view of the previous hydropower cases following estimates have been assumed for Lenders' and owners' advisors:

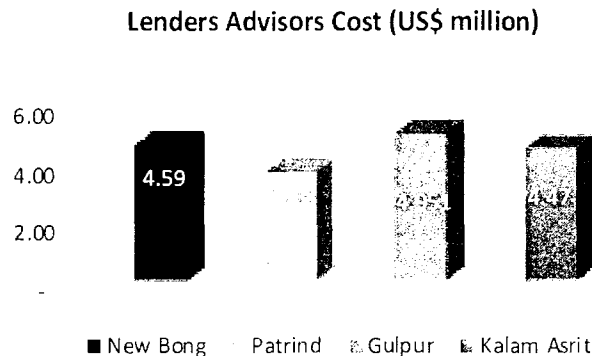
4.2.1.2.1 Lenders Advisors & Agents

In a limited recourse project financing, lenders have higher risk portfolio than other stakeholders where 75% to 80% of the project is financed through debt. In such scenario, lenders appoint their own advisors to conduct the technical, financial, insurance and legal due diligence and continuous monitoring of the Project activities and progress while the associated cost is charged to the project company. Lenders appoint following advisors and agents during initial phase of LOS and retain them throughout the construction phases and their cost is charged to the Project:

- Security Trustee
- Intercreditor Agent
- Syndication Agent
- Lenders Legal Counsel (Local)
- Lenders Legal Counsel (English)
- Lenders Technical Advisor
- Lenders E&S Advisor
- Financial Model Auditor
- Lenders Insurance Advisor
- Offshore and Onshore Account Banks

An amount of USD 4.47m has been estimated under Lenders Advisors cost which are based on the rates prevailing during feasibility finalization (i.e. 2021) as applicable to the similar hydropower project.

The cost of US\$ 4.47m is reasonable as is also evident from the actual incurred cost of the already implemented hydropower projects. Following chart shows the cost actually incurred by the previous projects:



4.2.1.2.2 Owner's Advisors

While the role of lenders' advisor is critical for lenders, similarly the owner's advisor role is also important and necessary for the Company to protect its rights and to act in accordance with the federal and provincial laws and legal requirements as well as to account for the cultural values of the local area of Project site.

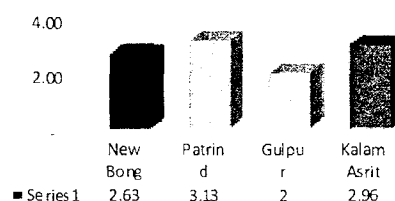
Therefore, an amount of US\$ 2,959,686 has been estimated based on market rates prevailing during feasibility finalization (i.e. 2021) of the experienced consultant, advisors and auditors for the period of 7 years of development and construction phase. The above estimates include the cost related to following advisors and auditors:

- Legal Advisor - Pakistan
- Legal Advisor - Korea
- Legal Advisor - English
- Advisor on KPK Affairs
- Auditors
- Tax Advisors

The above estimates are justified and reasonable considering the current market situation and actual cost incurred by previous hydropower projects.

OWNER'S COST (US\$ million)	
New Bong	2.63
Patrind	3.13
Gulpur	2.00
Kalam Asrit	2.96

OWNERS ADVISOR COST (US\$ MILLION)



4.2.1.3 Feasibility, Technical Studies/ Tendering

The Company has assumed USD 3 million for cost of conducting the feasibility study and technical assistance for preparation of tendering documents for international competitive bidding to select EPC contractor. Fees and charges of other technical studies required during the course of project development and construction as required by lenders/power purchaser/project requirement and various technical approvals of NTDC has also been envisaged under this head. The Company has already incurred major cost of around USD 2.5 million under this head while remaining costs would be for tendering, bidding documents preparation and for independent consultant for evaluation of bids. Any additional technical study required by Lenders/Government authorities would also be incurred from this head. The cost is comparable to previous projects keeping in view the level of efforts and inflation rate.

4.2.1.4 O&M Mobilization

O&M Contractor has an important role after COD and is required to mobilize the site at least 10 months before start of commercial operations of the Project. During the mobilization period the O&M contractor makes itself familiarize with the Project, gets the necessary onsite and offsite trainings, and witnesses the commissioning tests. It also prepares important operating, environmental and administration manuals and plans for the smooth operations of the project. The Company has assumed an amount of US\$ 2.5 million for the O&M Contractor's mobilization which is similar to Gulpur and New-Bong Escape. For the said purpose cost is estimated in the following manner

DESCRIPTION	USD
<i>Personnel Cost</i>	<i>1,780,000</i>
<i>Capital Expenditure</i>	<i>720,000</i>
Total	2,500,000

4.2.1.5 E&M LC Commission

Letter of Credit (LC) for E&M supply is expected to be open during the shipments of equipment. For the said LC an amount of USD 2,107,975 has been consider as LC Commission to be paid. The said cost is 2.5% of the E&M equipment supply.

4.2.2 Engineering and Supervision Cost

Engineering and Supervision Cost relates to expenses to be incurred on account of supervisory services of Owner's Engineer for construction monitoring, Sponsors Management Support for overall management of the Project and Independent Engineer for construction monitoring as well as Re-Opener Verifier services for Power Purchasers. Careful estimations, based on estimated rates and level of efforts, results into US\$ 20.615 million. The following cost estimates were assumed in each head:

DESCRIPTION	TOTAL USD
<i>Construction Supervision (Owners Engineer)</i>	14,504,459
<i>Management Supervision</i>	5,496,564
<i>Independent Engineer under PPA</i>	613,523
TOTAL	20,614,546

The level of efforts for such services are very much standard but vital & crucial however do not have any linear relationship with the bigger size/capacity of the project. Despite the fact the NEPRA has allowed a massive cost to other hydropower projects, the cost of US\$ 20.615 million (with major cost of US\$ 14.5 million for Owner's Engineer) has been assumed based on the rates prevailing during finalization of feasibility study.

4.2.2.1 Construction Supervision (Owners Engineer)

The Owner's Engineer role is pivotal in successful implementation of a hydropower project. Owner's Engineer role is primarily to carry out basic design and detailed design review, construction supervision & monitoring, QA/QC and milestone completion certifications after physical check. Owner's Engineer ensures that Project is being constructed according to design, project requirements under PPA & Grid Code, EPC Contract, and international/prudent practices. The Owner's Engineer role is critical for the fact that each hydropower project has unique site conditions and distinctive features and involves a huge civil works which demands stringent construction monitoring.

International lenders also require a strong team of Owner Engineer especially a foreign engineering firms with sufficient experience of supervision of hydropower projects in a lead role. They also require two to three specialist project managers to be on site to manage the project activities. Therefore, to effectively play its role Owner's Engineer requires strong team of experts and professionals on site (for construction monitoring) and offsite (for design review). The Sponsors shall appoint a consultant consisting of a mix of foreign expats and local expertise for the construction monitoring and design reviews of the Project.

Keeping in view of the pivotal and important role, construction supervision through OE is claimed of USD 14.505 million. A comparison of the cost of Owners Engineer with other Projects is provided below:

Old Cost (US\$ Million)	
Kohala	29.90
Karot	18.00
Suki Kinari	33.38
Azad Pattan	22.70
Gulpur	18.00

From the above comparison, it is evident that the claimed cost of US\$ 14.505 million is reasonable and justified.

4.2.2.2 Management Supervision

Similarly Sponsors Management Supervision is also pivotal for the overall project activities to ensure the arrangement of required resources in timely manner for the effective implementation of the Project. This includes the costs and expenses of the on-shore and off-shore deputed supervisory and management members dedicated for the Project liaison and development and to handle day to day affairs. Keeping in view the importance of requirement, only cost of US\$ 5.5 million has been estimated based on involvement of expats for a period of 7 years including construction period of 5 years. Gulpur HPP was also developed with same arrangements and total cost incurred under this head exceeds US\$ 5 million in 7 years.

4.2.2.3 Independent Engineer under PPA

Independent Engineer's role for re-opener verifier, construction monitoring and commissioning certification on behalf of power purchaser have been assumed with a cost of US\$ 0.614 million. For the purpose it is assumed that construction monitoring shall be required in the last 2 years with quarterly visits.

4.2.3 Custom Duty & Taxes

The rates for custom duties and taxes varies with the type of equipment and ancillary items. Accordingly various type of taxes and charges are imposed by the custom authorities at the time of the shipment clearance. Since the rates are subject to the type of the shipment therefore the firm estimates are difficult to made therefore the Company has estimated Custom Duty as per standard rates of 5% along with 1.15% of other provincial infrastructure taxes to calculate the cost under this head. Resultantly 6.15% of cost of imported equipment of Project amounted to US\$ 5,185,619. The cost is assumed to be reopener at the time of COD with adjustment at actual as per the standard practice of the Authority. Please note that Sales Tax at import stage has not been included keeping in view exemptions at import stage however shall be adjusted as per actual at COD stage tariff.

4.2.4 Insurance during Construction

Insurance During Construction is directly linked with the perception of the insurer/reinsurer regarding risk associated with the projects in a specific country. It is well known fact that Hydropower projects carries high risk being more prone to natural catastrophe in long gestation period, long construction period, remote areas with difficult access while most of

the lead insurers also show reluctance in parking risk in Pakistan due to country's political risks.

We would like the honorable Authority to appreciate that the number of insurers willing to provide insurance for hydropower projects has always been limited, with many considering it too risky. In comparison with other technologies, hydropower has some unique characteristics which have made the availability of insurance cover extremely limited. Some of the significant concerns raised by insurance companies are as follows:

4.2.4.1 Recent Losses

Recently insurers have reported as loss ratio of well more than 100%, with some reporting loss ratios of up to 300%. Some recent examples of these losses include the Ituango hydropower project in Columbia, the PNPC hydropower project in Laos, the Tapovan Hydropower in India, and the number of tunnel collapse incidents in Vietnam, China, Scotland, and Ethiopia. These losses and inherent risks have diminished the possibility of getting insurance at reasonable rates.

4.2.4.2 Site Conditions and Site Quality

Specific site condition especially flooding risk is a major concern of insurers worldwide. They prefer that during the construction period, the temporary structure should be designed at a return period of 1:20 years so that some variation margin remains. The situation puts the Sponsors in a severe quagmire; on the one hand, they are constrained to complete the project quickly and optimize the cost, while on the other hand, implementing a 1:20-year return period results in higher cost and time. Therefore, balancing insurance perception and avoiding additional costs always increases insurance premiums.

Additionally, based on the response from several reinsurers, the Swat area falls at high risk for earthquakes and GLOF. Additionally, this area has remained prone to insurgency and terrorism; therefore, many reinsurers are unwilling to participate in this risk.

4.2.4.3 Delay in Start-Up Cover

Insurers consider this coverage an extremely elevated risk as even a tiny incidence or physical damage can delay the project exposing the insurers to a significant claim of loss of revenue.

4.2.4.4 Risk Allocation

Under the turnkey lump sum contracts, more risk of ground condition area is allocated to the contractor, which sometimes results in higher EPC prices and makes the contractor uncompetitive. Recently contractors are not willing to take "Cost" risks and demand more fair risk allocation, which naturally resulted in higher insurance premiums.

4.2.4.5 Country Risk

The Company has contacted about some insurance companies to get the initial quotes; however, due to aforesaid situation, most of the reinsurers have denied participating in this Project. The primary reason for non-inclusion includes the earthquake area, GLOF Risk, Political Instability, Insurgency and terrorism risk, and the current economic situation

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resulting in high exchange risk and the ability to get SBP and SECP approvals for USD remittance. A more worrisome issue is that top reinsurers like Munich Re and Swiss Re are unwilling to participate in Pakistan-based hydropower projects as lead insurers. We have received only one quote, which amounts to US\$ 20.8 million (5.7% of EPC) with high deductibles [Attached as **Appendix-N** with this Tariff Petition]. We hope that this situation shall improve in future and we may be able to get better quotes. We are also planning to do a roadshow to convince the lead insurers.

The explanations above clearly demonstrate that getting the full coverage of insurance at the rate of 2% of EPC cost is not practically possible. Therefore, the Company shall request the waiver of the 2% cap on insurance at the EPC stage tariff once the firm insurance quotes are received.

The summary of the preliminary quotes is provided hereunder:

Insurance Items	Subscription amount	Deductible	Rate	Premium	Remarks
CAR (Construction work)	Property Damage	Minimum : 15% Maximum : \$20,000,000 Others : \$1,000,000	3.90%	13,921,375	Natural disasters (including earthquakes) 15% of the minimum accident amount Up to \$20Mil Tunnel, test drive, Under Ground, Wet Work Other accidents: \$1,000,000
	Third Party Liability	15,000,000			
	ALOP (loss of expected profit)	118,742,141	Property : \$50,000 Time Excess : 180	4.50%	5,343,396
	Sub Total			19,264,771	
Cargo	Property Damage (Property damage)	130,000,000	50,000	0.08%	104,000
	DSU (loss of expected profit)	118,742,141	60 days	0.36%	497,471 US\$ 70,000
	Sub Total			601,471	included Estimated Survey Cost
Terrorism insurance		60 days		937,500	
Total				20,803,742	

The following summary of responses of reinsurers shows that lead reinsurers did not take interest in hydropower risk and depicts the current situation for insurance market for hydropower projects:

Reinsurer	Acceptance	Remarks/Response
CV Starr	Provided Indication	<ul style="list-style-type: none"> • Rate: 3.9% net on ECV adjustable and annual declaration • Policy Limit: USD 100M a.o.o. and USD 200M in agg. • Deductible <ul style="list-style-type: none"> ◦ AoG – 5% of VARTL minimum USD 1M ◦ T&D, Fire, Explosion, LEG2, and other Major Perils – USD 1M ◦ PD AoP – USD 0.5M ◦ TPL – 20% of loss min USD 50,000 for TPPD, nil for TPBI <p>Additional Remarks of CV Starr: The rate quoted is on the CAR portion. As Swat River is located in a High EQ exposure region, this may have contributed to the</p>

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		<p>high rate. Additionally Hydro construction terms has hardened quite significantly over the years given the loss history of such projects.</p> <p>At this stage, given the limited underwriting information available and design detail of the Hydro project, the quote is likely to be higher. This may be sharpened at a later stage (depending on the risk quality and underwriting information).</p>
MunichRe	Declined	<ul style="list-style-type: none"> • Not UW appetite for Hydro in this Region (NAT CAT exposure)
AWAC	Declined	<ul style="list-style-type: none"> • Not keen of Pakistan project due to NAT CAT and Insurgency
SCOR	Declined	<ul style="list-style-type: none"> • Not able to quote for Hydro
SwissRe	Declined	<ul style="list-style-type: none"> • Not keen on Hydro in Pakistan
HDI	Declined	<ul style="list-style-type: none"> • Not keen to quote in Pakistan but may take a follow line
Helvetia	-	<ul style="list-style-type: none"> • -
BHS	Declined	<ul style="list-style-type: none"> • Not Keen on Hydro in Flood Prone territories
AxaXL	Declined	<ul style="list-style-type: none"> • unable to support hydropower construction as per our guideline
SwissRe Corso	Declined	<ul style="list-style-type: none"> • Not keen on Hydro in Pakistan
KoreanRe	Declined	<ul style="list-style-type: none"> • Not able to quote Hydro
Hannover:		<ul style="list-style-type: none"> • We would like to consider the risk on following basis. Please revert to us once the full project information and lead terms are available.
Awac	Declined	<ul style="list-style-type: none"> • Unfortunately, we will have to give this a miss. The global mandate is to avoid risk that far north due to concerns with NAT CAT i.e. glacial lake outburst and earthquake/landslide.
Munich Re	Declined	<ul style="list-style-type: none"> • Pakistan is not our preferred market as we are not sure about risk engineering and claims settlement for far away areas in this market because of difficult to reach areas and political situation at the ground. Also, we have known this project for long time. This particular hydro power, the hills are quite susceptible to landslides and rock is quite unstable. Also, for rock-filled dam, the overtopping and seismic risk for this location is quite high. Considering the above-mentioned issues, we are sorry to have stepped aside for this opportunity.
AxaXL	Declined	<ul style="list-style-type: none"> • unable to support hydropower construction as per our guideline, because we were seriously

		damaged by a couple of hydropower construction losses. Therefore, unfortunately I should give this offer a miss.
BH		<ul style="list-style-type: none"> • Thanks for sharing the captioned submission. We are responding on the same given the location of the works. As you may know, we proceed cautiously on HPPs in areas with heightened natcat exposures. Given this we will be only interested in XOL layers with high attachment points in this instance and additionally, will not be quoting terms for the same. We will therefore wait to hear from you upon finalization of terms and the availability of any XOL structures.
SwissRe Corso	Declined	<p>We have no risk appetite to lead owing to the following concerns:</p> <ul style="list-style-type: none"> • Long tail business; • Project site is highly exposed to earthquake”

Though the market situation is not favourable for hydropower projects however at this stage the Company has assumed insurance during construction at a rate of 2.5% of the EPC Cost as minimum Insurance during Construction expenditure with an amount of US\$ 9.15 million, which needs to be updated on EPC stage tariff proposal based on firm EPC cost and then prevailing insurance rates.

4.2.5 Land Acquisition & Resettlement

The cost of permanent land acquisition is assumed as USD 4,562,387. Permanent land acquisition which is required for the proposed project is divided into three categories, which is cultivable, wasteland and residential. The rate of these category is calculate based on the market rate USD 20,000 per Kanal per for cultivable, 13,334 per Kanal per for wasteland and 16,667 per Kanal per for residential area.

The cost of temporary land acquisition is assumed as USD 489,980. All the temporary land will be leased by the government department at the rate of USD 320 per Kanal per annum for the period of 5 years.

As a result of initial feasibility stage project implementation, a total of 11 household will be displaced. All households are Semi Pakka type in structure. The compensation shall be made on market rates.

To acquire the land for development of the Project and related resettlement, an amount of US\$ 5.052 million is assessed. Details of costs are as follows:

BREAKUP OF LAND ACQUISITION & RESETTLEMENT

SR.NO.	ITEM	UNIT	AREA	ESTIMATED COST(USD)
1.	Permanent		279.10	4,562,386.67
	<i>Reservoir</i>	<i>Kanal</i>	<i>47.6</i>	<i>946,000.00</i>
	<i>Weir</i>	<i>Kanal</i>	<i>52.6</i>	<i>572,726.67</i>
	<i>Disposal - I</i>	<i>Kanal</i>	<i>8.85</i>	<i>150,333.33</i>
	<i>Disposal - II</i>	<i>Kanal</i>	<i>1.9</i>	<i>33,493.33</i>
	<i>Disposal - III</i>	<i>Kanal</i>	<i>25.55</i>	<i>466,000.00</i>
	<i>Powerhouse</i>	<i>Kanal</i>	<i>142.6</i>	<i>2,393,833.33</i>
2.	Temporary	Kanal	294	489,980.00
	Houses	No.	11	326,700.00
	Trees	No.	278	27,946.67
	Electric Poles	No.	4	2,000.00
	Commercial Units	No.	1	133,333.33

Total Cost**5,052,367**

The company has assessed the cost of land acquisition and resettlement based on the survey carried out during preparation of feasibility stage EIA and land acquisition and resettlement Plan (LARP). This cost includes compensation for land, cost of affected structures, trees, Electric Poles, and a Commercial Units. This cost does not include LA compulsory charges cost of crops, monitoring and evaluation, business/transfer allowances, admin cost and myriad studies (if any).

It may be noted that estimation of land and other items is based on feasibility study and these requirements may change once the basic design is finalized. The Company shall submit the updated requirement at the time of EPC Stage tariff petition as per the NEPRA practice and guidelines the cost of land and compensation may change at the time of actual acquisition and payment shall be allowed as per actual cost incurred as an adjustment in reference tariff at COD.

4.2.6 Environment & Ecology

An environmental and social impact assessment (ESIA) has assessed the potential environmental impacts of the construction and operation of the Project in relation to both Pakistani legislation and World Bank guidelines applicable to Hydropower plants. The required no-objection certificate from the Khyber Pakhtunkhwa Environmental Protection Agency (KPK EPA) has been obtained on 04 July 2022 (**Appendix-J**), for the proposed project.

During the project execution, potential environmental impacts would be experienced primarily during construction and operation phases. An Environment and Social

Management Plan (ESMP) has been prepared to ensure that the environmental disturbances associated with the construction and operational phases of the Project will be handled in a way that is consistent with national standards and guidelines of IFC and ADB.

The potentially significant impacts on the social, physical, cultural and biological environment of construction and operation phases will be minimized/reduced and mitigated to acceptable levels through proper implementation of ESMP and ESMS.

To eliminate, minimize/reduce and mitigate the potential environmental and ecological impacts an amount of US\$ 1,999,440/ is estimated at this stage of Project which is 0.41% of the Project Cost. This cost will be refined through further studies during LOS period if required and will be presented to NEPRA at EPC stage tariff.

Since the projects in Pakistan are in initial phase to implement the mitigation measures of environmental and ecological impacts therefore the environmental studies and associated costs under such head remain underestimated. Keeping in view the importance of environmental and ecological impacts, the Company request the authorities to allow the said cost with a cap of 1% to the Project Cost.

S. NO.	DESCRIPTION	TOTAL (US \$)
1.	Environmental Studies	308,315
2.	Environmental Monitoring and Testing Cost	28,550
3.	Tree Plantation Cost	35,150
4.	Forest Dept Trees Compensation cost	30,520
5.	Construction and upgradation of fish hatchery	76,550
6.	Fish Seed Cost - (Fisheries Department)	46,500
7.	Biodiversity Action Plan and Implementation	150,850
8.	Human Resourcing & Strengthening Cost	67,500
9.	Implementation of Watershed Management Plan	140,500
10.	Monitoring and Evaluation	151,000
11.	Social Investment Programs	382,400
12.	EIA Fees and Public Hearing Arrangements	8,403
13.	Tourism Management Plan	185,520
14.	Stakeholders Engagement Plan Implementation	95,307
15.	Development of ESMS including ESMPs	31,875
16.	Lenders Monitoring cost	260,500
Total		1,999,440

4.2.6.1 Environmental Studies

An environmental and social impact assessment (ESIA) has assessed the potential environmental impacts of the construction and operation of the Project in relation to both Pakistani legislation and World Bank/IFC guidelines applicable to Hydropower plants. However, during the implementation of the Project until COD the Company is required to carry out significant number of studies including update of ESIA as per lenders requirements, Climate Change Assessment, Ecological flow assessment, Cumulative Impact Assessment (CIA), Due Diligence Reports for batching plants, asphalts plant, crusher plant etc. and seasonal survey etc.

4.2.6.2 Environmental Monitoring and Testing Cost:

This cost refers to the testing cost (water, noise, air pollution) etc. during the whole construction period to be carried out on quarterly basis as per the requirements of environmental management plan.

4.2.6.3 Tree Plantation Cost:

This cost includes to the tree plantation to offset expected damage trees during project implementation required as per ESIA. There are two types of tree plantation i.e., plantation relating to the damage of trees of forest land and tree plantation required for the trees affected for other community lands. Company plans to plant 1:10 of the damaged trees.

4.2.6.4 Forest Department Tree Compensation Cost:

This cost refers to the tree compensation required as per the Forest department of GoKP and is a condition of KP-EPA NOC approval.

4.2.6.5 Construction and upgradation of Fish Hatchery:

This cost required to the construction and upgradation of fish hatchery which requirement under KP-EPA NOC (also condition fisheries department of KP) to mitigation cost to manage and to maintain the population of trout fish population of proposed project area.

4.2.6.6 Fish Seed Cost:

This requirement has been imposed by the fisheries department of GoKP and is a condition for KP-EPA NOC approval. The fish seed is to be provided to the fisheries department of GoKPK on annual basis.

4.2.6.7 Biodiversity Action Plan and Implementation

This cost required for biodiversity action plan/ecological management plan (aggregated wildlife and flora mitigation initiatives to manage ecological regimes). It is expected that lenders and other stakeholders will requires the Company to study and implement the protection measures (like guarding, fencing, training and awareness etc.) comprehensive BAP for the protection of biodiversity of the area (including flora and wildlife etc.). This cost will cover the preparation and implementation of BAP. Furthermore, this cost would be more clearly understand at the EPC Stage Tariff once lenders are on board and more

studies for the proposed project are carried out. . Construction and upgradation of the fish hatchery as mentioned above are part of the BMP implementation measures to mitigate the damage and maintain the trout fish population.

4.2.6.8 Human Resourcing and Strengthening Cost:

The Company would be required to hire resources from local community including community liaison officers, social mobilizers and some HSE staff. Additionally, resources relating to the HSE shall also be stationed at the site to monitor the HSE performance of the EPC Contractor. This cost relates to these human resources and strengthening.

4.2.6.9 Implementation of Watershed Management Plan

The BMP for the Project shall include the establishment of integrated watershed management subject to the approval of the cost of the tariff by NEPRA. Integrated Watershed Management if recommended as part of the BMP may include strategic replantation for slope stabilization. Integrated Watershed Management is needed for the catchment area of the proposed project.

4.2.6.10 Monitoring & Evaluation:

This cost has been allocated to ensure aquatic health of the River Swat. After EMP and BAP is prepared and implemented on project site, the Company is required to hire reputable monitoring and evaluation consultant to monitor and evaluate the performance of such plan. M&E consultant shall also report to the Project lenders.

4.2.6.11 Social Investment Program:

This cost is allocated for community well-being, i.e. special projects in the health and educational sector, trainings for skilled and semi-skilled affected HHs, protection of forest and watershed management etc.

One of the key success factors in the successful implementation of hydropower projects is to engage the community in a respectable and compassionate manner. Worldwide many projects have failed or delayed due to lesser emphasize on community engagement. The Sponsors have already pledged US\$ 1 million to implement a comprehensive CSR program during construction phase. This is unprecedented that any sponsors have pledged this amount at early stage, and we believe that this amount is significant keeping in view the size of the Project.

The Company believe that keeping in view the exceptionally low socioeconomic profile and infrastructure of the area, a joint effort is required to uplift the socioeconomic profile of the proposed Project area. Keeping in view of this, Company believes that it will create enormous impact on the local community and this action by Authority and federal government will be appreciated at all levels.

4.2.6.12 EIA Fee & Public Hearing Arrangement:

This cost is allocated to reflects to the EIA fee and expenses incurred on arrangements of Public Hearing activity as per EPA act 2014.

4.2.6.13 Tourism Management Plan:

It is to appreciate that the Project is implemented in hardcore tourist area as Swat is one of the most popular tourism destinations in Pakistan. The Company plans to incorporate tourism management plan within the Project to explore the possibility of improving tourism infrastructure of the area. Additionally, some of the tourism activities are expected to be affected with the implementation of the Project. One of the purposes of having tourism management plan is to offset such effects.

This cost has been allocated for the preparation and implementation of tourism management plan to mitigate to offset impact on area tourism (if any) and to take initiatives to promote tourism in the project area.

It is to appreciate that the Project is implemented in the hardcore tourist area as Swat is one of the most popular tourist destinations in Pakistan. Hydropower and tourism complement each other very well. The Company plans to incorporate a tourism management plan within the Project to explore the possibility of improving the area's tourism infrastructure. Additionally, some of the tourism activities are expected to be affected by the implementation of the Project. One of the purposes of having a tourism management plan is to offset such effects. An amount of US\$ 120,000 has been allocated in this respect, which shall include preparing and implementing the tourism management plan.

4.2.6.14 Stakeholders Management Plan Implementation:

This cost has been allocated for construction phase for liaison and coordination management with all concern stakeholders. During project implementation, continues engagement with all stakeholders, Government authorities, institutions, and community is particularly important for the success of the Project. Based on this engagement and inputs a continues improvement is made in various EHS plans to implement this program.

A continuous engagement with all stakeholders, Government and Community is significant for the success of the Project. Based on this engagement and input, continuous improvement is made in various EHS plans to implement this program. For this purpose, the Company has allocated an amount of US\$ 100,000 during the construction period.

4.2.6.15 Development of ESMS including ESMPs:

This cost has been allocated for preparation of these plans during project implementation. The Company and Contractor will jointly develop site specific management plans including health & safety plans, contingency plan, environmental and social action plan, security management plan, emergency preparedness and response plan and stakeholders' engagement plan. Various consultants and in-house team shall jointly develop these plans.

The Company shall develop ESMS and SSMPs to run the environment and social matters

according to Lender's requirements. The Company and Contractor shall jointly develop site-specific management plans, including health & safety plans, contingency plans, environmental and social action plans, security management plans, emergency preparedness and response plans, and stakeholders' engagement plans. Various consultants and the house team shall jointly develop these plans. A cost of US\$ 35,000 has been allocated for preparing these plans.

4.2.6.16 Lenders Monitoring Cost:

This cost has been allocated to reflect the lenders and their advisors team visits the site on quarterly basis to monitor the environment and social monitoring performance of the proposed Project During the implementation of the Projects.

Cost of protected forest land and trees compensation is not included in above cost. This cost will be presented to NEPRA at EPC stage tariff after denotification of protected forest land completed.

4.2.7 Financing/ Lender Fees

An amount of US\$ 10.4 million, i.e. approx. 2.94% of base debt of the Project, is considered as expected financing charges and others fee for the Project. Breakup of the assumed cost under the financing cost is provided hereunder:

LENDERS	AMOUNT US\$
Working Fee	475,000
Front End fee	3,640,800
Commitment Fee	5,238,980
Monitoring Fees	525,000
Waiver Fees	270,000
Out of Pocket	250,000
Total	10,399,780

The Project is proposed to be fully financed by foreign debt through international financial institutions including MDBs. Since the commitment fee varies with the disbursement schedule and project may involve bridging financing gap of funding through syndication as "B" Loan, therefore the cost shall be adjusted accordingly but to the maximum of 3% of the debt. This is the minimum fee expected to be paid under above listed heads. However, finalized costs based on actual contracts and term sheets will be updated and presented in EPC stage tariff proposal.

4.2.8 Sales Tax on Services

Sales Tax on Services as applicable under the provincial and federal laws were not assumed in any previous projects which has a consequence on the project cost. Such sales tax is nonadjustable nature therefore has an impact on the cost therefore the said cost is estimated

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separately which is expected to be adjustable as per actual at COD. On the basis of estimation, an amount of US\$ 8,526,528 has been considered in the following manner.

SALES TAXES	TOTAL (USD)
<i>Construction Services</i>	5,211,191
<i>Engineering and Supervision</i>	290,089
<i>Management & Support Service Agreement</i>	453,300
<i>Insurance during Construction</i>	1,555,323
<i>Owner's Advisors</i>	571,713
<i>Environment & Ecology</i>	319,910
<i>O&M Mobilization</i>	125,000
Total	8,526,528

4.2.9 Government Fees and approvals

The Government workings and level of efforts have been increased many folds and accordingly the fees for processing and approvals are being charges by the relevant govt. departments to the projects. Since such cost is excessive therefore the same ha been estimated as USD 1,207,674. The detail of assumed costs is appended below:

FEES	TOTAL USD
<i>NEPRA (Annual Fee)</i>	206,631
<i>NEPRA (Generation License)</i>	9,293
<i>NEPRA (F/S Stage Petition Filling Fee)</i>	10,473
<i>NEPRA (EPC Stage Petition Filling Fee)</i>	10,473
<i>NEPRA (COD Stage Petition Filling Fee)</i>	10,473
<i>PPIB Upon Issuance of LOS</i>	190,400
<i>PPIB Upon FC</i>	238,000
<i>PPIB Upon COD</i>	71,400
<i>PPIB Other Expected Fee</i>	59,500
<i>PPIB Fee</i>	73,500
<i>NTDC Interconnection Review Charges</i>	28,011
<i>Stamp Duties</i>	28,011
<i>Competition Commission Fee</i>	11,204
<i>SECP Registration</i>	227,580
<i>Power Purchaser LC</i>	32,725
Total	1,207,674

It is to be noted that the above fees have been assumed based on reasonable judgement however some costs may have been overlooked for which we request the Authority to adjust the fees paid to any govt. department at actual including any variation in the rates or indexation etc.

4.3 INTEREST DURING CONSTRUCTION (IDC)

Interest During Construction (IDC) is also the major cost for any project and varies with base project cost. IDC starts accruing immediately after the first drawdown and to be paid in arrears after each six-month period subject to the terms of the Finance Agreements. In

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this regard an amount of US\$ 37,201,428 has been estimated on account of IDC with the following assumptions:

DISCRIPTION	UNIT	AMOUNT
Base Debt Amount (incl. financing cost)	US\$ Million	361.71
Debt to Equity Ratio		80:20
Foreign Loan	%	100%
Rate	%	0.16%
Margin	%	4.6%
Biannual drawdown	No.	10

IDC has been calculated keeping in view the methodology of NEPRA for such purpose. Currently 6 months Libor rate has been assumed to calculate the IDC however the said rate is supposed to change as Libor rate is expected to be discontinued from June 2023.

The following preliminary assumptions of drawdown has been considered:

DRAWDOWN	PERCENT
1 st	4.60%
2 nd	4.60%
3 rd	7.52%
4 th	7.52%
5 th	10.09%
6 th	10.09%
7 th	17.15%
8 th	17.15%
9 th	10.63%
10 th	10.63%
Total	100%

The said preliminary assumptions shall be revisited at EPC Stage on the then scenario whereas IDC shall be adjusted at COD on account of actual variation in disbursement schedule and Libor rate (or new applicable rate) as per the NEPRA Mechanism.

4.4 FINAL PROJECT COST

Based on the forgoing assertions, following is the final project cost:

S#	Description	TOTAL USD
1	Engineering, Procurement and Construction Cost	365,958,331
2	Project Development Cost	24,038,347
3	Engineering & Supervision	20,614,546

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S#	Description	TOTAL USD
4	Customs Duties	5,185,619
5	Insurance During Construction	9,148,958
6	Environmental Cost	1,999,440
7	Resettlement and Rehabilitation Cost	5,052,367
8	Sales Tax on Services	8,526,528
9	Government Fees and Approval	1,207,674
Base Project Cost		441,731,810
10	Financing/Lenders Fees	10,399,780
11	Interest During Construction	37,201,428
Total Project Cost		489,333,018

5. FINANCING PLAN

The Project cost is planned to be financed through debt and equity with proposed capital structure consisting of 80% debt and 20% equity.

DESCRIPTION	SHARE %	AMOUNT (US\$)
Total Equity	20%	97,866,603
Total Debt	80%	391,466,414
Total Project Cost	100%	489,333,017

Debt is assumed to be 100% foreign debt with benchmark LIBOR rate of 16 bps (or alternate rate as per the terms of the financing agreements) and spread of 460 bps. Debt and equity drawdowns are assumed on biannual basis and debt drawdowns are assumed to start after financial close of the Project.

This capital structure is tentative only and may change after negotiations with lenders; however, it shall stay within limits defined by NEPRA.

LONDON: London Interbank Offered Rates (LIBOR) on Thursday (September 30, 2021).

52-Week				
	Latest	Wk Ago	High	Low
Libor Overnight	0.07025	0.07250	0.08738	0.05425
Libor 1 Week	0.07250	0.07025	0.10838	0.05788
Libor 1 Month	0.08238	0.08325	0.15863	0.07263
Libor 2 Month	0.11025	0.10800	0.19400	0.09263
Libor 3 Month	0.13088	0.12925	0.25388	0.11413
Libor 6 Month	0.15738	0.15550	0.26663	0.14663
Libor 1 Year	0.24063	0.22525	0.36013	0.21950

Sources: FactSet, ICE Benchmark Administration

Debt is assumed to be 100% foreign debt with a benchmark LIBOR rate of 16 bps¹ and spread of 460 bps. Debt and equity drawdowns are assumed on a bi-annual basis, and debt drawdowns are assumed to start after the Project's financial close.

All expenses before financial close of the Project will be met from equity injection by the sponsors of the Project. Cost of equity is assumed as 17% on all the equity injections starting from 30 months before financial close of the Project.

5.1 FUNDS INJECTION SCHEDULE

A 30-month period is assumed for financial close of the Project and 5 years for construction period. Concession Period is assumed as 30 years starting from COD, which means that Project will be transferred to government at the end of the term.

Capital cost outflow from the Company will start from LOI date and will end on COD of the Project. During development period no loan contribution is expected, and all cash expenditure will be met from financing through equity. After financial close the banks will contribute as per the capital structure envisaged for the Project, which is assumed 80:20 at this stage. Annual funding profile is envisaged as follows:

PERIOD ENDING	EQUITY AMOUNT	DEBT AMOUNT
1.	0.44%	
2.	0.44%	
3.	1.76%	
4.	3.52%	
5.	8.09%	8.66%
6.	13.57%	14.50%
7.	18.66%	19.90%
8.	31.85%	33.96%
9.	21.67%	22.98%
Total	100%	100%

All required funding will be met from equity sources till financial close of the Project. Thereafter debt and equity will be injected on pro-rata basis till commercial operations date.

5.2 EQUITY INVESTMENT SCHEDULE

Equity injection in the Company will start from the date of LOI and will end COD of the Project. As per NEPRA guidelines. Separate returns are calculated for equity invested during development period (during 30 months prior to financial close), during construction (60 months of construction) and 30 years of operations.

¹ The Reference Date for LIBOR is September 30, 2021

EQUITY PROFILE	UNIT	AMOUNT
Total Equity	US\$ Million	97.87
Cost of Equity	% age	17.00%
ROE during Development	US\$ Million	7.73
ROE during Construction	US\$ Million	27.72

For tariff calculation purposes, ROE during development and construction are added together and shown under one head (ROE DD & DC).

5.2.1 JUSTIFICATION OF 17% IRR

KOEN, the main sponsor of the Project, is a reputable international investor and has the experience of investing in number of countries. The applicant is concerned that no official document, except for “Concept Paper on Determination of Rate of Return for Power Sector” by NEPRA, is available for explanation of basis of IRR calculation. The approved IRR to different hydropower projects ranges between 13%-17%. The applicant has requested an IRR of 17% which has been justified from various perspectives. In the following sections we have attempted to give an overall viewpoint on IRR for the consideration of honorable Authority so that an informed decision can be taken to attract the FDI in Pakistan.

In cost plus tariff regime, the IRR allows to a sponsors should consider the sufficiency and bankability of the proposed investment. There are number of factors which affect the IRR of the investors to which consideration should be given to attract the much-needed FDI in the country.

Some of the key take aways in this respect are as follows:

- 1) Economic and Political Stability and its impact on foreign direct investment and required rate of return
- 2) Sector Specific Risks and its impact on IRR
- 3) Hydropower Specific risks and its impact on IRR
- 4) Gross IRR vs Net IRR – impact of cost overruns, delayed payments, sponsors costs and taxes on IRR
- 5) Testing the consistency of “IRR” with internationally acceptable criteria like CAPM, UNFCCC hurdle rates, sovereign risks, and defaults spreads.

A brief paper on Justification of the 17% IRR net of tax is attached as **Appendix-O**.

We would take this opportunity to highlight that all the hydel projects, which are in development (post LOS), construction or operations phase including Gulpur Hydropower Project, has received 17% IRR and that is net of tax (dividend tax as pass through).

Based on conclusion of the aforesaid paper, we believe that an IRR of 17% (net of tax) is fully justified for hydropower projects in Pakistan as further explained in below section.

6. OPERATING COSTS

Operating costs will be incurred on recurring basis during operations phase of the Project i.e., after successful commissioning of the Project. These are estimated minimum costs required for successful commissioning of the Project. Following is summary of operating costs of the Project:

COST DESCRIPTION	(US\$ / ANNUM)
Water Use Charges (GoP approved)	2,251,952
O&M Cost (1.5% of Project Cost)	7,339,995
Variable O&M (10% of O&M)	734,000
Fixed O&M	6,605.996
Insurance Expense (1% of EPC Cost)	3,659,583
Total Annual Operating Expenses	13,251,531

O&M Cost covers personnel costs, administration/management expenses, maintenance cost, replacement of parts necessitated due to regular operation/normal maintenance and other costs. The proposed cost is taken as 1.5% of the Total Project Cost which is in line with precedents approval of NEPRA for other hydropower projects.

These costs represent initial calculated estimates and may change/ be refined during the development period of the Project. Company will demonstrate the updated and more accurate budgets at EPC stage tariff proposal of the Project.

7. PROJECT PROPOSED TARIFF

The tariff of the Project is calculated keeping in view the following:

- 1) Rule 3 of the National Electric Power Regulatory Authority Tariff (Standard and Procedure) Rules, 1998 for determination of Feasibility Stage Reference Tariff.
- 2) Applicable provisions of Government of Pakistan's Power Generation Policy 2015 (Policy)
- 3) Mechanism for the Determination of Tariff for Hydropower Projects 2008 by NEPRA.
- 4) Tariff Determinations by NEPRA for similar projects.

According to Section 10 of the Policy, the tariff for hydropower projects is calculated and presented in two sections i.e., two-tier tariff as follows:

TIER	TARIFF COMPONENTS
Energy Purchase Price	Water Use Charges + Variable O&M
Capacity Purchase Price	Fixed O&M + Insurance + ROE + ROEDC + Debt Service

7.1 Energy Purchase Price

The Energy Purchase Price (EPP) comprises Water Use Charge (WUC), Variable O&M and any other variable component determined by NEPRA. The EPP will be paid based on the amount of kWh (PKR/kWh) supplied by the Project Company at the point of delivery.

7.1.1 Water Use Charges

As mentioned in Section 5 of the Policy, WUC are assumed to be payable @ Rs. 0.425/kWh by the Company to GoKPK. As per Policy the rate of WUC will be reviewed every five years by the GoKPK to determine if an increase in WUC is necessary. For the calculation of reference tariff of the Project, it is assumed that WUC will stay the same and any change in rate will be considered as a pass-through item.

7.1.2 Variable O&M

Variable O&M is estimated at US\$ 0.734 million per annum.

Tariff component is calculated as PKR 0.139/ kWh out of which 40% i.e., PKR 0.0554/ kWh is estimated as local currency cost and 60% i.e., PKR 0.083/ kWh is in foreign currency, both during and after the debt repayment period.

7.1.3 Total Energy Purchase Price

Total EPP during and after the loan repayment period is shown below. Please note that amounts in US\$ million are the total annual payments under respective tariff component.

TARIFF COMPONENT	DURING LOAN REPAYMENT			AFTER LOAN REPAYMENT		
	US\$ Million	US¢/kWh	PKR/kWh	US\$ Million	US¢/kWh	PKR/kWh
Water Use Charges	2.252	0.238	0.425	2.252	0.238	0.425
Variable O&M	0.734	0.078	0.139	0.734	0.078	0.139
Foreign	0.440	0.047	0.083	0.440	0.047	0.083
Local	0.294	0.031	0.055	0.294	0.031	0.055
Total EPP	2.986	0.316	0.564	2.986	0.316	0.564

7.2 Capacity Purchase Price

The Capacity Purchase Price (CPP) comprises fixed O&M, insurance during operations, return on equity (ROE), ROE during development & construction and debt servicing (both principal and interest charges). The CPP expressed in PKR/kW/month is payable by power purchaser to the Company, provided the Project is made available for despatch by the Company as per the standards defined in the agreed PPA.

7.2.1 Fixed O&M

Fixed O&M cost is 90% of total operations & maintenance cost and amounts to US\$ 6.61 million per annum. It is estimated that 60% of this cost i.e., US\$ 3.96 million will be incurred in foreign currency & therefore treated as foreign part. Remaining amount of US\$ 2.64 million i.e., 40% of total fixed O&M will be incurred in local currency.

Tariff component is calculated as PKR 412.87/ kW/Month out of which 60% i.e., PKR 247.72/kW/Month is estimated as foreign currency cost and 40% i.e., PKR 165.15/kW/Month, both during and after the debt repayment period.

7.2.2 Insurance during Operations

As explained earlier the insurance market is not favorable for hydropower projects and very high premium is being quoted by the reinsurers. Similarly, Insurance During Operations shall also be higher than expected. At this juncture the Company has assumed Insurance During Operations at a rate of 1% of the EPC Cost and amounts to US\$ 3,659,583 per annum however essentially requires to be adjusted on actual at EPC and COD stage tariffs. The insurance cost based on these assumptions translates into PKR. 228.72 per kilowatt per month.

7.2.3 Return on Equity

Based on Project cost, the total equity of the Company results into US\$ 97.87 million. Redemption of equity starts after repayment of loan i.e., from year 13 onward, and hence ROE component of the tariff during loan repayment period (year 1 – year 12) is lower than after loan repayment period (year 13- year 30).

Based on IRR of 17%, ROE during loan repayment period is calculated as PKR 1,039.83 per kilowatt per month and PKR 1,105.32 per kilowatt per month after loan repayment period. In absolute terms US\$ 16.64 million per year during loan repayment period and US\$ 17.69 million per year after loan repayment period will be received by the Company on account of return on equity.

7.2.4 ROE during Construction

ROE during development and construction amounts to US\$ 35.45 million. This amount includes ROE during development for 30 months before financial close and ROE during construction period of 60 months.

Tariff component under this head is calculated as PKR 380.07 per kilowatt per month both during and after loan repayment period. In absolute terms this amounts to US\$ 6.08 million per annum for 30 years of concession periods.

7.2.5 Debt Service

Expected total loan (including IDC) of the Company will be US\$ 391.47 million (US\$ 361.71 million as base debt and US\$ 29.76 million as IDC share), which will be repaid in twelve (12) years in the form of annuity payments. Tariff component of loan repayment amounts to PKR 2,699.47 per kilowatt per month.

Following is the estimated loan repayment schedule of the Company. Please note that all figures in this table are US\$.

TARIFF PETITION – 238 MW KALAM-ASRIT HYDROPOWER PROJECT

YEAR ENDING	INTEREST	PRINCIPAL	TOTAL
1.	18,331,348	24,860,105	43,191,453
2.	17,134,592	26,056,861	43,191,453
3.	15,880,224	27,311,228	43,191,453
4.	14,565,472	28,625,980	43,191,453
5.	13,187,429	30,004,024	43,191,453
6.	11,743,046	31,448,406	43,191,453
7.	10,229,132	32,962,321	43,191,453
8.	8,642,339	34,549,114	43,191,453
9.	6,979,158	36,212,295	43,191,453
10.	5,235,912	37,955,541	43,191,453
11.	3,408,746	39,782,706	43,191,453
12.	1,493,622	41,697,831	43,191,453
Total	126,831,020	391,466,414	518,297,434

7.2.6 Tariff Components of Loan

Based on loan repayment schedule, following is the detail of annual Interest Charge, Principal Repayment, and total loan components of Reference Tariff Table. Please note that all numbers in the following table are in PKR per kilowatt per month.

YEAR	INTEREST CHARGE	PRINCIPAL REPAYMENT	TOTAL
1.	1,553.76	1,145.71	2,699.47
2.	1,628.55	1,070.92	2,699.47
3.	1,706.95	992.52	2,699.47
4.	1,789.12	910.34	2,699.47
5.	1,875.25	824.22	2,699.47
6.	1,965.53	733.94	2,699.47
7.	2,060.15	639.32	2,699.47
8.	2,159.32	540.15	2,699.47
9.	2,263.27	436.20	2,699.47
10.	2,372.22	327.25	2,699.46
11.	2,486.42	213.05	2,699.47
12.	2,606.11	93.36	2,699.47

7.2.7 Total Capacity Payment

Based on discussions above following is the summary of tariff components pertaining to Capacity Purchase Price. Please note that amounts in US\$ million are total annual payments under respective tariff components.

TARIFF COMPONENT	DURING LOAN REPAYMENT		AFTER LOAN REPAYMENT	
	US\$/kWh	PKR/kW/M	US\$/kWh	PKR/kW/M
Fixed O&M	0.70	412.87	0.70	412.87
Foreign	0.42	247.7248	0.42	247.7248
Local	0.28	165.1499	0.28	165.1499
Insurance	0.39	228.7240	0.39	228.7240

TARIFF COMPONENT	DURING LOAN REPAYMENT		AFTER LOAN REPAYMENT	
	US\$/kWh	PKR/kW/M	US\$/kWh	PKR/kW/M
ROE	1.76	1,039.8327	1.87	1,105.3176
ROEDC	0.64	380.0701	0.64	380.0701
Debt Service	4.57	2,699.47	-	
Total CPP	8.05	4,760.9672	3.60	2,126.9864

7.3 SUMMARY OF ANNUAL & LEVELIZED TARIFF

Project tariff is higher in first 12 years due to loan repayment; however, it drops substantially, approximately half once the loan repayment is completed.

TARIFF COMPONENT	LOAN PERIOD	POST LOAN PERIOD
Operating Expenditure	1.401¢	1.401¢
Equity Return	2.402¢	2.513¢
Debt Service	4.567¢	
Total Tariff	8.37¢	3.914¢
Levelized Tariff (PKR/kWh)	12.1714	
Levelized Tariff (US¢ /kWh)	7.1344	

A discount rate of 10% has been used to calculate the levelized tariff of the Project.

During the loan repayment period approximately 55% of the annual tariff is used to service the debt component of the Project. Once is loan repayment is complete there will be only two main components i.e., equity return and operating costs which constitute 64% & 36% share in tariff during remaining 18 years of the concession period.

Reference Tariff Table, as per NEPRA standards is attached as Annex-1 of this Petition.

8. INDEXATION OF THE REFERENCE TARIFF

In line with the Power Policy 2015 and NEPRA guidelines the various components of the Reference Tariff shall be indexed as per Cluse 10.2 of the Power Policy 2015 of GOP.

9. ASSUMPTIONS OF PETITION

Reference Tariff for the Project as presented in above has been computed based on the costs documented in Section 3 of this Petition. The Project cost and the Reference Tariff as determined pursuant to this Petition shall be subject to adjustment for the following Cost Reopeners at COD stage tariff determination.

9.1 TUNNEL COST VARIATION

NEPRA Tariff Mechanism for Hydropower Projects (hereinafter “Mechanism”) provides mitigation for changes in rock quality by allowing adjustments on COD stage. Adjustments allowed are due to variation in different rock categories within overall design parameters and escalation in unit rates due to escalation in input costs.

Following formulas will be used to calculate the reference and adjusted cost of tunnel construction.

EQUATION: REFERENCE TUNNEL CONSTRUCTION COST

$$TCC_{ref} = \sum_{x=1}^n (Q_{xRef} * R_{xRef})$$

Where.

TCC_{ref} = Reference Tunnel Construction Cost

Q_{xRef} = Reference Quantity of Rock Category “x”

R_{xRef} = Reference Unit Rate of Rock Category “x”

The Company will submit details of actual rock classification on COD stage tariff, supported by the report & certificate issued by the Re-opener verifier to NEPRA for adjustment in Project cost and the Reference Tarif. Adjustment will be made using following formula subject to caveat expressed in Equation 4.

EQUATION: ADJUSTED TUNNEL CONSTRUCTION COST

$$TCC_{adj} = \sum_{x=1}^n (Q_{xAct} * R_{xRef})$$

Where.

TCC_{adj} = Adjusted Tunnel

Construction Cost Q_{xAct} = Actual

Quantity of Rock Category “x”

R_{xRef} = Reference Unit Rate of Rock Category “x”

CAVEAT IN ADJUSTMENT OF TUNNEL COST

Escalations in unit rates and adjustments rock categories are subject to following caveat as per Mechanism.

EQUATION: CAVEAT IN TUNNEL COST ADJUSTMENT

$$\sum_{x=1}^n Q_{xRef} = \sum_{x=1}^n Q_{xAct}$$

This means that any variation in total quantity is prohibited and only changes within distinct categories are subject to adjustments.

9.2 LAND ACQUISITION & RESETTLEMENT

Section 3.1.2.7 provides detailed cost estimates for acquisition of land and resettlements required for the development of the Project. Project Cost will be adjusted on Commercial Operations Date with the actual land acquisition and resettlement costs (including but not limited to land acquisition cost, house and structures compensation, livelihood restoration, family packages, infrastructure improvement/restoration, land improvements, cost of facilities, structures and trees, restoration of access (through bridges or other means) or other activities directly related with the land acquisition or resettlement) incurred by the Company. The relevant component of the RTT shall be revised at the Commercial Operations Date to incorporate the variation related to changes in the cost of land acquisition and resettlement on provision of documentary evidence to the Power Purchaser.

9.3 CONSTRUCTION COST

Construction costs as explained in Section 4.1 of this Petition are calculated based on the rates available during feasibility study period. On EPC tariff stage a revised reference date will be agreed with EPC contractor (“Reference EPC Cost”) for escalation in rates of cement, labor, steel, and fuel.

Total Reference Construction Cost will be calculated as follows.

EQUATION: REFERENCE EPC COST

$$EPC_{ref} = FC_{ref} + LC_{ref}$$

Where.

EP_{Cref} = Reference Total EPC Cost

FC_{ref} = Offshore/ Foreign component of Reference EPC Cost

LC_{ref} = Onshore/ Local component of Reference EPC Cost

Final EPC cost will be adjusted using the following formula on COD stage tariff.

EQUATION: ADJUSTED EPC COST

$$EPC_{adj} = FC_{ref} + LC_{adj}$$

Where.

EP_{Cadj} = Adjusted Total EPC Cost on COD stage

LC_{adj} = Adjusted Onshore/ Local component of EPC Cost

Adjusted Onshore portion of EPC costs i.e., LC_{adj} will be calculated using following formula.

EQUATION: ADJUSTED PART OF ONSHORE LOCAL EPC COST

$$LC_{adj} = \sum_{x=1}^n W_c \left(\frac{C_x}{C_{ref}} \right) + W_s \left(\frac{S_x}{S_{ref}} \right) + W_l \left(\frac{L_x}{L_{ref}} \right) + W_f \left(\frac{F_x}{F_{ref}} \right)$$

Where.

x = Month of LCref payment starting from 1 to “n” number of months.

W_c = Weight/ Coefficient of Cement in LCref W_s = Weight/ Coefficient of Steel in LCref W_l = Weight/ Coefficient of Labor in LCref W_f = Weight/ Coefficient of Fuel in LCref

C_x = Cost/ indices of Cement in month “x”

S_x = Cost/ indices of Steel in month “x” L_x = Cost/ indices of Labor in month “x” F_x = Cost/ indices of Fuel in month “x”

C_{ref} = Cost/ indices of Cement on reference date S_{ref} = Cost/ indices of Steel on reference date L_{ref} = Cost/ indices of Labor on reference date F_{ref} = Cost/ indices of Fuel on reference date

9.4 INTEREST RATES

Reference debt terms as discussed in Section 3.3 are based on initial discussions with prospective lenders of the project, which will be finalized and locked at financial close of the Project. However as per Policy, changes in prime rate i.e., LIBOR and KIBOR are assumed as pass through items during operation phase. Similarly, any changes in prime rate during construction period shall be adjusted on COD tariff stage using following formula.

EQUATION 6-7: CALCULATION OF ADJUSTED IDC

$$IDC_{act} = \sum_{x=1}^n \left(D_x * \frac{k_x}{k_{ref}} \right)$$

Where.

x = Month of Debt Disbursement starting from 1 to “n” number of months.

D_x = Debt Disbursement in Month “x”

K_x = Prime rate (LIBOR/ KIBOR as the case may be) at time “x”

K_{ref} = Reference Prime Rate (LIBOR/ KIBOR as the case may be)

9.5 GOVERNMENT FEES

Project costs as discussed hereinabove contain certain assumptions regarding Government Fees as applicable to Project as per government policies and procedures. This section explains the assumptions of cost calculation and later adjustments due to variation in tariff.

9.6 SALES TAX ON EPC & OTHER SERVICES

Due to variation in sales tax rates for CPEC and non CPEC projects, this cost has been assumed ranging from 2% to 16% as per the type of services for the Project. Company will try to opt for concessionary sales tax rate for CPEC projects and will finalize this aspect of cost on EPC stage tariff of the project.

9.7 INCOME TAX EXEMPTION

The Company has assumed tax exemption applicable to hydropower project as provided in Clause 132 of Part I of Second Schedule of Income Tax Ordinance, 2001 and as envisaged in the Policy for Power Generation 2015 and KPK Hydropower Policy 2016. Any variation/imposition in the above stated provision shall be considered as pass-through.

9.8 WITHHOLDING TAX

Only 7% withholding tax has been assumed on onshore civil works. Any other withholding taxes under the EPC contract will be allowed with corresponding adjustment in tariff.

No provision for withholding tax has been made for offshore component of EPC cost and therefore will be adjusted for any impact due to these factors.

9.9 CUSTOM DUTY & CESS

Only 5% of electrical & mechanical cost is considered as custom duty applicable to the Project. For Insurance and Sind Infrastructure Cess @1.15% of the E&M Cost is also included in this head. Other cesses, charges, and fees applicable on import of Project components are not considered at this stage.

9.10 RETURN ON EQUITY

Return on equity forms a major part of the Project tariff and adjustments thereto will be made according to escalations/ indexations available according to Policy and NEPRA guidelines, at COD stage tariff as follows.

9.11 ROE During Development

A Return on Equity during Development (ROEDD) per annum has been assumed starting from 30 months before financial close of the Project. An estimate has been made and presented in this Petition regarding expected equity drawdowns during this period and ROEDD has been included in calculation of Project Tariff. However, actual equity drawdowns may vary depending on progress of the Project.

Adjustment in ROEDD will be made on COD stage tariff as follows:

EQUATION 6-8: ADJUSTED ROEDD ON COD STAGE TARIFF

$$ROEDD_{adj} = \sum_{x=1}^{-30} (E_x * K_e)$$

Where.

x = Month starting from financial close date to 30 months before financial close. E_x = Equity contribution during month “x.”

K_e = Cost of Equity as mentioned in Paragraph 5 above.

9.12 RETURN ON EQUITY DURING CONSTRUCTION

Return on equity during construction has been calculated in an analogous manner as SROE and this too is based on estimated cash outflows of the Project during construction period. This component of tariff will be adjusted on COD stage tariff using following formula.

EQUATION: ADJUSTED ROE DC ON COD STAGE TARIFF

$$ROEDC_{adj} = \sum_{x=1}^{60} (E_x * K_e)$$

Where.

x = Month starting from financial close date to 60 months after financial close. E_x = Equity contribution during month “x.”

K_e = Cost of Equity as mentioned in Paragraph 5 above.

9.13 CAVEAT IN ADJUSTMENT OF ROE

Adjustments in SROE and ROEDC as discussed in above sections are subject to following caveat as per Policy and various regulations of NEPRA.

EQUATION: CAVEAT IN ADJUSTMENT OF SROE AND ROEDC

$$\sum_{x=30}^{60} (E_x) = E_{ref}$$

Where.

x = Month starting from 30 months before financial close date to 60 months after financial close.

E_x = Equity contribution during month “x.”

E_{ref} = Reference Equity Amount as mentioned in EPC Tariff Determination.

9.14 LENDER FEES & CHARGES

As per Guidelines, Lender Fees & Charges will be adjusted based on actual evidence of final Project debt at the time of COD stage tariff

9.15 INSURANCE DURING CONSTRUCTION

The reference cost of insurance during construction is US\$ 9.15 million being 2.5% of the aggregate Construction Cost and such insurance cost will be adjusted at Commercial Operations Date on the basis of actual EPC Cost & Insurance rate.

9.16 INSURANCE DURING OPERATIONS

Arrangements of insurance during operations will be finalized before filing of COD stage tariff proposal by the Company. This component will be therefore adjusted on COD stage on provision of verifiable evidence of rates negotiated with insurance provider.

10. REQUEST FOR TARIFF DETERMINATION

Pursuant to the relevant provisions of the NEPRA Act, read with the provisions of the Rules and Regulations made thereunder and in accordance with the LOI, Power Generation Policy 2015 and KPK Hydropower Policy 2016, the Company submits herewith before NEPRA, for its approval, this tariff petition (the "Tariff Petition") for approval of:

- 1) the Reference Generation Tariff (the "Reference Generation Tariff");
- 2) the Project Cost
- 3) the Energy Production Estimate
- 4) the Indexations, Adjustments and Escalations
- 5) Tariff Reopeners; and other matters set out in this Tariff Petition

This Petition is intended to seek a tariff determination at Feasibility Stage. Subsequent tariff determinations will be made in accordance with the Mechanism at a future date.

NEPRA is kindly requested to process the Tariff Petition at the earliest, enabling the Company to proceed further with the development process.

Respectfully submitted on behalf of the Company.

Kind regards,
For and on behalf of
KA Power Limited



Oh Inhwan
Chief Executive Officer

REFERENCE TARIFF TABLE

During Year Ending	Period	Energy Purchase Price-EPP (PKR/kWh)					Capacity Purchase Price - CPP (PKR/kW/Month)							Total Tariff	
		Water Use Charges	Variable O&M (Foreign)	Variable O&M (Local)	Total	Fixed O&M (Foreign)	Fixed O&M (Local)	Insurance	ROE	ROE DC	Debt Principal	Interest Charges	Total	Capacity Charge	US ¢ per kWh
31-Mar-31	1	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,553.76	1,145.71	4,760.9672	14.3762	14.9398
31-Mar-32	2	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,628.55	1,070.91	4,760.9672	14.3762	14.9398
31-Mar-33	3	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,706.95	992.51	4,760.9672	14.3762	14.9398
31-Mar-34	4	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,789.12	910.34	4,760.9672	14.3762	14.9398
31-Mar-35	5	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,875.25	824.21	4,760.9672	14.3762	14.9398
31-Mar-36	6	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	1,965.53	733.94	4,760.9672	14.3762	14.9398
31-Mar-37	7	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,060.15	639.32	4,760.9672	14.3762	14.9398
31-Mar-38	8	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,159.32	540.15	4,760.9672	14.3762	14.9398
31-Mar-39	9	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,263.27	436.20	4,760.9672	14.3762	14.9398
31-Mar-40	10	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,372.22	327.24	4,760.9672	14.3762	14.9398
31-Mar-41	11	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,486.42	213.05	4,760.9672	14.3762	14.9398
31-Mar-42	12	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,606.11	93.35	4,760.9672	14.3762	14.9398
31-Mar-43	13	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-44	14	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-45	15	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-46	16	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-47	17	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-48	18	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-49	19	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-50	20	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-51	21	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-52	22	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-53	23	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-54	24	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-55	25	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-56	26	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-57	27	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-58	28	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-59	29	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
31-Mar-60	30	0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
Avg 1-12		0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1.039.8327	380.0701	2,038.8876	660.5782	4,760.9672	14.3762	14.9398
Avg 13-30		0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,105.3176	380.0701	-	-	2,126.9864	6.4227	5.9862
Avg 1-30		0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,079.1236	380.0701	815.5550	264.2313	3,180.5787	9.6041	10.1676
Levelized Tariff		0.4250	0.0831	0.0554	0.5635	247.7248	165.1499	228.7240	1,057.9857	380.0701	1,397.8663	553.2841	4,030.8048	12.1714	7.1344

APENDIX-A

238 MW KALAM ASRIT HYDROPOWER PROJECT

BOARD

RESOLUTION

**TRUE EXTRACTS OF THE RESOLUTION
PASSED BY THE BOARD OF DIRECTORS
ON 29TH APRIL 2022**

**TO APPROVE RESOLUTIONS FOR THE SUBMISSION AN APPLICATION
FOR GENERATION LICENSE AND TARIFF PETITION TO NEPRA.**

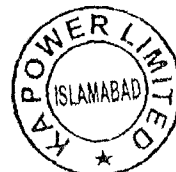
Under the conditions of LOI issued by PEDO, company is obligated to apply for Generation License and Tariff Petition to NEPRA and therefore, all Board members resolved following resolutions, unanimously.

"RESOLVED THAT KA Power Limited, a company incorporated under the laws of Pakistan with its registered office located at 7C, G-8 Markaz, Islamabad (the "Company") be and is hereby authorized to submit an application for Generation License (including any subsequent modification) and Tariff Petition (including any subsequent modifications) for submission to the National Electric Power Regulatory Authority (the "NEPRA") for the grant of Generation License and Tariff in respect of its 238 MW (Gross) Kalam Asrit Hydropower Project to be located at Swat River, Swat, Khyber Pakhtunkhwa, Pakistan (the "Project") and in relation thereto, enter into and execute all documents, make all filings and pay all applicable fees, In each case, of any nature whatsoever, as required,"

"RESOLVED FURTHER THAT in respect of application for the Grant of Generation License (including any modification to the application for the Grant of Generation License) and for the Grant of Tariff (including any modification to the tariff petition for the Grant of Tariff) for submission to NEPRA, Mr. Oh, Inhwan (the "Authorized Representatives"), be and is hereby acting singly empowered and authorized for and behalf of Company to;

- i. prepare, review, execute, submit and deliver the Generation License Application and Tariff Petition (including any modification to the application for the Grant of Generation License and Tariff Petition) and related documentation required by National Electric Power Regulatory Authority, including any contracts, documents, power of attorney, affidavits, statements, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, letters, communications, notices, certificates, requests, statements, and any other instruments in respect to the Generation License and Tariff;
- ii. represent the Company in all negotiations, representations, presentations, hearings, conferences and/or meetings of any nature whatsoever with any entity (including, but in no manner limited to NEPRA, any private parties, companies, partnerships, individuals, governmental and/or semi-governmental authorities and agencies, ministries, boards, departments, regulatory authorities and/or any other entity of any nature whatsoever).

Signature



KA POWER
LIMITED

7C, G-8 Markaz, Islamabad
Tel: +92 51 2726703,
Fax: +92 51 2726703

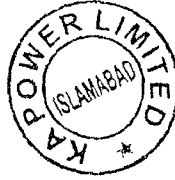
- iii. sign, certify and execute all necessary documentation, pay the necessary fees, appear before the NEPRA as and when required, and do all acts necessary for the completion and processing of the application for the Generation License and Tariff (including any modification).
- iv. do all such acts, matters and things as may be necessary for carrying out the purpose aforesaid and giving full effect to the above resolution/resolutions."

CERTIFIED

Certified further that the above resolutions are included in the minute's book of the Company. It is further stated that the information given above is correct and true to the best of our knowledge and belief.

On behalf of the Company


TARIQ MEHMOOD
Company Secretary



Date: 29th June 2022
Place: Islamabad

APENDIX-B

238 MW KALAM ASRIT HYDROPOWER PROJECT

AFFIDAVIT OF
MR. OK INHWAN
GLOKAPOWER LTD



I, Oh, Inhwan, Chief Executive Officer of KA Power Limited, hereby solemnly affirm and declare that the contents of the accompanying Tariff Petition, including all supporting documents are true and correct to the best of my knowledge and belief and that nothing material has been concealed therefrom.

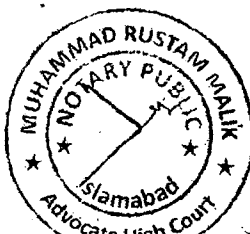
I also affirm that all further documentation and information to be provided by me in connection with the accompanying Tariff Petition will also be true and correct to the best of my knowledge and belief.

Date:

Deponent
Oh, Inhwan
Chief Executive Officer
CNIC/Passport No. M35293154
KA Power Limited

Verified on oath at Islamabad on this 07 day of July 2022 that the contents of the above Affidavit are true and correct to the best of my knowledge and belief.

ATTESTED



Deponent
[•]
Chief Executive Officer
CNIC/Passport No. M3529454
KA Power Limited

APENDIX-C

DRAFT FOR REVIEW
TABLE OF CONTENT

238 MW KALAM ASRIT HYDROPOWER PROJECT

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APENDIX-D

CERTIFICATION OF
INCORPORATION OF
COMPANY

238 MW KALAM ASRIT HYDROPOWER PROJECT

**TRUE EXTRACTS OF THE RESOLUTION
PASSED BY THE BOARD OF DIRECTORS
ON 29TH APRIL 2022**

**TO APPROVE RESOLUTIONS FOR THE SUBMISSION AN APPLICATION
FOR GENERATION LICENSE AND TARIFF PETITION TO NEPRA.**

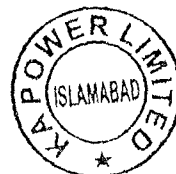
Under the conditions of LOI issued by PEDO, company is obligated to apply for Generation License and Tariff Petition to NEPRA and therefore, all Board members resolved following resolutions, unanimously.

“RESOLVED THAT KA Power Limited, a company incorporated under the laws of Pakistan with its registered office located at 7C, G-8 Markaz, Islamabad (the "Company") be and is hereby authorized to submit an application for Generation License (including any subsequent modification) and Tariff Petition (including any subsequent modifications) for submission to the National Electric Power Regulatory Authority (the "NEPRA") for the grant of Generation License and Tariff in respect of its 238 MW (Gross) Kalam Asrit Hydropower Project to be located at Swat River, Swat, Khyber Pakhtunkhwa, Pakistan (the "Project") and in relation thereto, enter into and execute all documents, make all filings and pay all applicable fees, In each case, of any nature whatsoever, as required,”

“RESOLVED FURTHER THAT in respect of application for the Grant of Generation License (including any modification to the application for the Grant of Generation License) and for the Grant of Tariff (including any modification to the tariff petition for the Grant of Tariff) for submission to NEPRA, Mr. Oh, Inhwon (the "Authorized Representatives"), be and is hereby acting singly empowered and authorized for and behalf of Company to;

- i. prepare, review, execute, submit and deliver the Generation License Application and Tariff Petition (including any modification to the application for the Grant of Generation License and Tariff Petition) and related documentation required by National Electric Power Regulatory Authority, including any contracts, documents, power of attorney, affidavits, statements, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, letters, communications, notices, certificates, requests, statements, and any other instruments in respect to the Generation License and Tariff;
- ii. represent the Company in all negotiations, representations, presentations, hearings, conferences and/or meetings of any nature whatsoever with any entity (including, but in no manner limited to NEPRA, any private parties, companies, partnerships, individuals, governmental and/or semi-governmental authorities and agencies, ministries, boards, departments, regulatory authorities and/or any other entity of any nature whatsoever).

Signature



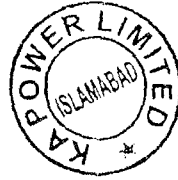
- iii. sign, certify and execute all necessary documentation, pay the necessary fees, appear before the NEPRA as and when required, and do all acts necessary for the completion and processing of the application for the Generation License and Tariff (including any modification).
- iv. do all such acts, matters and things as may be necessary for carrying out the purpose aforesaid and giving full effect to the above resolution/resolutions."

CERTIFIED

Certified further that the above resolutions are included in the minute's book of the Company. It is further stated that the information given above is correct and true to the best of our knowledge and belief.

On behalf of the Company


TARIQ MEHMOOD
Company Secretary



Date: 29th June 2022
Place: Islamabad

APENDIX-E

MEMORANDUM OF ASSOCIATION
OF THE COMPANY

238 MW KALAM ASRIT HYDROPOWER PROJECT



THE COMPANIES ACT, 2017 (XIX of 2017)
(COMPANY LIMITED BY SHARES)

MEMORANDUM

OF

ASSOCIATION

OF

KA POWER LIMITED



THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

MEMORANDUM OF ASSOCIATION

OF

KA POWER LIMITED

1. The name of the company is **KA POWER LIMITED**.
2. The registered office of the Company will be situated in **Islamabad Capital Territory**.
3. (i) The principal line of business of the company shall be to carry on all or any of the businesses of generating, purchasing, importing, transforming, converting, distributing, supplying, exporting and dealing in electricity and all other forms of energy and products or services associated therewith and of promoting the conservation and efficient use of electricity and to perform all other acts which are necessary or incidental to the business of electricity generation, transmission, distribution and supply, subject to permission of concerned authorities; and to locate, establish, construct, equip, operate, use, manage and maintain thermal power plants, coal fired power plants, hydal power plants, wind mills, power grid station, grid stations, cables, overhead lines, sub-stations, switching stations, tunnels, cable bridges, link boxes, heat pumps, plant and equipment for combined heat and power schemes, offices, computer centres, shops and necessary devices, showrooms, depots, factories, workshops, plants and to provide transforming, switching, conversion and transmission facilities, subject to permission of relevant authorities.
- (ii) Except for the businesses mentioned in sub-clause (iii) hereunder, the company may engage in all the lawful businesses and shall be authorized to take all necessary steps and actions in connection therewith and ancillary thereto.
- (iii) Notwithstanding anything contained in the foregoing sub-clauses of this clause nothing contained herein shall be construed as empowering the Company to undertake or indulge, directly or indirectly in the business of a Banking Company, Non-banking Finance Company (Mutual Fund, Leasing, Investment Company, Investment Advisor, Real Estate Investment Trust management company, Housing Finance Company, Venture Capital Company, Discounting Services, Microfinance or Microcredit business), Insurance Business, *Modaraba* management company, Stock Brokerage



business, forex, managing agency, business of providing the services of security guards or any other business restricted under any law for the time being in force or as may be specified by the Commission.

- (iv) It is hereby undertaken that the company shall not:
- (a) engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;
 - (b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, or other related activities/businesses or any lottery business;
 - (c) engage in any of the permissible business unless the requisite approval, permission, consent or license is obtained from competent authority as may be required under any law for the time being in force.

4. The liability of the members is limited.

5. The authorized capital of the company is Rs. 528,000,000 (Rupees Five Hundred Twenty Eight Million Only) divided into 5,280,000 (Five Million Two Hundred Eighty Thousand Only) Ordinary Shares of Rs.100/- (Rupees Hundred Only) each with powers to increase and reduce the Capital of the Company and to divide the shares in the Capital for the time being into several classes in accordance with the provisions of Companies Act, 2017.



the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of this **Memorandum of Association**, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

Name and surname (present & former) in full (in Block Letters)	NIC No. (in case of foreigner, Passport No.) Father's	Father's/ Husband's Name in full	Nationality(ies) with any former Nationality	Occupation	Usual residential address in full or the registered/ principal office address for a subscriber other than natural person	Number of shares taken by each subscriber (in figures and words)	Signatures
KOREA SOUTH-EAST POWER CO., LTD. THROUGH CHOI, HOON TAE	Reg. No. 120-86-19151 M96807349	NA CHOI, KYU SIK	KOREA (SOUTH) KOREA (SOUTH)	BUSINESS	IN KOREA 32, SADEUL-RO, 123 BEON-GIL, JINJU-SI, GYEONGSANGNAM-DO, REPUBLIC OF KOREA. IN PAKISTAN APARTMENT 804 B, 17TH FLOOR, CENTAURUS RESIDENCIA, JINNAH AVENUE SECTOR F-8, ISLAMABAD.	5,219,985	
MIN, BYEONG SOO	M03699409	MIN, CHOUNG SIK	KOREA (SOUTH)	SERVICE	IN KOREA 26, JEONGWANGSINGIL RO 49BEON GIL, SIHEUNG SI, GYEONGGI DO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
CHOI, HOON TAE	M96807349	CHOI, KYU SIK	KOREA (SOUTH)	SERVICE	IN KOREA APARTMENT NO. 605/1203, CHUNGHEUNG APARTMENT, JINJUSI, GYUNGSANGNAMDO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
KIM, MIN YOUNG	M19162342	KIM, CHONG- OK	KOREA (SOUTH)	SERVICE	IN KOREA BUSINESS 314-804 12, BYEORYANG RO GWACHEON-SI, GYEONGGI DO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
Total number of shares taken (Five Million Two Hundred Twenty Thousand Only)						5,220,000	

Dated the 10th day of March 2022.

APENDIX-F

ARTICLES OF ASSOCIATION
OF COMPANY

238 MW KALAM ASRIT HYDROPOWER PROJECT



THE COMPANIES ACT, 2017 (XIX of 2017)

(COMPANY LIMITED BY SHARES)

ARTICLES OF ASSOCIATION

OF

KA POWER LIMITED



PRELIMINARY

PUBLIC COMPANY

1. The Regulations contained in Table 'A' to the First Schedule to the Companies Act, 2017 (the "Act") shall be the regulations of **KA POWER LIMITED** (the "Company") so far as these are applicable to a private company.
2. The Company is a "Public Company" within the meaning of Section 2(1)(52) of the Act and accordingly:

The number of the members of the Company (exclusive of persons in the employment of the Company), shall not be limited, provided that for the purpose of this provision. Where two or more persons hold one or more shares in the company jointly, they shall be treated as single member, and

The right to transfer shares of the Company shall not be restricted in the manner and to the extent herein appearing.

3. The authorized capital of the company is Rs.528,000,000 (Rupees Five Hundred Twenty-Eight Million Only) divided into 5,280,000 (Five Million Two Hundred Eighty Thousand Only) Ordinary Shares of Rs.100/- (Rupees Hundred Only) each with powers to increase and reduce the Capital of the Company and to divide the shares in the Capital for the time being into several classes in accordance with the provisions of Companies Act, 2017.
4. The minimum subscription upon which the directors may proceed to make the first allotment has been fixed as Rs. 522,000,000 (Rupees Five Hundred Twenty-Two Million Only).
5. (1) In these regulations—

1. In these Articles, unless the context or the subject matter otherwise requires:

2.

- a) —the Company means **KA POWER LIMITED**.
- b) —the office means the registered office for the time being of the company.
- c) —the directors mean the directors for the time being of the company.
- d) —the seal means the common seal or official seal of the company as the case may be.
- e) —the Act means the Companies Act, 2017.
- f) —the Commission means the Securities and Exchange Commission of Pakistan.
- g) —the registrar means the registrar of companies as defined in the Companies Act, 2017.
- h) —the register means the register of the members to be kept in pursuant to section 119 of the Act.
- i) —chief executive means the chief executive of the company.
- j) —secretary means the company secretary of the company.
- k) —memorandum means the memorandum of association of the company.
- l) —person includes an individual, company, corporation and body corporate.
- m) —articles means the articles of association of the company.
- n) —board means the board of directors of the company.



- o) —year used in the context of financial matters shall mean financial year of the company.
- p) Expressions referring to writing shall be construed as including references to typewriting, printing, lithography, photography and other modes of representing or reproducing words in visible form.
- q) Words importing the singular number include the plural number and vice versa and words importing the masculine gender include the feminine gender.
- r) Unless the context otherwise requires words or expressions contained in these Articles shall be of the same meaning as in the Act or any statutory modification thereof in force at the date at which these Articles become binding on the company.

s) — **Interpretations**

- 1) **Affiliate** means any entity (including any person, firm, corporation, association or partnership) which (a) is owned and controlled, directly or beneficially, singly or collectively, by one or more Initial Shareholders, (b) owns and controls, directly or beneficially, one or more Initial Shareholders, or (c) is under common ownership and control, directly or beneficially, by an entity which owns and controls, directly or beneficially, one or more Initial Shareholders. For the purposes of this definition, "own and controls" by an entity or entities or another entity shall mean direct or beneficial ownership of fifty one percent (51%) or more interest in, and management control over, such other entity;
- 2) **Commercial Operation Date** means the meaning ascribed thereto in the Power Purchase Agreement;
- 3) **Complex** means the meaning ascribed thereto in the Power Purchase Agreement;
- 4) **Common Terms Agreement** means the Common Terms Agreement dated the Signing Date among the Company and the Finance Parties.
- 5) **Finance Parties** bears the meaning ascribed thereto in Common Terms Agreement.
- 6) **Financiers** bear the meaning ascribed thereto in Common Terms Agreement.
- 7) **GOP** bears the meaning ascribed thereto in the GOP Implementation Agreement.
- 8) **GOP Implementation Agreement** or **GOP IA** means the Implementation Agreement dated the Signing Date by and between the GOP and the Company entered into in relation to the Project, as may be amended by the parties thereto from time to time.
- 9) **Initial Shareholders** means (i)- **M/s. Korea South-East Power Co. Ltd.**, a company incorporated under the laws of Republic of Korea with its principal office at 32, Sadeul-Ro, 123 Beon-Gil, Jinju-Si, Gyeongsangnam-Do, Republic of Korea, (ii) - **Mr. Min, Byeong Soo** having Passport No. M03699409, (iii) - **Mr. Choi, Hoon Tae** having Passport No. M96807349, (iv) - **Mr. Kim, Min Young** having Passport No. M19162342 and all other shareholders as ascribed under the Sponsors' Support Agreement as well as under the Common Terms Agreement, with their permitted assigns, permitted transferee and successors;
- 10) **Main Sponsor** means **Korea South-East Power Co. Ltd.**, a company incorporated under the laws of Republic of Korea with its principal office at 32,



Sadeul-Ro, 123 Beon-Gil, Jinju-Si, Gyeongsangnam-Do, Republic of Korea with permitted assigns, permitted transferees and successors;

- 11) **Power Purchase Agreement** means the Power Purchase Agreement entered into by and between the Power Purchaser and the Company, for the purchase and sale of electric generation capacity and electric power generated by the Complex, as may be amended by the parties thereto from time to time; and
- 12) **Power Purchaser** means the Central Power Purchasing Agency (CPPA-G) is a Company incorporated under the Companies Ordinance, 1984 and wholly owned by the Government of Pakistan (the "GOP"), with its principal office located at CPPA-G, Shaheen Plaza, Plot No. 73-West, Fazal-e-Haq Road, Blue Area, Islamabad., Pakistan or any successor or substitute board or agency that assumes the responsibilities of the Central Power Purchasing Agency.
- 13) **PPIB** means the Private Power & Infrastructure Board of, a body corporate established under the Ministry of Water and Power, Government of Pakistan PPIB Act, 2012, with the principal office at Ground & 2nd Floors, Emigration Tower, Plot No. 10, Mauve Area, Sector G-8/1, Islamabad-Pakistan or any successor or substitute board or agency that assumes the responsibilities of the Private Power & Infrastructure Board.
- 14) **PEDO** means Pakhtunkhwa Energy Development Organization is an autonomous body of the Government of Khyber Pakhtunkhwa under the Pakhtunkhwa Energy Development Organization (Amendment) Act, 2014, with the principal office at Plot # 38, Sect B-2, Phase-5, Hayatabad, District Khyber Pakhtunkhwa, Peshawar-Pakistan or any successor or substitute board or agency that assumes the responsibilities of the Pakhtunkhwa Energy Development Organization.
- 15) **Project Completion Date** bears the meaning ascribed thereto in Common Terms Agreement.
- 16) **Release Date** bears the meaning ascribed thereto in Common Terms Agreement.
- 17) **Signing Date** bears the meaning ascribed thereto:
 - a)-in Common Terms Agreement;
 - b)-in GOP Implementation Agreement or GOP IA; and
 - c)-in Sponsors Support Agreement.
- 18) **Sponsors Support Agreement** means the Sponsors Support Agreement dated the Signing Date among the Company, Sponsors' of the Company and the Finance Parties.

- (2) Unless the context otherwise requires, words or expressions contained in these regulations shall have the same meaning as in this Act; and words importing the singular shall include the plural, and vice versa, and words importing the masculine gender shall include feminine, and words importing persons shall include bodies corporate.

BUSINESS

6. The directors shall have regard to the restrictions on the commencement of business imposed by section 19 if, and so far as, those restrictions are binding upon the company.



SHARES

7. In case of shares in the physical form, every person whose name is entered as a member in the register of members shall, without payment, be entitled to receive, within thirty days after allotment or within fifteen days of the application for registration of transfer, a certificate under the seal specifying the share or shares held by him and the amount paid up thereon:

Provided that if the shares are in book entry form or in case of conversion of physical shares and other transferable securities into book-entry form, the company shall, within ten days after an application is made for the registration of the transfer of any shares or other securities to a central depository, register such transfer in the name of the central depository.

8. The company shall not be bound to issue more than one certificate in respect of a share or shares in the physical form, held jointly by several persons and delivery of a certificate for a share to one of several joint holders shall be sufficient delivery to all.
9. If a share certificate in physical form is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding one hundred rupees, and on such terms, if any, as to evidence and indemnity and payment of expenses incurred by the company in investigating title as the directors think fit.
10. Except to the extent and in the manner allowed by section 86, no part of the funds of the company shall be employed in the purchase of, or in loans upon the security of, the company's shares.

TRANSFER AND TRANSMISSION OF SHARES

11. The instrument of transfer of any share in physical form in the company shall be executed both by the transferor and transferee, and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the register of members in respect thereof, provided that the following provisions/conditions apply to all shares issued by the Company:
- (a) The transfer of such shares to persons of a nationality that is specifically prescribed by the laws of Pakistan shall not be registered by the Company.
 - (b) The Company shall have the right and power to investigate the declaration of nationality stated on any application for registration or transfer of such shares if, as a result of such transfer, the transferee would hold five percent (5%) or more of Ordinary Share Capital of the Company.
 - (c) The Company cannot issue any such shares and Initial Shareholder cannot transfer any such shares owned directly or beneficially by it at any time prior to the Commercial Operations Date or for a period of six (6) years after the Commercial Operations Date, if following such issuance or such transfer the Initial Shareholder will own directly, indirectly or beneficially less than fifty-one percent (51%) of the outstanding Ordinary Share Capital, except for a transfer of shares:
 - (i) to another Initial Shareholder
 - (ii) subject to national security interests of Pakistan as such interests shall be determined in the sole but reasonable discretion of the GOP, to an Affiliate of any Initial Shareholder;



- (iii) required by any law(s) of Pakistan or by the operation of the law(s) of Pakistan or by order of a court, tribunal, or governmental authority or agency with appropriate jurisdiction;
 - (iv) resulting from the creation or enforcement of a security interest in or over any such shares in accordance with the financing documents entered into by the Company in relation to its power generation complex; or
 - (v) to which the Government of Pakistan (including any of its relevant authority or agency) has given its prior written approval.
- (d) The Main Sponsor shall own directly or beneficially at all times prior to the Commercial Operations Date and for a period of six (6) years after the Commercial Operations Date, not less than twenty percent (20%) of the then outstanding Ordinary Share Capital, except where the reduction of ownership of Ordinary Share Capital below twenty percent (20%) by the Main Sponsor results from a transfer of Ordinary Share Capital:
- (i) required by any laws of Pakistan or by the operation of the laws of Pakistan or by order of a court, tribunal, or governmental authority or agency with appropriate jurisdiction;
 - (ii) resulting from the creation or enforcement of a security interest in or over any Ordinary Share Capital in accordance with the financing documents entered into by the Company in relation to its power generation complex; or
 - (iii) the Government of Pakistan (including any of its relevant authority or agency) has given its prior written approval.
- (e) The restrictions set out in Articles 6(c) and 6(d) above shall be noted on all share certificates by affixing thereon a prominent legend as follows: "Subject in all respects to the restrictions on transfers of these shares set out in Articles 6(c), and 6(d) of the Company's Articles of Association". After the completion of the time period, provided in Articles 6(c) and 6(d), any share certificates to which the legend set out in Article 6(e) is still affixed may be returned to the Company and exchanged for a new certificate in accordance with Article 5.

12. Shares in physical form in the company shall be transferred in the following form, or in any usual or common form which the directors shall approve:—

**Form for Transfer of Shares
(First Schedule to the Companies Act, 2017)**

I..... s/or/o..... (hereinafter called the transferor) in consideration of the sum of..... paid to me by..... s/or/o..... (hereinafter called the transferee), do hereby transfer to the said transferee.....the share (or shares) with distinctive numbers fromto.....inclusive, in the **KA POWER LIMITED**, to hold unto the said transferee, his executors, administrators and assigns, subject to the several conditions on which I held the same at the time of the execution hereof, and I, the said transferee, do hereby agree to take the said share (or shares) subject to the conditions aforesaid.



As witness our hands this..... day of....., 20.....

Signature

Transferor Full Name,

Father's / Husband's Name

CNIC Number (in case of

foreigner, Passport

Number)

Nationality

Occupation

Usual Residential Address

Signature

Transferee Full Name,

Father's / Husband's

Name

CNIC Number (in case

of foreigner, Passport

Number)

Nationality

Occupation and

Usual Residential

Address

Cell number

Landline number,

If any Email address

**Bank Account Details of Transferee for Payment of Cash Dividend
(Mandatory in case of a listed company or optional for any other company)**

It is requested that all my cash dividend amounts declared by the company, may be credited into the following bank account:

Title of Bank Account	
Bank Account Number	
Bank's Name	
Branch Name and Address	

It is stated that the above mentioned information is correct and that I will intimate the changes in the above-mentioned information to the company and the concerned Share Registrar as soon as these occur.

.....
Signature of the Transferee(s)

13. (1) Subject to the restrictions contained in regulation 10 and 11, the directors shall not refuse to transfer any share unless the transfer deed is defective or invalid. The directors may also suspend the registration of transfers during the ten days immediately preceding a general meeting or prior to the determination of entitlement or rights of the shareholders by giving seven days' previous notice in the manner provided in the Act. The directors may, in case of shares in physical form, decline to recognize any instrument of transfer unless—

(a) a fee not exceeding fifty rupees as may be determined by the directors is paid to the company in respect thereof; and

(b) the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the directors may reasonably require to show the right of the transferor to make the transfer.



- (2) If the directors refuse to register a transfer of shares, they shall within fifteen days after the date on which the transfer deed was lodged with the company send to the transferee and the transferor notice of the refusal indicating the defect or invalidity to the transferee, who shall, after removal of such defect or invalidity be entitled to re-lodge the transfer deed with the company.

Provided that the company shall, where the transferee is a central depository the refusal shall be conveyed within five days from the date on which the instrument of transfer was lodged with it notify the defect or invalidity to the transferee who shall, after the removal of such defect or invalidity, be entitled to re-lodge the transfer deed with the company.

TRANSMISSION OF SHARES

14. The executors, administrators, heirs, or nominees, as the case may be, of a deceased sole holder of a share shall be the only persons recognized by the company to deal with the share in accordance with the law. In the case of a share registered in the names of two or more holders, the survivors or survivor, or the executors or administrators of the deceased survivor, shall be the only persons recognized by the company to deal with the share in accordance with the law.
15. The shares or other securities of a deceased member shall be transferred on application duly supported by succession certificate or by lawful award, as the case may be, in favour of the successors to the extent of their interests and their names shall be entered to the register of members.
16. A person may on acquiring interest in a company as member, represented by shares, at any time after acquisition of such interest deposit with the company a nomination conferring on a person, being the relatives of the member, namely, a spouse, father, mother, brother, sister and son or daughter, the right to protect the interest of the legal heirs in the shares of the deceased in the event of his death, as a trustee and to facilitate the transfer of shares to the legal heirs of the deceased subject to succession to be determined under the Islamic law of inheritance and in case of non-Muslim members, as per their respective law.
17. The person nominated under regulation 12 shall, after the death of the member, be deemed as a member of company till the shares are transferred to the legal heirs and if the deceased was a director of the company, not being a listed company, the nominee shall also act as director of the company to protect the interest of the legal heirs.
18. A person to be deemed as a member under regulation 11, 12 and 13 to a share by reason of the death or insolvency of the holder shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holder of the share and exercise any right conferred by membership in relation to meetings of the company.

ALTERATION OF CAPITAL

19. Subject to the provisions of Article 6(c) and 6(d), the company may, by special resolution—
 - (a) -increase its authorized capital by such amount as it thinks expedient;
 - (b) consolidate and divide the whole or any part of its share capital into shares of larger amount than its existing shares;
 - (c) -sub-divide its shares, or any of them, into shares of smaller amount than is fixed by the memorandum;



- (d) -cancel shares which, at the date of the passing of the resolution in that behalf, have not been taken or agreed to be taken by any person, and diminish the amount of its share capital by the amount of the share so cancelled.
20. Subject to the provisions of the Act, all new shares shall at the first instance be offered to such persons as at the date of the offer are entitled to such issue in proportion, as nearly as the circumstances admit, to the amount of the existing shares to which they are entitled. The offer shall be made by letter of offer specifying the number of shares offered, and limiting a time within which the offer, if not accepted, will deem to be declined, and after the expiration of that time, or on the receipt of an intimation from the person to whom the offer is made that he declines to accept the shares offered, the directors may dispose of the same in such manner as they think most beneficial to the company. The directors may likewise so dispose of any new shares which (by reason of the ratio which the new shares bear to shares held by persons entitled to an offer of new shares) cannot, in the opinion of the directors, be conveniently offered under this regulation.
21. The new shares shall be subject to the same provisions with reference to transfer, transmission and otherwise as the shares in the original share capital.
22. The company may, by special resolution—
- (a) consolidate and divide its share capital into shares of larger amount than its existing shares;
 - (b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the memorandum of association, subject, nevertheless, to the provisions of section 85;
 - (c) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by any person.
23. The company may, by special resolution, reduce its share capital in any manner and with, and subject to confirmation by the Court and any incident authorized and consent required, by law.

GENERAL MEETINGS

24. The statutory general meeting of the company shall be held within the period required by section 131.
25. A general meeting, to be called annual general meeting, shall be held, in accordance with the provisions of section 132, within sixteen months from the date of incorporation of the company and thereafter once at least in every year within a period of **one hundred and twenty days** following the close of its financial year.
26. All general meetings of a company other than the statutory meeting or an annual general meeting mentioned in sections 131 and 132 respectively shall be called extraordinary general meetings.
27. The directors may, whenever they think fit, call an extra-ordinary general meeting, and extra-ordinary general meetings shall also be called on such requisition, or in default, may be called by such requisitions, as provided by section 133. If at any time there are not within Pakistan sufficient directors capable of acting to form a quorum, any director of the company may call an extra-ordinary general meeting in the same manner as nearly as possible as that in which meetings may be called by the directors.
28. The company may provide video-link facility to its members for attending general meeting at places other than the town in which general meeting is taking place after considering the geographical dispersal of its members:



Provided that in case of listed companies if the members holding ten percent of the total paid up capital or such other percentage of the paid up capital as may be specified, are resident in any other city, the company shall provide the facility of video-link to such members for attending annual general meeting of the company, if so required by such members in writing to the company at least seven days before the date of the meeting.

NOTICE AND PROCEEDINGS OF GENERAL MEETINGS

29. Twenty-one days' notice at the least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hour of meeting and, in case of special business, the general nature of that business, shall be given in manner provided by the Act for the general meeting, to such persons as are, under the Act or the regulations of the company, entitled to receive such notice from the company; but the accidental omission to give notice to, or the non-receipt of notice by, any member shall not invalidate the proceedings at any general meeting.
30. All the business transacted at a general meeting shall be deemed special other than the business stated in sub-section (2) of section 134 namely; the consideration of financial statements and the reports of the board and auditors, the declaration of any dividend, the election and appointment of directors in place of those retiring, and the appointment of the auditors and fixing of their remuneration.
31. No business shall be transacted at any general meeting unless a quorum of members is present at that time when the meeting proceeds to business. The quorum of the general meeting shall be—
 - (a) in the case of a public listed company, not less than ten members present personally, or through video-link who represent not less than twenty-five per cent of the total voting power, either of their own account or as proxies;
 - (b) in the case of any other company having share capital, two members present personally, or through video-link who represent not less than twenty-five per cent of the total voting power, either of their own account or as proxies.
32. If within half an hour from the time appointed for the meeting a quorum is not present, the meeting, if called upon the requisition of members, shall be dissolved; in any other case, it shall stand adjourned to the same day in the next week at the same time and place, and, if at the adjourned meeting a quorum is not present within half an hour from the time appointed for the meeting, the members present, being not less than two, shall be a quorum.
33. The chairman of the board of directors, if any, shall preside as chairman at every general meeting of the company, but if there is no such chairman, or if at any meeting he is not present within fifteen minutes after the time appointed for the meeting, or is unwilling to act as chairman, any one of the directors present may be elected to be chairman, and if none of the directors is present, or willing to act as chairman, the members present shall choose one of their number to be chairman.
34. The chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjournment took place. When a meeting is adjourned for fifteen days or more, notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid, it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an adjourned meeting.



35. (1)-At any general meeting a resolution put to the vote of the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the chairman that a resolution has, on a show of hands, been carried, or carried unanimously, or by a particular majority, or lost, and an entry to that effect in the book of the proceedings of the company shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favour of, or against, that resolution.

(2)-At any general meeting, the company shall transact such businesses as may be notified by the Commission, only through postal ballot.

36. A poll may be demanded only in accordance with the provisions of section 143.

37. If a poll is duly demanded, it shall be taken in accordance with the manner laid down in sections 144 and 145 and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

38. A poll demanded on the election of chairman or on a question of adjournment shall be taken at once.

39. In the case of an equality of votes, whether on a show of hands or on a poll, the chairman of the meeting at which the show of hands takes place, or at which the poll is demanded, shall have and exercise a second or casting vote.

40. Except for the businesses specified under sub-section (2) of section 134 to be conducted in the annual general meeting, the members of a private company or a public unlisted company (having not more than fifty members), may pass a resolution (ordinary or special) by circulation signed by all the members for the time being entitled to receive notice of a meeting. The resolution by circulation shall be deemed to be passed on the date of signing by the last of the signatory member to such resolution.

VOTES OF MEMBERS

41. Subject to any rights or restrictions for the time being attached to any class or classes of shares, on a show of hands every member present in person shall have one vote except for election of directors in which case the provisions of section 159 shall apply. On a poll every member shall have voting rights as laid down in section 134.

42. In case of joint-holders, the vote of the senior who tenders a vote, whether in person or by proxy or through video-link shall be accepted to the exclusion of the votes of the other joint-holders; and for this purpose seniority shall be determined by the order in which the names stand in the register of members.

43. A member of unsound mind, or in respect of whom an order has been made by any court having jurisdiction in lunacy, may vote, whether on show of hands or on a poll or through video link, by his committee or other legal guardian, and any such committee or guardian may, on a poll, vote by proxy.

44. On a poll votes may be given either personally or through video link, by proxy or through postal ballot:

Provided that nobody corporate shall vote by proxy as long as a resolution of its directors in accordance with the provisions of section 138 is in force.

45. (1)-The instrument appointing a proxy shall be in writing under the hand of the appointer or of his attorney duly authorized in writing.

(2)-The instrument appointing a proxy and the power-of-attorney or other authority (if any) under which it is signed, or a notarially certified copy of that power or authority, shall be



deposited at the registered office of the company not less than forty-eight hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of proxy shall not be treated as valid.

46. An instrument appointing a proxy may be in the following form, or a form as near thereto as may be:

INSTRUMENT OF PROXY KA POWER LIMITED

I s/o r/o.....being a member of the Limited, hereby appoint..... s/o.....r/oas my proxy to attend and vote on my behalf at the (statutory, annual, extra-ordinary, as the case may be) general meeting of the company to be held on the.... day of....., 2.... and at any adjournment thereof.

47. A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, or the transfer of the share in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the company at the office before the commencement of the meeting or adjourned meeting at which the proxy is used.

DIRECTORS

48. The following subscribers of the memorandum of association shall be the first directors of the company, so, however, that the number of directors shall not in any case be less than that specified in section 154 and they shall hold office until the election of directors in the first annual general meeting:

1	MR. MIN, BYEONG SOO	(PASSPORT NO. M03699409)
2	MR. CHOI, HOON TAE	(PASSPORT NO. M96807349)
3	MR. KIM, MIN YOUNG	(PASSPORT NO. M19162342)

49. The remuneration of the directors shall from time to time be determined by the company in general meeting subject to the provisions of the Act.
50. Save as provided in section 153, no person shall be appointed as a director unless he is a member of the company.

POWERS AND DUTIES OF DIRECTORS

51. The business of the company shall be managed by the directors, who may pay all expenses incurred in promoting and registering the company, and may exercise all such powers of the company as are not by the Act or any statutory modification thereof for the time being in force, or by these regulations, required to be exercised by the company in general meeting, subject nevertheless to the provisions of the Act or to any of these regulations, and such regulations being not inconsistent with the aforesaid provisions, as may be prescribed by the company in general meeting but no regulation made by the company in general meeting shall invalidate any prior act of the directors which would have been valid if that regulation had not been made.
52. The directors shall appoint a chief executive in accordance with the provisions of sections 186 and 187.
53. The amount for the time being remaining un-discharged of moneys borrowed or raised by the directors for the purposes of the company (otherwise than by the issue of share capital) shall not at any time, without the sanction of the company in general meeting, exceed the issued share capital of the company.



54. The directors shall duly comply with the provisions of the Act, or any statutory modification thereof for the time being in force, and in particular with the provisions in regard to the registration of the particulars of mortgages, charges and pledge affecting the property of the company or created by it, to the keeping of a register of the directors, and to the sending to the registrar of an annual list of members, and a summary of particulars relating thereto and notice of any consolidation or increase of share capital, or sub-division of shares, and copies of special resolutions and a copy of the register of directors and notifications of any changes therein.

MINUTE BOOKS

55. The directors shall cause records to be kept and minutes to be made in book or books with regard to—
- (a) all resolutions and proceedings of general meeting(s) and the meeting(s) of directors and Committee(s) of directors, and every member present at any general meeting and every director present at any meeting of directors or Committee of directors shall put his signature in a book to be kept for that purpose;
 - (b) recording the names of the persons present at each meeting of the directors and of any committee of the directors, and the general meeting; and
 - (c) all orders made by the directors and Committee(s) of directors:

Provided that all records related to proceedings through video-link shall be maintained in accordance with the relevant regulations specified by the Commission which shall be appropriately rendered into writing as part of the minute books according to the said regulations.

THE SEAL

56. The directors shall provide for the safe custody of the seal and the seal shall not be affixed to any instrument except by the authority of a resolution of the board of directors or by a committee of directors authorized in that behalf by the directors and in the presence of at least two directors and of the secretary or such other person as the directors may appoint for the purpose; and those two directors and secretary or other person as aforesaid shall sign every instrument to which the seal of the company is so affixed in their presence.

DISQUALIFICATION OF DIRECTORS

57. No person shall become the director of a company if he suffers from any of the disabilities or disqualifications mentioned in section 153 or disqualified or debarred from holding such office under any of the provisions of the Act as the case may be and, if already a director, shall cease to hold such office from the date he so becomes disqualified or disabled:

Provided, however, that no director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for, the company of which he is director, but such director shall not vote in respect of any such contract or work, and if he does so vote, his vote shall not be counted.

PROCEEDINGS OF DIRECTORS

58. The directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings, as they think fit. A director may, and the secretary on the requisition



- of a director shall, at any time, summon a meeting of directors. Notice sent to a director through email whether such director is in Pakistan or outside Pakistan shall be a valid notice.
59. The directors may elect a chairman of their meetings and determine the period for which he is to hold office; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the directors present may choose one of their number to be chairman of the meeting.
60. At least one-third (1/3rd) of the total number of directors or two (2) directors whichever is higher, for the time being of the company, present personally or through video-link, shall constitute a quorum.
61. Save as otherwise expressly provided in the Act, every question at meetings of the board shall be determined by a majority of votes of the directors present in person or through video-link, each director having one vote. In case of an equality of votes or tie, the chairman shall have a casting vote in addition to his original vote as a director.
62. The directors may delegate any of their powers not required to be exercised in their meeting to committees consisting of such member or members of their body as they think fit; any committee so formed shall, in the exercise of the powers so delegated, conform to any restrictions that may be imposed on them by the directors.
63. (1)-A committee may elect a chairman of its meetings; but, if no such chairman is elected, or if at any meeting the chairman is not present within ten minutes after the time appointed for holding the same or is unwilling to act as chairman, the members present may choose one of their number to be chairman of the meeting.
- (2)-A committee may meet and adjourn as it thinks proper. Questions arising at any meeting shall be determined by a majority of votes of the members present. In case of an equality of votes, the chairman shall have and exercise a second or casting vote.
64. All acts done by any meeting of the directors or of a committee of directors, or by any person acting as a director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of any such directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be a director.
65. A copy of the draft minutes of meeting of the board of directors shall be furnished to every director within seven working days of the date of meeting.
66. A resolution in writing signed by all the directors for the time being entitled to receive notice of a meeting of the directors shall be as valid and effectual as if it had been passed at a meeting of the directors duly convened and held.

FILLING OF VACANCIES

67. At the first annual general meeting of the company, all the directors shall stand retired from office, and directors shall be elected in their place in accordance with section 159 for a term of three years.
68. A retiring director shall be eligible for re-election.
69. The directors shall comply with the provisions of sections 154 to 159 and sections 161, 162 and 167 relating to the election of directors and matters ancillary thereto.
70. Any casual vacancy occurring on the board of directors may be filled up by the directors, but the person so chosen shall be subject to retirement at the same time as if he had become a director on the day on which the director in whose place he is chosen was last elected as director.



71. The company may remove a director but only in accordance with the provisions of the Act.

DIVIDENDS AND RESERVE

72. The company in general meeting may declare dividends but no dividend shall exceed the amount recommended by the directors.
73. The directors may from time to time pay to the members such interim dividends as appear to the directors to be justified by the profits of the company.
74. Any dividend may be paid by a company either in cash or in kind only out of its profits. The payment of dividend in kind shall only be in the shape of shares of listed company held by the distributing company.
75. Dividend shall not be paid out of unrealized gain on investment property credited to profit and loss account.
76. Subject to the rights of persons (if any) entitled to shares with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares.
77. (1)-The directors may, before recommending any dividend, set aside out of the profits of the company such sums as they think proper as a reserve or reserves which shall, at the discretion of the directors, be applicable for meeting contingencies, or for equalizing dividends, or for any other purpose to which the profits of the company may be properly applied, and pending such application may, at the like discretion, either be employed in the business of company or be invested in such investments (other than shares of the company) as the directors may, subject to the provisions of the Act, from time to time think fit.
- (2)-The directors may carry forward any profits which they may think prudent not to distribute, without setting them aside as a reserve.
78. If several persons are registered as joint-holders of any share, any one of them may give effectual receipt for any dividend payable on the share.
79. (1)-Notice of any dividend that may have been declared shall be given in manner hereinafter mentioned to the persons entitled to share therein but, in the case of a public company, the company may give such notice by advertisement in a newspaper circulating in the Province in which the registered office of the company is situate.
- (2)-Any dividend declared by the company shall be paid to its registered shareholders or to their order. The dividend payable in cash may be paid by cheque or warrant or in any electronic mode to the shareholders entitled to the payment of the dividend, as per their direction.
- (3)-In case of a listed company, any dividend payable in cash shall only be paid through electronic mode directly into the bank account designated by the entitled shareholders.
80. The dividend shall be paid within the period laid down under the Act.

ACCOUNTS

81. The directors shall cause to be kept proper books of account as required under section 220.
82. The books of account shall be kept at the registered office of the company or at such other place as the directors shall think fit and shall be open to inspection by the directors during business hours.
83. The directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the accounts and books or papers of the company or any of them shall be open to the inspection of members not being directors, and no member (not being a director) shall have any right of inspecting any account and



book or papers of the company except as conferred by law or authorized by the directors or by the company in general meeting.

84. The directors shall as required by sections 223 and 226 cause to be prepared and to be laid before the company in general meeting the financial statements duly audited and reports as are referred to in those sections.
85. The financial statements and other reports referred to in regulation 80 shall be made out in every year and laid before the company in the annual general meeting in accordance with sections 132 and 223.
86. A copy of the financial statements and reports of directors and auditors shall, at least twenty-one days preceding the meeting, be sent to the persons entitled to receive notices of general meetings in the manner in which notices are to be given hereunder.
87. The directors shall in all respect comply with the provisions of sections 220 to 227.
88. Auditors shall be appointed and their duties regulated in accordance with sections 246 to 249.

NOTICES

89. (1)-A notice may be given by the company to any member to his registered address or if he has no registered address in Pakistan to the address, if any, supplied by him to the company for the giving of notices to him against an acknowledgement or by post or courier service or through electronic means or in any other manner as may be specified by the Commission.
(2)-Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying and posting a letter containing the notice and, unless the contrary is proved, to have been effected at the time at which the letter will be delivered in the ordinary course of post.
90. A notice may be given by the company to the joint-holders of a share by giving the notice to the joint-holder named first in the register in respect of the share.
91. A notice may be given by the company to the person entitled to a share in consequence of the death or insolvency of a member in the manner provided under regulation 85 addressed to them by name, or by the title or representatives of the deceased, or assignees of the insolvent, or by any like description, at the address, supplied for the purpose by the person claiming to be so entitled.
92. Notice of every general meeting shall be given in the manner hereinbefore authorized to (a) every member of the company and also to (b) every person entitled to a share in consequence of the death or insolvency of a member, who but for his death or insolvency would be entitled to receive notice of the meeting, and (c) to the auditors of the company for the time being and every person who is entitled to receive notice of general meetings.

WINDING UP

93. (1)-In the case of members' voluntary winding up, with the sanction of a special resolution of the company, and, in the case of creditors' voluntary winding up, of a meeting of the creditors, the liquidator shall exercise any of the powers given by sub-section (1) of section 337 of the Act to a liquidator in a winding up by the Court including inter-alia divide amongst the members, in specie or kind, the whole or any part of the assets of the company, whether they consist of property of the same kind or not.
(2)-For the purpose aforesaid, the liquidator may set such value as he deems fair upon any property to be divided as aforesaid and may determine how such division shall be carried out as between the members or different classes of members.



(3)-The liquidator may, with the like sanction, vest the whole or any part of such assets in trustees upon such trusts for the benefit of the contributories as the liquidator, with the like sanction, thinks fit, but so that no member shall be compelled to accept any shares or other securities whereon there is any liability.

INDEMNITY

94. Every officer or agent for the time being of the company may be indemnified out of the assets of the company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the company, except those brought by the company against him, in which judgment is given in his favour or in which he is acquitted, or in connection with any application under section 492 in which relief is granted to him by the Court.



We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of this **Articles of Association**, and we respectively agree to take the number of shares in the capital of the company as set opposite our respective names:

Name and surname (present & former) in full (in Block Letters)	NIC No. (in case of foreigner, Passport No.) Father's	Father's/ Husband's Name in full	Nationality (ies) with any former Nationality	Occupation	Usual residential address in full or the registered/ principal office address for a subscriber other than natural person	Number of shares taken by each subscriber (in figures and words)	Signatures
KOREA SOUTH-EAST POWER CO., LTD. THROUGH CHOI, HOON TAE	Reg. No. 120-86-19151 M96807349	NA CHOI, KYU SIK	KOREA (SOUTH) KOREA (SOUTH)	BUSINESS	IN KOREA 32, SADEUL-RO, 123 BEON-GIL, JINJU-SI, GYEONGSANGNAM-DO, REPUBLIC OF KOREA. IN PAKISTAN APARTMENT 804 B, 17TH FLOOR, CENTAURUS RESIDENCIA, JINNAH AVENUE SECTOR F-8, ISLAMABAD.	5,219,985	
MIN, BYEONG SOO	M03699409	MIN, CHOUNG SIK	KOREA (SOUTH)	SERVICE	IN KOREA 26, JEONGWANGSINGIL RO 49BEON GIL, SIHEUNG SI, GYEONGGI DO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
CHOI, HOON TAE	M96807349	CHOI, KYU SIK	KOREA (SOUTH)	SERVICE	IN KOREA APARTMENT NO. 605/1203, CHUNGHEUNG APARTMENT, JINJUSI, GYUNGSANGNAMDO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
KIM, MIN YOUNG	M19162342	KIM, CHONG-OK	KOREA (SOUTH)	SERVICE	IN KOREA BUSINESS 314-804 12, BYEORYANG RO GWACHEON-SI, GYEONGGI DO, REPUBLIC OF KOREA. IN PAKISTAN 7C, G8 MARKAZ, ISLAMABAD.	5	
Total number of shares taken (Five Million Two Hundred Twenty Thousand Only)						5,220,000	

Dated the 10th day of March 2022.

APENDIX-G

LETTER OF INTEREST OF
KALAM ASRIT HYDROPOWER PROJECT

238 MW KALAM ASRIT HYDROPOWER PROJECT



P E D O

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



No. 1296-1304/PEDO/DPP/KOEN/LOI

Dated: 24/04/2018

To

M/S Korea South East Power Company (KOEN),
32, Sadeul-ro 123beon-gil, Jinju-si, Gyeongsangnam-do, Korea.
Tel: +82-70-8898-1000

Subject: LETTER OF INTENT (LOI) FOR APPROXIMATELY 197 MW KALAM ASRIT
HYDRO POWER PROJECT (the "Project")

WHEREAS

- A) The hydel potential raw Site was registered to M/S Korea South East Power Company (KOEN) on first come first serve basis under the KP Hydro Power Policy 2016.
- B) Proposal dated 6th December 2017 including the Statement of Qualification (SOQ) (the "Proposal") was submitted by M/S Korea South East Power Company (KOEN) (the "Main Sponsor"), having its registered address at 32, Sadeul-ro 123beon-gil, Jinju-si, Gyeongsangnam-do, Korea; (Main Sponsor Korea South East Power Company (KOEN) referred herein as the "Sponsors");
- C) PEDO issued No Objection Certificate (NOC) dated 26th March 2018; and
- D) The Sponsors having delivered an irrevocable, unconditional, on demand bank guarantee No. HMB/LG/9902/06/18 dated 16th April 2018, on terms acceptable to PEDO, issued by Habib Metropolitan Bank Limited, Islamic Banking Branch, Hill View Plaza, Near Fresco Sweets, Jinnah Avenue, Blue Area, Islamabad, in the amount of US \$ 197,000/- (United State Dollar seven thousand only) valid up to 16th March 2021 (hereinafter referred to as the 'Performance Guarantee') in favour of PEDO.

NOW THEREFORE

In terms of the provisions of the KP Hydro Power Policy 2016 and associated Guidelines (the "Policy"), the LOI is issued to the Sponsors for conducting a bankable feasibility study (the "Feasibility Study") for establishing, in private sector, an approximately 197 MW Kalam Asrit Hydropower Project to be located on Swat River in Swat District, Khyber Pakhtunkhwa (KP), Pakistan (the "Project") and to perform such actions as provided hereinafter in accordance with following terms and conditions:

1. The Sponsors shall be required to carry out the Feasibility Study, complete, at internationally acceptable standards and in accordance with the terms and conditions stipulated in the Policy for the Project, at no risk and cost to, and without any obligation on



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PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



part of, the GOKP and its agencies, within 24 months from the date of issuance of this LOI. Indicative Terms of Reference (TOR) for the Feasibility Study at Annex-A. The Feasibility Study shall include, but not limited to, an environmental & social impact assessment study, optimized layout of the Project components, detailed design of power house and its allied structures, load flow and stability studies, design of interconnection/transmission lines, details pertaining to infrastructure, detailed bill of quantities and rate analysis of major items, project cost, financing plan, financing terms, tariff calculations and assumptions of financial calculations including economic/financial analysis. You are advised to liaise with the power purchaser while determining your plant size and site, project layout, transmission line and interconnection arrangements, etc. In addition you will also be required to liaise and coordinate with the sponsors of other upstream and downstream projects at Swat River in order to ensure that the design and other parameters/features of the Project do not affect such other projects.

2. The Sponsors shall submit detailed project milestones within one month of signing of this LOI and shall submit monthly progress reports showing progress against these milestones.

3. PEDO will appoint a Panel of Experts (POE) to monitor the conduct of the Feasibility Study and its progress, to verify attainment of the aforesaid milestones and to ensure implementation of the project consistent with national and provincial needs.

4. The Sponsors shall be jointly and severally liable for all obligations and liabilities hereunder. Furthermore, the approval of Feasibility Study by PEDO is subject to fulfillment by the Sponsors of the terms and conditions under and in accordance with the Policy and commitment made under SOQ.

5. Within ninety (90) days after the approval of Feasibility Study by GOKP/PEDO, you are also required to finalize and file a complete feasibility stage tariff petition before National Electric Power Regulatory Authority (NEPRA) in accordance with NEPRA's Mechanism for Determination of Tariff for Hydropower Projects. Furthermore, within sixty (60) days after such tariff determination / approval by NEPRA of the feasibility stage tariff, the Sponsors, after meeting all requirements under the Policy including but not limited to posting of an irrevocable, unconditional, on demand bank Guarantee on terms acceptable to PEDO/PPIB in an amount equal to US\$ 5000/MW shall apply to PPIB for issuance of Tripartite Letter of Support (LOS).

6. PEDO shall be entitled to encash the Performance Guarantee and the LOI shall stand terminated without any notice. In the event, the Sponsors delays, defaults or fails either to:

- i. Complete Feasibility Study within 24 months from the date of issuance of this LOI in accordance with the terms hereof.
- ii. File petition before NEPRA, in accordance with NEPRA's Mechanism for Determination of Tariff for Hydropower Projects, within ninety (90) days of the approval of the Feasibility Study by GOKP/PEDO, for tariff determination.
- iii. Apply to PPIB for issuance of Tripartite LOS within sixty (60) days of tariff determination by NEPRA; or



P E D O

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



iv. Extend the validity of the Performance Guarantee as and when required.

7. If PEDO acting in its sole discretion determines that any extension is required by the Sponsors in relation to their obligations to achieve any milestone(s) under the LOI, PEDO shall be entitled acting on an application in writing made to it by the Main Sponsors at least thirty (30) days before the expiry of such milestone, to grant in writing to the Sponsors such extension as is prescribed under and subject to such conditions as provided in the Policy.

8. The Performance Guarantee shall secure the Sponsor's obligations under and in accordance with the terms of this LOI. The Performance Guarantee shall remain valid and in full force until the date falling three (3) months beyond the expected date for issuance of Tripartite LOS, If the Performance Guarantee is due to expire within thirty (30) days and is required to be maintained by the Sponsors, the Sponsors shall renew the Performance Guarantee no later than ten (10) days before its expiry, failing which PEDO shall be entitled to encash the Performance Guarantee in full and hold such cash as security for the obligations of the Sponsors under the LOI.

9. The Sponsors shall hold not less than fifty one percent (51%) of the equity during Lock in Period (commencing from the date of issuance of this LOI until the sixth (6th) anniversary of the commissioning of the Project). The Main Sponsor shall hold not less than twenty percent (20%) of the equity during the Lock in Period.

10. This LOI shall be effective from the date hereof, and remain valid till the issuance of Tripartite LOS by PPIB or unless terminated earlier in accordance with the terms hereof. **Nevertheless, this LOI shall lapse if the signed copy is not received at PEDO within fifteen (15) days of its issuance.**

11. This LOI shall in no way be construed as an award of the Project as no such vested legal or contractual rights shall accrue, in your favor, till such time, valid Project Agreements (as defined in the LOS) are executed in accordance with the terms and conditions contained therein.

12. Issuance of this LOI or any act done in terms hereof or its termination, lapse or expiry or Sponsors' conduct of Feasibility Study hereunder cannot form the basis of any claim for compensation or damages by the Sponsors or any party claiming through them against the Government of Khyber Pakhtunkhwa, PEDO or any of its agencies on any grounds whatsoever, during or after the expiration, lapse or termination of the LOI.

13. The obligations and liabilities of the Sponsors under the LOI and the Performance Guarantee shall be joint and several. Any notice or communication by or to the Main Sponsor under this LOI shall be deemed a notice or communication to or by the entire Sponsors. *m*

14. The rights and obligations of the parties pursuant to and under this LOI shall be governed by the laws of Pakistan and the Courts of Pakistan shall have exclusive jurisdiction in



P E D O

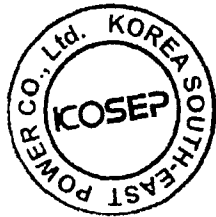
PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



relation to any dispute or matter arising out of or in connection herewith. The court of jurisdiction will be at Peshawar High Court.

This LOI has been issued in duplicate on the date hereof. Kindly sign the attached copy of this LOI at the place indicated and return the same to us no later than fifteen (15) days of its issuance.

Yours sincerely,



[Signature]
Director
Private Power PEDO

Mr. *[Signature]* Min, Byeong Soo

CNIC/Passport: *M036PP40P*

For and on behalf of

M/S KOREA SOUTH EAST POWER Co. Ltd. (KOSEP)

Encl.: 1) Indicative Terms of Reference (TOR) for the Feasibility Study of Hydropower Project (Annex-A)

Cc:

1. Chairman NEPRA, NEPRA Tower, Ataturk Avenue, G-5/1 (east), Islamabad.
2. MD NTDCL, 4th Floor, PIA Tower, Egerton Road Lahore.
3. CEO, CPPA-G, Shaheed-e-Millat Secretariat, Blue Area Islamabad.
4. MD PPIB, Immigration Tower, G-8/1, Mauve Area Islamabad.
5. CEO PESCO, WAPDA House, Shami Road, Peshawar.
6. PS to Secretary E&P Department, Civil Secretariat, Peshawar.
7. PS to Secretary Environment Department, Civil Secretariat, Peshawar.
8. PS to GM (Hydel), PEDO Peshawar.

[Signature]

APENDIX-H

APPROVAL OF FEASIBILITY
STUDY REPORT

238 MW KALAM ASRIT HYDROPOWER PROJECT



P E D O

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



No. 64-70/PEDO/DRE/FS/KA

Dated: April 06, 2022

To

Yoon, An Sang,
Branch Manager Pakistan,
Korea South-East Power Company Limited, (KOEN),
Plot 7-C, G-8 Markaz,
Islamabad, Pakistan


Subject: **APPROVAL OF FEASIBILITY STUDY FOR 238 MW KALAM-ASRIT HPP, LOCATED ON
SWAT RIVER, DISTRICT SWAT**

- References:**
- Letter of Interest (LOI) dated April 24, 2018
 - Feasibility Study submitted dated April 14, 2020
 - Minutes of POE Meeting dated December 22, 2021, issued vide PEDO letter no. 52-65/PEDO//DRE/PP/KOEN/MoM dated February 10, 2022.

PEDO is pleased to communicate following decision of Panel of experts (POE) of PEDO, monitoring the conduct of Feasibility Study for the subject project:


"The feasibility Study for 238 MW Kalam-Asrit Hydropower Project on Swat River, District Swat carried out by the consultants for M/S KOEN is approved in accordance with KP Hydropower Policy 2016 and Associated Guidelines subsequent to NOCs from Environment Protection Agency (EPA) and Power Evacuation Consent from National Transmission & Dispatch Company Limited (NTDCL)."

- Due to nature of data and resultant conclusion, Panel of Experts jointly and/or individually will not be responsible for reliability of data, contents and conclusions given in the feasibility study.
- As the feasibility study has been carried out at the risk & cost of the sponsor, the approval of feasibility study shall not form basis of any claim for compensation from Govt. of KP / PEDO in future.
- In accordance with the KP Hydropower Policy 2016, upon the approval of the feasibility study by the POE, you are requested to process the case for tariff determination with NEPRA within 60 days.
- PEDO appreciates your efforts to complete the feasibility study and expect the same pace and spirit for negotiation and finalizing tariff with NEPRA.


Manager Renewable Energy
(Private Power)

Copy for information to:

- Managing Director, NTDCL, Lahore.
- Managing Director, PPIB, Islamabad.
- CEO, CPPA-G, Islamabad.
- Registrar, NEPRA, Islamabad.
- PS to Secretary, E&P Department, Peshawar.
- PS to CEO, PEDO, Peshawar.


Manager Renewable Energy
(Private Power)

PEDO House, 38/B-2, phase-V, Hayatabad, Peshawar. Tel: (+92-91) 9217246, Fax (+92-91) 9217003

APENDIX-I

APPLICATION FOR GRANT OF
GENERATION LICENSE

238 MW KALAM ASRIT HYDROPOWER PROJECT

**KA POWER
LIMITED**

23rd Floor, Ufone Tower,
Jinnah Avenue, Blue Area,
Islamabad.
Tel: +92 51 2726703
Fax: +92 51 2726703

Dated: 4 Jul 2022

The Registrar
National Electric Power Regulatory Authority (NEPRA)
NEPRA Tower Attaturk Avenue (East)
Sector 0-5/1,
Islamabad.

NEPRA R & I Section
Morning Shift

Date: 04/7/22

4:52 pm

Subject: Application for Grant of Generation License to KA Power Limited in respect of 238 MW Kalam Asrit Hydropower Project, Swat, Khyber Pakhtunkhwa

Dear Sir,

Korea South-East Power Co. ("KOEN"), a premium generation company owned by Government of Korea, has been awarded LOI by Pakhtunkhwa Energy Development Organization (PEDO) for developing a 238 MW hydroelectric power project (the "Project"). In this regard, KA Power Limited (the "Company"), a special purpose company, has recently been established under the laws of Pakistan for the execution of development process of the Project. The Project would be developed on a Build, Own, Operate and Transfer ("BOOT") basis under Pakistan Power Generation Policy 2015 and KPK Hydropower Policy 2016.

I, Oh Inhwon, Chief Executive Officer, being the duly authorized representative of the Company by virtue of board resolution dated 29 April 2022, hereby apply to National Electric Regulatory Authority ("NEPRA" or "Authority") for grant of Generation License to the Company pursuant to the section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997.

I hereby certify that the documents-in-support attached with this Application are prepared and submitted in conformity with the provisions of National Electric Power Regulatory Authority Licensing (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021 and undertake to abide by the terms and provision 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 knowledge and no material omission has been made.

A bank draft in the sum of Rupees 1,814,686 (Pakistani Rupees One Million Eight Hundred Fourteen Thousand Six hundred and Eighty Six only), being the license applicable fee calculated in accordance with Schedule II of the National Electric Power Regulatory Authority Licensing (Application, Modification, Extension and Cancellation) Procedure Regulations, 2021 is also attached herewith.

We would like to submit that the Grid Interconnection Study (GIS) for the Project was conducted by Power Planners International and has been submitted to National Transmission and Dispatch Company (NTDC). NTDC has informed that an integrated study for evacuation of power from the hydropower projects in Swat cascade projects through 220kV transmission lines is under final stages by NTDC/PEDO, therefore NTDC shall approve the Project's GIS study as part of the said integrated study and shall make their comments upon its completion accordingly.

We would take this opportunity to submit that all legal requirements regarding Environmental Impact Assessment (EIA) approval/NOC from Khyber Pakhtunkhwa (KPK) Environmental Protection Agency (EPA) has been fulfilled including public hearing, redressed of all comments of EPA, NOCs from line departments like Mines, Minerals, fisheries and wildlife etc.. All is set by EPA for issuance of NOC except project requires 4 Acres of protected forest land which need to be de-notified by KPK

**KA POWER
LIMITED**

23rd Floor, Ufone Tower,
Jinnah Avenue, Blue Area,
Islamabad.
Tel: +92 51 2726703
Fax: +92 51 2726703

Cabinet for which approval is expected shortly. We would submit EPA NOC as soon we receive it. Documentary evidence of above is attached.

Keeping in view the forgoing, the Authority is requested to kindly process Company's application for grant of generation license for the subject Project so that further required steps can be taken for the full implementation of the Project.

Yours Sincerely,

Chief Executive Officer



Letter No. KA/PD/GL/0001 -2022

Date: 06th July 2022

The Registrar,
National Electric Power Regulatory Authority (NEPRA),
NEPRA Tower Attaturk Avenue (East),
Sector G-5 1,
Islamabad.

Subject: Application for Grant of Generation License for KA Power Limited in respect of 238 MW Kalam-Asrit Hydropower Project Swat, Khyber Pakhtunkhwa

Dear Sir,

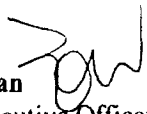
Please refer to our application for Generation License dated 04 July 2022 wherein it was informed that all is set by KPK EPA for issuance of NOC on ESIA of the Project and will be submitted to NEPRA as soon we receive it.

In this regard, we are pleased to inform that the Company has received NOC for EIA from KPK EPA dated July 4, 2022 (copy attached as Annex-1).

We would request to please enclose EPA NOC with above referred application for Generation License. We look forward to NEPRA for early processing of Project Generation License to enable the Project Sponsor to move ahead for next development process and deliver the Project within timeline.

We look forward to your continued support in the future.

Yours truly,


Oh Inhwan
Chief Executive Officer
KA Power Limited

Attachment-1:

Annex 1: PKP EPA NOC for EIA of 238 MW Kalam-Asrit Hydropower Project

APENDIX-J

238 MW KALAM ASRIT HYDROPOWER PROJECT

NOC OF EPA/NAK



Environmental Protection Agency
Forestry, Environment & Wildlife Department
Govt. of Khyber Pakhtunkhwa

EPA/EIA/HPT/238MW/Kalam-Asrit/Swt/22/305

Date: 11/11/2022



To

Mr. Oh Inhwan,
CEO KA Power Limited,
23rd Floor, Ufone Tower, Jinnah Avenue, Blue Area, Islamabad,
Contact No. 051-2726703

Subject: **EIA REPORT FOR 238MW HYDROPOWER PROJECT IN SWAT DISTRICT, KHYBER PAKHTUNKHWA**

Kindly refer to the subject cited above and to enclose herewith Environmental Approval/Decision Note on EIA Report of "238 MW Kalam Asrit Hydro Power Project, District Swat" for your information and further implementation.

Moreover, **Schedule-X** must be submitted to this Agency within a month on Stamp Paper as an undertaking for the compliance of terms and conditions as mentioned in the Environmental Approval as well as mitigation measures proposed in the EIA Report. (Copy enclosed).


Director General

Copy for information and necessary action to the;

- PS to Secretary FE&WD, Govt. of Khyber Pakhtunkhwa
- PS to Secretary Energy & Power Department, Govt. of Khyber Pakhtunkhwa
- GIS Specialist, EPA, HQ, Peshawar

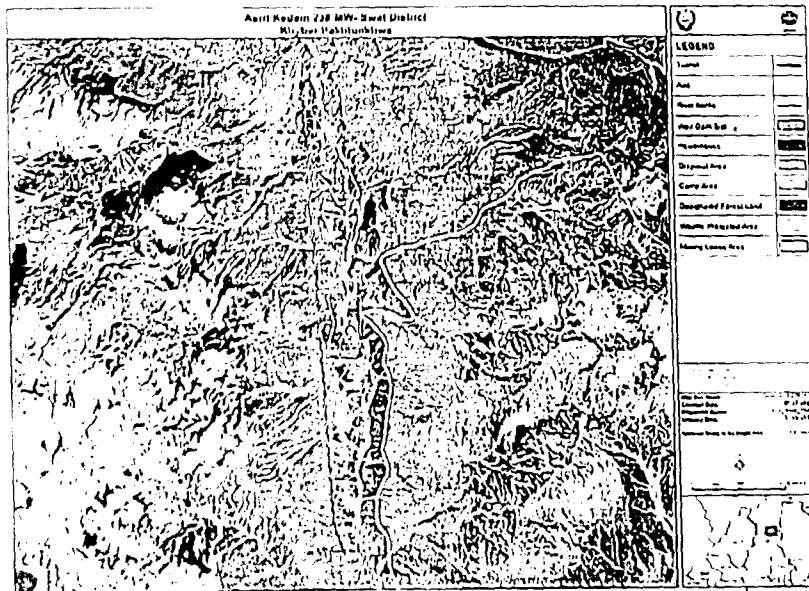
Ei/EIA #SectoralWaste Companies/Waste Water Treatment (Chashma Sugar Mills Limited Dera Ismail Khan)

3rd Floor, Old Courts Building, Khyber Road, Peshawar Cantt.
Tel: 92(91) 9210263-9210148, Fax: 92 (91) 9210280

"238 MW Kalam Asrit Hydro Power Project, District Swat" in line with the Khyber Pakhtunkhwa Environmental Protection Act, 2014 and the

SCHEDULE VI
Decision on EIA

1. **Name, address of proponent:** Mr. Oh Inhiwan,
CEO KA Power Limited,
23rd Floor, Ufone Tower, Jinnah Avenue,
Blue Area, Islamabad, Islamabad.
Contact No. 051-2726703
2. **Description of project** The proposed 238MW Hydropower project is located on river Swat. The project weir will be located at Kalam, Swat district of KPK province at approximately 2 km downstream from the confluence of Gabral and Ushu Rivers. The powerhouse is located upstream of Asrit Khwar, which is about 600m downstream from the intake. It is run of the river project and will be operated on the base load. The E Flow study adopts 2.6 cumec using CHEMGRAPH method for calculation of E-Flow. The project is a run of a river project and will be operated on base load.
3. **Location of project.** District Swat.
GIS Map & Coordinates Powerhouse (35°21'45.62"N 72°36'6.20")
Weir (35°27'52.65"N 72°35'52.42"E)



4. **Date of filing of EIA.** 15/02/2022 (Ref: EPA Diary No.166)
5. After careful review, the Environmental Protection Agency, Govt. of Khyber Pakhtunkhwa has decided to accord Construction Environmental Approval of the Environmental Impact Assessment (EIA) Report of "238 MW Kalam Asrit Hydro Power Project, District Swat" in line with the Khyber Pakhtunkhwa Environmental Protection Act, 2014 and the

Environmental Impact Assessment and Approval of Pak. 2024 subject to
the NEQS 2008.

The project will adopt all precautionary and mitigation measures
mentioned in the EIA Report as well as replies of the proponent
to the comments of the Agency and any anticipated impacts arising
during the Construction and Operation phase of the project.

- f) Arrangements for compensation to the affectees in case of loss of
agricultural land, crops and property, Schools, Graveyards, Masjids,
will be finalized before the start of construction. Any money involved
in compensation will be deposited with District Govt./Revenue
Department for disbursement among the affectees. A committee will
be constituted as per laid out procedure in EIA report ensuring fair
representation of locals with properly documented grievance
procedure. As far as possible recommendations of a committee
comprising of land/house owners and tenants shall be taken into
consideration during finalizing the compensation package. All
conflicting issues regarding compensation, etc. should be settled
before executing/commencing of the project activities and a certificate
in this regard should be submitted to this Agency.
- g) In light of the LARP, in addition to other compensation measures, at
least one male from every affected household will be given
employment or loan based on their willingness, based on the project
requirement.
- h) The existing irrigation channels, natural water springs, the water
supply scheme/spring affected from the Project shall be properly
compensated and alternate water supply for the affectees shall be
ensured, Detail of the same shall shared with the Agency before
commencement of the construction activity;
- i) The spring channels disturbed during tunnel excavation shall be
connected to pipes and shall be used as source of drinking water or
other purposes for the locals of the area. Details of the same shall be
submitted to this Agency.
- j) Detail of steps/mitigation measures shall be taken to mitigate
impacts of the project on River Swat/natural water streams;
- k) The Right of Way (RoW) of the River Swat shall be protected.
Moreover, the River shall be also protected from all type of pollution
from project related activities;
- l) The natural rainwater water sheds RoW shall not be disturbed;
- m) The contaminated waste water of the tunnels shall be retained in
confined pits of proper size ensuring proper treatment, complying
NEQS parameters before final disposal.
- n) The existing routes going to the nearby villages shall not be affected
or alternate routes shall be provided to the villagers;



- k) Affected existing structures shall be relocated & compensated to the appropriate area before start of construction work.

A committee shall be constituted under the supervision of District Administration comprising representatives of the affected villages. The committee will look into issues arising from the Project;

In order to avoid the traffic congestion issues, the submitted traffic management plan shall be properly implemented

Proper mitigation plan shall be formulated and implemented to avoid soil erosion, land sliding and sedimentation to the nearby river water channel before commencement of Construction activity.

- l) Minimum environmental flow of 2.6 Cumecs with 10% extra flow shall be maintained in the downstream in case of emergency or as recommended by EPA KP. In light of the submitted EIA Report, the project management shall operate the dam on option of base load / high protection operation run of river mode. The amount of E. Flow may be revised on the basis of findings of the Cumulative Impacts Assessment study of Hydropower Projects on river Swat that is planned to be conducted in near future. Moreover, E.flow meters shall be installed on site and online access of the same shall be provided to EPA KP as and when required.
- m) The muck/debris generated from the project shall be properly quantified, dumping sites for the same shall be properly identified & selected and this Agency shall be informed prior commencement of the construction activities. The proponent shall ensure to avoid dumping of debris into down slope or in the River Swat Right of Way (RoW) or other water bodies. The same shall be stabilized by proper plantation, bio engineering and engineering techniques. Retention walls of proper size shall be erected along the muck disposal material/site;
- n) The biodiversity management plan shall be implemented. Fisheries, Wildlife, Forest Department and EPA shall be consulted in improvement of the Biodiversity Action Plan to mitigate the impact of the project on aquatic life, fauna, flora and Environment. Moreover, Biodiversity Action Plan (BAP) shall be formulated in future if recommended by EPA KP at any stage on the basis of findings during monitoring of the instant project.
- o) Clearance from Wildlife Department Govt. of Khyber Pakhtunkhwa shall be obtained if impacts of the project activities are identified / reported on the nearest wildlife park in future.
- p) Safety zone/adequate engineering measures should be provided to overcome fears of the residents regarding project activities to their houses;
- q) The construction/installations shall be carried out keeping in view seismicity of the project area & ensuring implementation of updated building by-laws/codes;



- Proper Flood Management Plan shall be identified for the project site & site specific mitigation measures shall be implemented during floods.
- Primary baseline data comprising analysis reports of surface water (River Swat/water bodies), Soil, ambient air, noise, ground water etc. of the project area shall be carried out on quarter basis from KP-EPA certified Lab before commencement of the construction activity. Moreover, the analysis reports shall be submitted to EPA on quarterly basis.
- w) A sedimentation load study shall be carried out along with mitigation measures for the control of sedimentation from upstream of the reservoir;
 - x) Road/Highway Submerged/damaged due to project activity should be reconstructed/repared/rehabilitated to another suitable place in consultation with concerned Govt. Department;
 - y) The proponent shall ensure the strict and efficient health and safety measures for the protection of workers and passersby backed by a comprehensive emergency response plan;
 - z) A comprehensive CSR policy shall be formulated keeping in view, the demands/needs of the locals and quantum of the project activity. The detail of the same shall be shared with this Agency before commencement of the construction activity. A committee with representation from locals and EPA shall be finalized for this reason before commencement of physical activities.
 - aa) Funds shall be allocated for environmental improvement, monitoring facilitation and protection of natural resources of the area.
 - bb) Non-technical jobs shall be provided to local community/villages. Priority should also be given to locals in technical jobs. Employment record for all positions shall be provided to EPA-Khyber Pakhtunkhwa. Regular trainings shall be arranged for the locals regarding acquiring knowledge of technical jobs.
 - cc) The camp site, asphalt plants, crush plants & batching plants shall be located at a safe distance as recommended by the Agency.
 - dd) Separate approval shall be obtained for establishment of Crushing Plant, permanent Colony, Asphalt plant, etc. under Khyber Pakhtunkhwa Environmental Assessment Rules, 2021. For temporary colony and camps, proper treatment plant shall be constructed for municipal effluents treatment to bring it within the NEQS parameters before final discharge;
 - ee) A comprehensive plantation plan, in consultation with Forest Department, shall be submitted to this Agency along with GPS Coordinates of the plantation sites.
 - ff) De-notification of the Forest land from the concerned Govt. Authority shall be submitted to this Agency before commencement

Physical activities shall be implemented in accordance with the Environmental Management Plan. The Environmental Management Plan shall be implemented in letter and spirit and compliance of the same shall be submitted to this Agency.

- xx) As permitted only TBM shall be used for establishment of tunnel and control blasting techniques shall be adopted only at start and end points of the tunnel in accordance with prevailing explosive laws.
- yy) Fisheries Department recommendations communicated vide letter No. 1068 DGF R 3, dated 18/04/2022 shall be implemented in letter and spirit and compliance of the same shall be submitted to EPA KP.
- zz) Mines & Mineral Department letter No. 1704/MDW/SWT/Kalam Asrit Hydropower Project, dated: 21/06/2022 shall be implemented in letter and spirit and compliance of the same shall be submitted to EPA KP.
- 1) Proper plan shall be submitted for safe disposal of hazardous waste before commencement of physical activities.
- kk) Cumulative Impacts Assessment study of the project on river Swat shall be conducted or the proponent shall pay the due share as and when decided for a cumulative impacts assessment study for all the Hydropower projects located on river Swat. Moreover, the proponent will facilitate the Agency in research activities / studies through allocation of scholarship for proper assessment of the HPPs on different rivers and its mitigation.
- ll) Boulders trap shall be installed at upstream of Asrit nala and sand trap shall installed for control of sedimentation.
- mm) An Environmentalist along with team shall be hired for proper and effective implementation of the Environmental Management Plan.
- nn) The cultural values & social norms of the area shall be followed strictly;
- oo) No extension would be permitted in the future in the existing hydropower project without prior approval of the EPA Govt. of Khyber Pakhtunkhwa.
- pp) The proponent shall adopt all the possible mitigation measures to prevent ground water contamination at any cost.
- qq) River bed mining shall not be conducted without prior approval of this Agency.
- rr) A proper flood protection and management plan duly approved from Provincial Disaster Management Authority (PDMA) shall be submitted to this Agency before commencement of physical activities.




ss' The proponent shall provide the copy of this approval and EIA Report to the contractor for information and compliance. Applicable conditions of this approval shall be made part of the contract agreement. However, compliance of this approval shall be the sole responsibility of the proponent of this project.

iii) This Agency may suggest any additional mitigation measures updated technology for the control of Environmental Pollution degradation at any stage (construction & operational phase) of the project.

6. The Proponent shall be liable for correctness and validity of the information supplied by the environmental consultant.
7. There shall be no legal case pending in any court against the project.
8. The proponent shall be liable for compliance of rules 14, 15, 18, 19, 20 & 21 of the Khyber Pakhtunkhwa Environmental Assessment Rules, 2021 regarding approval, confirmation of compliance, entry, inspections and monitoring.
9. This approval is accorded only for the construction phase of the project. The Proponent will obtain approval for operation of the hydro power project in accordance with the rule-15 and 18 of the Khyber Pakhtunkhwa Environmental Assessment Rules, 2021.
10. Any change in the approved project shall be communicated to EPA, Khyber Pakhtunkhwa and shall be commenced after obtaining the approval.
11. This approval shall be treated as null and void if all or any of the conditions mentioned above is/are not complied with.
12. This approval does not absolve the proponent of the duty to obtain any other approval or clearance that may be required under any law in force.
13. The quarterly progress/compliance report of the above conditions shall be submitted to EPA.
14. In exercise of the power under Section-13 of the Khyber Pakhtunkhwa Environmental Protection Act, 2014, the undersigned is pleased to approve the EIA Report of "**Kalam-Asrit 238 MW Hydro Power Project, District Swat**" for construction phase of the project with above mentioned terms and conditions.

Dated: Peshawar 21 / 07 / 2022

Tracking/ File.No. EPA/EIA/HPP/238MW/Kalam-Asrit/Swt/22/303-06


**DIRECTOR GENERAL,
EPA, Khyber Pakhtunkhwa,
3rd Floor, SDU Building,
Khyber Road, Peshawar Cantt.**

APENDIX-K

238 MW KALAM ASRIT HYDROPOWER PROJECT

APPROVAL OF FLAT-PILE
FOUNDATION REPORT



P E D O

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION
Government of Khyber Pakhtunkhwa Peshawar



No. 64-70/PEDO/DRE/FS/KA

Dated: April 06, 2022

To

Yoon, An Sang,
Branch Manager Pakistan,
Korea South-East Power Company Limited, (KOEN),
Plot 7-C, G-8 Markaz,
Islamabad, Pakistan


Subject: **APPROVAL OF FEASIBILITY STUDY FOR 238 MW KALAM-ASRIT HPP, LOCATED ON SWAT RIVER, DISTRICT SWAT**

- References:**
- Letter of Interest (LOI) dated April 24, 2018
 - Feasibility Study submitted dated April 14, 2020
 - Minutes of POE Meeting dated December 22, 2021, issued vide PEDO letter no. 52-65/PEDO//DREPP/KOEN/MoM dated February 10, 2022.

PEDO is pleased to communicate following decision of Panel of experts (POE) of PEDO, monitoring the conduct of Feasibility Study for the subject project:


"The feasibility Study for 238 MW Kalam-Asrit Hydropower Project on Swat River, District Swat carried out by the consultants for M/S KOEN is approved in accordance with KP Hydropower Policy 2016 and Associated Guidelines subsequent to NOCs from Environment Protection Agency (EPA) and Power Evacuation Consent from National Transmission & Dispatch Company Limited (NTDCL)."

- Due to nature of data and resultant conclusion, Panel of Experts jointly and/or individually will not be responsible for reliability of data, contents and conclusions given in the feasibility study.
- As the feasibility study has been carried out at the risk & cost of the sponsor, the approval of feasibility study shall not form basis of any claim for compensation from Govt. of KP / PEDO in future.
- In accordance with the KP Hydropower Policy 2016, upon the approval of the feasibility study by the POE, you are requested to process the case for tariff determination with NEPRA within 60 days.
- PEDO appreciates your efforts to complete the feasibility study and expect the same pace and spirit for negotiation and finalizing tariff with NEPRA.


Manager Renewable Energy
(Private Power)

Copy for information to:

- Managing Director, NTDCL, Lahore.
- Managing Director, PPIB, Islamabad.
- CEO, CPPA-G, Islamabad.
- Registrar, NEPRA, Islamabad.
- PS to Secretary, E&P Department, Peshawar.
- PS to CEO, PEDO, Peshawar.


Manager Renewable Energy
(Private Power)

PEDO House, 38/B-2, phase-V, Hayatabad, Peshawar. Tel: (+92-91) 9217246, Fax (+92-91) 9217003

APENDIX-L

238 MW KALAM ASRIT HYDROPOWER PROJECT

ENVIRONMENTAL & COST ESTIMATION

Pakistan Kalam Asrit Hydropower Project

FEASIBILITY STUDY REPORT

Volume 10 – BOQ & Cost Estimate

Feb. 2022

KOEN

 **saman**
Saman Corp.

DOCUMENTS / REPORT CONTROL FORM

Project Name	Feasibility Study of Kalam Asrit Hydropower Project
Report Name	Volume 10, BOQ & Cost Estimate
Project Number	018375
Client	Korea South-East Power Co. (KOEN)

PREPARATION, REVIEW AND AUTHORIZATION

Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
Rev. 01	22 Nov 2019	Various	CH. Lee KK. Shin	JS. Han
Rev. 02	01 Apr 2020	Various	CH. Lee KK. Shin	JS. Han
Rev. 03	15 Feb 2022	YH. Shin	CH. Lee	JS. Han

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2. Cost Estimates of EPC	Annex A
3. Unit Rate Analysis	Annex B
4. Material Cost Escalation	Annex C
5. Tunnel Cost Variation	Annex D

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Summary of EPC Cost

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Kalam-Asrit HPP				Kalam-Asrit HPP			
			Estimates by FS Consultant				POE Approved (15% reduction in Unit Rate by POE)			
			Quantity	Unit Price (US\$)	Total (US\$)	Total (Rps)	Quantity	Unit Price (US\$)	Total (US\$)	Total (Rps)
	TOTAL EPC COST				385,383,287	68,790,916,768			365,958,331	65,323,562,158
A	Civil Works									
1	ROADS				247,013,958	44,091,991,583			228,911,462	40,860,695,905
2	BYPASS TUNNEL & COFFERDAM				5,740,000	1,024,590,000			5,740,000	1,024,590,000
3	SPILLWAY				22,191,527	3,961,187,570			19,795,417	3,533,481,997
4	POWER INTAKE				26,182,231	4,673,528,234			22,397,132	3,997,888,070
5	WATERWAY				6,992,477	1,248,157,145			5,957,105	1,063,343,189
6	SURGE SHAFT				137,875,885	24,610,845,473			132,280,555	23,612,079,036
7	POWERHOUSE CIVIL				6,568,093	1,172,404,601			5,602,083	999,971,809
8	O&M STAFF COLONY				25,175,988	4,493,913,858			21,842,094	3,898,813,758
9	CONSTRUCTION MACHINERY & EQUIPMENT				3,000,000	535,500,000			3,000,000	535,500,000
10	CONTINGENCY FOR CIVIL WORKS	%	5%	235,251,389	11,762,569	2,099,618,647			1,396,531	249,280,784
B	ELECTRICAL & MECHANICAL EQUIPMENT									
1	ELECTRICAL WORK				105,398,764	18,813,679,332			105,398,764	18,813,679,332
2	HYDRAULIC STEEL STRUCTURE EQUIPMENT				26,720,646	4,769,635,249			26,720,646	4,769,635,249
3	ELECTRO-MECHANICAL EQUIPMENT				36,104,187	6,444,597,424			36,104,187	6,444,597,424
C	PRELIMINARY WORKS & EPC CAMP ESTABLISHMENT COST				42,573,931	7,599,446,660			42,573,931	7,599,446,660
1	BUILDINGS (2.0 % of Civil)				32,970,565	5,885,245,853			31,648,106	5,649,186,921
2	ESTABLISHMENT (6.0 % of Civil)		2%	235,251,389	4,497,077	802,728,245	2%	218,010,917	4,162,026	742,921,641
3	ENGINEERING	LS	6%	235,251,389	13,473,488	2,405,017,608	6%	218,010,917	12,486,080	2,228,765,280
			1	15,000,000	15,000,000	2,677,500,000	1	15,000,000	15,000,000	2,677,500,000
	TOTAL EPC COST				385,383,287	68,790,916,768			365,958,331	65,323,562,158

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Cost Estimate of EPC

Annex - A

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	TOTAL EPC COST				385,383,287		365,958,331
A	Civil Works				247,013,958		228,911,462
1	ROADS				5,740,000		5,740,000
1.1	Permant road (Surge tank, Weir, Powerhouse etc.)	m	2,450.00	2,000	4,900,000	2,000	4,900,000
	Road to Surge Tank	m	1,950.00	2,000	3,900,000	2,000	3,900,000
	Road to Weir	m	250.00	2,000	500,000	2,000	500,000
	Road to Powerhouse	m	250.00	2,000	500,000	2,000	500,000
1.2	Construction road	m	2,100.00	400	840,000	400	840,000
2	BYPASS TUNNEL & COFFERDAM				22,191,527		19,795,417
2.1	COFFERDAM				3,267,606		2,784,209
2.1.1	Upstream Cofferdam				2,720,264		2,312,223
	Overburden excavation	CUM	2,594.00	5	12,970	4	11,024
	Rock fill	CUM	2,075.00	15	31,270	13	26,579
	Sand Fill	CUM	519.00	18	9,260	15	7,872
	Pile Drilling	M	2,170.00	45	97,404	38	82,793
	Concret for piles,D=0.8M	CUM	1,090.90	186	202,907	158	172,471
	Reinforcement for Pile	TON	49.09	1,983	97,345	1,686	82,743
	Lean concrete	CUM	311.00	110	34,210	94	29,078
	Concrete RCC	CUM	9,073.00	186	1,687,578	158	1,434,441
	Reinforcement	TON	272.18	1,983	539,732	1,686	458,772
	Rip Rap	CUM	210.00	36	7,588	31	6,450
2.1.2	Downstream Cofferdam			-	502,342	-	426,986
	Overburden excavation	CUM	105.00	5	525	4	446
	Embankment filling	CUM	3,933.00	15	58,995	13	50,145
	Sand filter	CUM	160.00	18	2,854	15	2,426
	Pile Drilling	m	2,160.00	45	96,955	38	82,411
	Concrete for piles D=0.8m	CUM	1,085.88	186	201,973	158	171,677
	Reinforcement for Pile	tons	48.86	1,983	96,889	1,686	82,355
	Rip Rap	CUM	1,056.25	36	38,167	31	32,441
	Filter mat	SQM	715.00	7	5,007	6	4,255
	Geomembrane	SQM	715.00	1	977	1	830
2.1.3	Pumping and Dewatering during construction	L.S	1.00	45,000		45,000	45,000
2.2	BYPASS TUNNEL(DIVERSION TUNNEL)	L.S			18,923,921	-	17,011,209
2.2.1	INLET & OUTLET PORTAL				5,600,000	-	5,600,000
2.2.2	BYPASS TUNNEL				13,323,921	-	11,411,209
	Rock Excavation	m ³	57,686.27	49	2,826,627	42	2,402,633
	Mucking	m ³	63,455.00	5	317,275	4	269,684

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Shotcrete	m³	1,814.54	420	762,106	357	647,790
	Wire Mesh	m	14,610.66	7	102,274	6	86,933
	Rockbolt	m	6,705.27	49	328,558	42	279,274
	Steel Ribs supports	Nos	182.35	2,732	498,180	2,322	423,453
	Concrete lining	m³	18,386.61	200	3,677,322	170	3,125,724
	Steel Reinforcement	tons	1,021.16	1,983	2,024,960	1,686	1,721,216
	Frame Work of Concrete lining	m	521.00	25	13,025	21	11,071
	Grouting	m²	521.00	1,600	833,600	1,360	708,560
	Auxiliary	m²	547.00	2,500	1,367,500	2,125	1,162,375
2.2.3	Dewatering, Ventilation, Instrumentation etc.	LS	1.00	572,494	572,494	572,494	572,494
3	SPILLWAY				26,182,231		22,397,132
3.1	Earth works				742,546	-	631,164
	Clearing and grubbing	m²	10,272.00	1	10,272	1	8,731
	Soil/Overburden excavation	m³	19,432.00	5	97,160	4	82,586
	Rock excavation	m³	38,917.00	15	583,755	13	496,192
	Structural backfill against all concrete structures	m³	7,337.00	7	51,359	6	43,655
3.2	Retaining wall works				4,680,000	-	3,978,000
	H-Pile works(Depth=30.0m)	m	180.00	8,000	1,440,000	6,800	1,224,000
	Anchor(ctc 2.5m)	ea	540.00	2,400	1,296,000	2,040	1,101,600
	grouting around wall	m²	5,400.00	360	1,944,000	306	1,652,400
3.2	Structure works				16,107,420	-	13,691,308
	Lean concrete	m³	4,411.30	110	485,243	94	412,457
	Structural concrete	m³	44,113.00	186	8,205,018	158	6,974,265
	Formwork	m2	22,056.50	19	419,073	16	356,212
	Reinforcing steel	tons	3,529.04	1,983	6,998,086	1,686	5,948,373
3.3	Foundation treatment works				702,000	-	596,700
	Secant pile(D800mm, L=234m, Height=30.0m)	M	234.00	3,000	702,000	2,550	596,700
3.4	Natural Pool				3,000,265	-	2,549,960
	Plain dam concrete 1740psi (12MPa) i/c form work	m³	16,000.00	127	2,032,000	108	1,727,200
	Soil Excavation / Weathered Rock	m³	53,600.00	11	589,600	9	501,160
	Steel Reinforcement: Deformed Bars G-60	tons	217.00	1,745	378,665	1,483	321,865
3.5	Control Building, Instrumentation, Dewatering et	LS	1.00	950,000	950,000	950,000	950,000
4	POWER INTAKE				6,992,477		5,957,105
4.1	Earth work				1,367,507	-	1,162,381
	Rock Excavation	m³	25,268.00	49	1,238,132	42	1,052,412
	Embankment Fill	m³	8,625.00	15	129,375	13	109,969
4.2	Structural work				5,534,970	-	4,704,724
	Structural concrete	m³	6,764.00	186	1,258,104	158	1,069,388

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Formwork	m ²	3,119.00	19	59,261	16	50,372
	Lean concrete	m ³	146.00	110	16,060	94	13,651
	Reinforcing steel 125 kg/m ³	tons	845.00	1,983	1,675,635	1,686	1,424,289
	Shotcrete	m ³	684.00	420	287,280	357	244,188
	Wire Mesh	tons	4,560.00	7	31,920	6	27,132
	Rockbolt	Nos	9,120.00	49	447,336	42	380,236
	Concrete fill	m ³	9,459.00	186	1,759,374	158	1,495,468
4.3	Instrumentation, Dewatering etc	LS	1.00	90,000	90,000	90,000	90,000
5	WATERWAY				137,875,885		132,280,555
5.1	ADIT TO HEADRACE TUNNEL (NATM)				7,659,571		6,535,952
	Overburden excavation	m ³	9,633.60	5	48,168	4	40,943
	Rock Excavation	m ³	54,093.00	49	2,650,557	42	2,252,973
	Mucking	m ³	59,503.00	6	380,819	5	323,696
	Shotcrete	m ³	1,992.00	420	836,640	357	711,144
	Wire Mesh	m	13,800.00	7	96,600	6	82,110
	Rockbolt	m	7,855.00	49	384,895	42	327,161
	Steel Ribs supports	tons	275.00	2,732	751,300	2,322	638,605
	Auxiliary	m ²	875.00	2,500	2,187,500	2,125	1,859,375
	Dewatering,Ventilation and Instrumentation works etc	m	282.23	598	168,773	598	168,774
	Plug Concrete Including Drilling & Injection	m ³	437.40	353	154,319	300	131,171
5.2	HEADRACE TUNNEL (TYPE-II, NATM)				3,066,787		2,632,089
	Rock Excavation (7.4+0.7) = 8.1m, (7.4+1.1) = 8.5m	m ³	17,036.03	49	834,765	42	709,551
	Mucking	m ³	18,739.63	5	93,698	4	79,643
	Shotcrete	m ³	364.76	420	153,197	357	130,218
	Wire Mesh	m	6,101.55	7	42,710	6	36,304
	Rockbolt	m	649.13	49	31,807	42	27,036
	Steel Ribs supports	tons	-	2,732	-	2,322	-
	Concrete lining	m ³	931.36	200	186,272	170	158,332
	Steel Reinforcement	tons	553.17	1,983	1,096,941	1,686	932,400
	Frame Work of Concrete lining	m	282.23	25	7,055	21	5,997
	Grouting	m	282.23	1,600	451,569	1,360	383,834
	Auxiliary	m ²	-	2,500	-	2,125	-
	Dewatering,Ventilation and Instrumentation works etc	m	282.23	598	168,773	598	168,774
5.3	HEADRACE TUNNEL (TYPE-III, NATM)				2,253,215		1,932,113
	Rock Excavation (7.4+1.4) = 9.0m	m ³	11,772.80	56	657,275	47	558,684
	Mucking	m ³	12,950.08	5	64,750	4	55,038
	Shotcrete	m ³	406.41	420	170,693	357	145,089
	Wire Mesh	m	4,096.30	7	28,674	6	24,373

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Rockbolt	m	1,185.37	49	58,083	42	49,371
	Steel Ribs supports	tons	-	2,732	-	2,322	-
	Concrete lining	m ³	620.91	200	124,181	170	105,554
	Steel Reinforcement	tons	368.78	1,983	731,294	1,686	621,600
	Frame Work of Concrete lining	m	188.15	25	4,703	21	3,998
	Grouting	m	188.15	1,600	301,046	1,360	255,889
	Auxiliary	m ²	-	2,500	-	2,125	-
	Dewatering,Ventilation and Instrumentation works etc	m	188.15	598	112,516	598	112,516
5.4	HEADRACE TUNNEL (TYPE-IV, NATM)				1,456,850		1,246,765
	Rock Excavation (7.4+1.6) = 9.0m	m ³	6,096.94	56	340,392	47	289,333
	Mucking	m ³	6,706.64	5	33,533	4	28,503
	Shotcrete	m ³	306.13	420	128,573	357	109,287
	Wire Mesh	m	2,062.45	7	14,437	6	12,272
	Rockbolt	m	1,373.52	49	67,302	42	57,207
	Steel Ribs supports	tons	78.40	2,732	214,181	2,322	182,055
	Concrete lining	m ³	418.27	200	83,653	170	71,105
	Steel Reinforcement	tons	184.39	1,983	365,647	1,686	310,800
	Frame Work of Concrete lining	m	94.08	25	2,351	21	1,999
	Grouting	m	94.08	1,600	150,523	1,360	127,945
	Auxiliary	m ²	-	2,500	-	2,125	-
	Dewatering,Ventilation and Instrumentation works etc	m	94.08	598	56,258	598	56,258
5.5	HEADRACE TUNNEL (Very Poor Rock, NATM)				2,215,403		1,888,724
	Rock Excavation (7.4+1.6) = 9.0m	m ³	4,135.50	56	230,884	47	196,252
	Mucking	m ³	4,549.05	5	22,745	4	19,333
	Shotcrete	m ³	327.69	420	137,629	357	116,985
	Wire Mesh	m	1,384.50	7	9,691	6	8,238
	Rockbolt	m	1,097.57	49	53,780	42	45,714
	Steel Ribs supports	tons	62.72	2,732	171,345	2,322	145,644
	Concrete lining	m ³	280.73	200	56,145	170	47,723
	Steel Reinforcement	tons	122.93	1,983	243,764	1,686	207,200
	Frame Work of Concrete lining	m	62.72	25	1,567	21	1,333
	Grouting	m	62.72	1,600	100,348	1,360	85,296
	Auxiliary	m ²	460.00	2,500	1,150,000	2,125	977,500
	Dewatering,Ventilation and Instrumentation works etc	m	62.72	598	37,505	598	37,505
5.6	HEADRACE TUNNEL (100m PILOT TUNNEL)				7,754,289		6,600,116
	Rock Excavation (7.4+1.6) = 9.0m	m ³	18,108.60	56	1,011,003	47	859,353
	Mucking	m ³	19,919.46	5	99,597	4	84,658
	Shotcrete	m ³	646.20	420	271,404	357	230,693

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Wire Mesh	m	4,518.60	7	31,630	6	26,886
	Rockbolt	m	1,200.00	49	58,800	42	49,980
	Steel Ribs supports	tons	50.00	2,732	136,600	2,322	116,110
	Concrete lining	m³	8,699.50	200	1,739,900	170	1,478,915
	Steel Reinforcement	tons	385.00	1,983	763,455	1,686	648,937
	Frame Work of Concrete lining	m	100.00	25	2,500	21	2,125
	Grouting	m	100.00	1,600	160,000	1,360	136,000
	Auxiliary	m²	833.00	2,500	2,082,500	2,125	1,770,125
	Dewatering,Ventilation and Instrumentation works etc	m	100.00	598	59,800	598	59,800
	Filling Concrete	CUM	13,371.00	100	1,337,100	85	1,136,535
5.7	HEADRACE TUNNEL (TBM)				99,439,644		99,439,644
	TBM Machine(including conveyorbelt)	EA	1.00	28,151,311	28,151,311	28,151,311	28,151,311
	Concrete	SET	1.00	2,708,333	2,708,333	2,708,333	2,708,333
	Shipping & Customs	SET	1.00	2,400,000	2,400,000	2,400,000	2,400,000
	Tunneling	m	11,030.00	6,000	66,180,000	6,000	66,180,000
5.8	VERTICAL PRESSURE TUNNEL				3,244,574		2,774,755
	Rock Excavation	m³	12,105.72	49	593,180	42	504,203
	Mucking	m³	13,316.29	25	332,907	21	282,971
	Shotcrete	m³	397.73	420	167,047	357	141,991
	Wire Mesh	m	4,473.91	7	31,317	6	26,620
	Rockbolt	m	1,659.80	49	81,329	42	69,130
	Steel Ribs supports	tons	34.32	2,732	93,766	2,322	79,702
	Concrete lining	m³	2,847.13	200	569,425	170	484,011
	Steel Reinforcement	tons	463.00	1,983	918,129	1,686	780,410
	Frame Work of Concrete lining	m	206.00	75	15,450	64	13,133
	Grouting	m²	206.00	1,600	329,600	1,360	280,160
	Dewatering,Ventilation and Instrumentation works etc	m	188.00	598	112,424	598	112,424
5.9	HORIZONTAL PRESSURE TUNNEL				2,111,735	-	1,805,640
	Rock Excavation	m³	7,360.00	49	360,640	42	306,544
	Mucking	m³	8,096.00	5	40,480	4	34,408
	Shotcrete	m³	231.27	420	97,134	357	82,565
	Wire Mesh	m	2,582.50	7	18,077	6	15,366
	Rockbolt	m	708.47	49	34,714	42	29,508
	Steel Ribs supports	tons	19.81	2,732	54,125	2,322	46,007
	Concrete lining	m³	2,026.40	200	405,280	170	344,488
	Steel Reinforcement	tons	422.00	1,983	836,826	1,686	711,302
	Frame Work of Concrete lining	m	119.00	25	2,975	21	2,529
	Grouting	m²	119.00	1,600	190,400	1,360	161,840

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Dewatering,Ventilation and Instrumentation works etc	m	118.87	598	71,084	598	71,084
5.10	ADIT TO HORIZONTAL TUNNEL				4,078,232		3,491,606
	Rock Excavation	m³	30,282.00	49	1,483,818	42	1,261,245
	Mucking	m³	33,310.00	5	166,550	4	141,568
	Shotcrete	m³	1,115.00	420	468,300	357	398,055
	Wire Mesh	m	7,725.00	7	54,075	6	45,964
	Rockbolt	m	4,397.00	49	215,453	42	183,135
	Steel Ribs supports	tons	153.95	2,732	420,577	2,322	357,491
	Auxiliary	m²	378.00	2,500	945,000	2,125	803,250
	Dewatering,Ventilation and Instrumentation works etc	m	279.90	598	167,380	598	167,380
	Fill Concrete	m³	1,570.80	100	157,079	85	133,518
5.11	STEEL PENSTOCK TUNNEL				3,411,825		2,914,304
	Rock Excavation	m³	6,892.29	49	337,722	42	287,064
	Mucking	m³	7,581.52	5	37,907	4	32,221
	Shotcrete	m³	265.53	420	111,520	357	94,792
	Wire Mesh	m	4,107.61	7	28,753	6	24,440
	Rockbolt	m	1,132.40	49	55,487	42	47,164
	Steel Ribs supports	tons	31.67	2,732	86,513	2,322	73,536
	Concrete lining	m³	2,131.93	200	426,386	170	362,429
	Steel Reinforcement	tons	970.14	1,983	1,923,787	1,686	1,635,219
	Frame Work of Concrete lining	m	190.00	25	4,750	21	4,038
	Grouting	m	190.00	1,600	304,000	1,360	258,400
	Ventilation and Instrumentation works	EA	190.00	500	95,000	500	95,000
5.12	STEEL PENSTOCK TUNNEL(MANIFOLD)				1,183,760		1,018,847
	Rock Excavation	m³	1,797.22	49	88,063	42	74,854
	Mucking	m³	1,976.94	5	9,884	4	8,402
	Shotcrete	m³	122.17	420	51,312	357	43,615
	Wire Mesh	m	3,046.77	7	21,327	6	18,128
	Rockbolt	m	753.98	49	36,944	42	31,403
	Steel Ribs supports	tons	31.71	1,106	35,070	940	29,810
	Concrete lining	m³	905.75	200	181,150	170	153,978
	Steel Reinforcement	tons	202.66	1,983	401,869	1,686	341,589
	Frame Work of Concrete lining	m	140.93	25	3,523	21	2,995
	Grouting	m	141.00	800	112,800	680	95,880
	Auxiliary	m²	63.00	2,500	157,500	2,125	133,875
	Dewatering,Ventilation and Instrumentation works etc	m	141.00	598	84,318	598	84,318
6	SURGE SHAFT				6,568,093		5,602,083
6.1	SURGE SHAFT				5,426,235		4,624,144

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Rock Excavation	m ³	20,668.25	49	1,012,744	42	860,833
	Mucking	m ³	22,735.08	25	568,376	21	483,120
	Shotcrete	m ³	908.11	420	381,407	357	324,197
	Wire Mesh	m	5,408.20	11	56,786	9	48,268
	Rockbolt	m	2,017.00	74	148,249	62	126,012
	Steel Ribs supports	tons	110.33	2,732	301,430	2,322	256,216
	Concrete lining	m ³	5,669.44	200	1,133,887	170	963,805
	Steel Reinforcement	tons	768.19	1,983	1,523,320	1,686	1,294,823
	Frame Work of Concrete lining	m	132.00	75	9,900	64	8,415
	Grouting	m	132.00	1,600	211,200	1,360	179,520
	Dewatering,Ventilation and Instrumentation works etc	m	132.00	598	78,936	598	78,936
6.2	ADIT TO SURGE SHAFT				1,141,858		977,938
	Rock Excavation	m ³	8,817.23	49	432,044	42	367,238
	Mucking	m ³	9,698.96	5	48,494	4	41,221
	Shotcrete	m ³	324.62	420	136,341	357	115,890
	Wire Mesh	m	2,249.42	7	15,745	6	13,384
	Rockbolt	m	1,280.37	49	62,737	42	53,327
	Steel Ribs supports	tons	44.83	2,732	122,461	2,322	104,093
	Auxiliary	m ²	110.00	2,500	275,000	2,125	233,750
	Dewatering,Ventilation and Instrumentation works etc	m	82.00	598	49,036	598	49,036
7	POWERHOUSE CIVIL				25,175,988		21,842,094
7.1	Earth work				6,849,758		5,822,297
	Overburden excavation	m ³	263,489.10	5	1,317,445	4	1,119,829
	Rock excavation	m ³	92,858.50	15	1,437,449	13	1,221,832
	Fill	m ³	34,052.20	19	632,008	16	537,208
	Shotcrete	m ³	3,355.12	420	1,407,843	357	1,196,667
	Rock Bolt for shotcrete	m	41,939.05	49	2,055,013	42	1,746,761
7.2	Structural work				15,376,230		13,069,797
	Structural concrete	m ³	27,479.71	186	5,111,225	158	4,344,542
	Reinforcing steel	tons	4,842.22	1,838	8,900,005	1,562	7,565,005
	Gabion Wall	m ³	2,100.00	50	105,000	43	89,250
	Pavement for road	m ²	3,600.00	30	108,000	26	91,800
	Reinforcing slope stability(anchor, L=240m)	m ²	360.00	3,200	1,152,000	2,720	979,200
7.3	Archetectural Works (Archetecture, Plumbing, Potable	LS	1.00	2,000,000	2,000,000	2,000,000	2,000,000
7.4	Dewatering, Instrumentation works etc	LS	1.00	950,000	950,000	950,000	950,000
8.0	O&M Staff Colony	LS	1.00	3,000,000	3,000,000	3,000,000	3,000,000
9.0	Construction Machinery & Equipment	LS	1.00	1,525,188	1,525,188	1,396,531	1,396,531
10	CONTINGENCY FOR CIVIL WORKS	%	5%	235,251,389	11,762,569	218,010,917	10,900,545

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
B	ELECTRICAL & MECHANICAL EQUIPMENT				105,398,764		105,398,764
1	ELECTRICAL WORK				26,720,646		26,720,646
1.1	11 kV Equipment and Transmission						
	11 kV Equipment(GCB, PT, CT, Ext TR etc)	Lot	1.00	2,253,308	2,253,308	2,253,308	2,253,308
	11 kV Phase Bus Generator to M.Transformer(IPB)	Lot	1.00	629,044	629,044	629,044	629,044
1.2	220kV Step-Up Transformer Station						
	220/11kV Step-Up Main Transformer	Set	4.00	1,088,838	4,355,352	1,088,838	4,355,352
	Generator Step Up Transformer SERGI System	Set	4.00	216,298	865,194	216,298	865,194
	The Overhead Line from the MT to Switchyard	Lot	1.00	231,077	231,077	231,077	231,077
	220kV GIS	Lot	1.00	4,523,783	4,523,783	4,523,783	4,523,783
1.3	Station Service Power Supply						
	Station Transformer(UAT, Barrage site)	Lot	1.00	185,648	185,648	185,648	185,648
	Low Voltage Switch Cabinet	Lot	1.00	648,731	648,731	648,731	648,731
1.4	Emergency Diesel Generator						
	Emergency Diesel Generator for powerhouse	Lot	1.00	167,739	167,739	167,739	167,739
	Emergency Diesel Generator for Barrage site	Lot	1.00	71,890	71,890	71,890	71,890
1.5	Control, Protection and DC/UPS System	Lot	1.00	4,421,291	4,421,291	4,421,291	4,421,291
1.6	Cables and Wires for the Station	Lot	1.00	1,447,647	1,447,647	1,447,647	1,447,647
1.7	Station Lightning, Earthing System and Steel Support	Lot	1.00	483,738	483,738	483,738	483,738
1.8	Lighting System	Lot	1.00	190,798	190,798	190,798	190,798
1.8	Communication System	Lot	1.00	538,656	538,656	538,656	538,656
1.10	CCTV, Public Address, Paging and Fire Alarm System	Lot	1.00	519,786	519,786	519,786	519,786
1.11	Revenue Metering Equipment (excluding CTs/VTs)	Lot	1.00	14,330	14,330	14,330	14,330
1.12	Asset Management System	Lot	1.00	154,854	154,854	154,854	154,854
1.13	Upstream River Inflow Measurement System	Lot	1.00	210,000	210,000	210,000	210,000
1.14	Turbine Monitoring System	Set	4.00	231,776	927,104	231,776	927,104
1.15	Generator Monitoring System	Set	4.00	231,776	927,104	231,776	927,104
1.16	Ultrasonic Flow Measurement System (for Turbine)	Set	4.00	105,000	420,000	105,000	420,000
1.17	Building Management System	Set	1.00	131,343	131,343	131,343	131,343
1.18	Fault Recorder System (for 220kV voltage level)	Set	1.00	84,000	84,000	84,000	84,000
	Sub-Total				24,402,416	-	24,402,416
1.11	Contingency	%	2.5%	24,402,416	610,060	24,402,416	610,060
1.12	Delivery Cost Insurance Freight to Kedam	%	7%	24,402,416	1,708,169	24,402,416	1,708,169
1.13	Custom Duty(Import Taxes)	%	-	24,402,416	-	24,402,416	-
2	HYDRAULIC STEEL STRUCTURE EQUIPMENT				36,104,187		36,104,187
2.1	Weir	LS	1.00		8,095,747	-	8,095,747
	Spillway Radial gate	EA	3.00	1,083,762	3,251,286	1,083,762	3,251,286

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Stoplogs	EA	1.00	365,077	365,077	365,077	365,077
	Gantry crane	EA	1.00	259,706	259,706	259,706	259,706
	Sluiceway Radial gate	EA	2.00	2,054,736	4,109,472	2,054,736	4,109,472
	Stoplogs	EA	1.00	110,206	110,206	110,206	110,206
2.2	Bypass Tunnel	LS	1.00		4,768,948	-	4,768,948
	Bypass tunnel Inlet Roller gate	EA	1.00	852,295	852,295	852,295	852,295
	Bypass tunnel Outlet Radial gate	EA	1.00	3,916,653	3,916,653	3,916,653	3,916,653
2.3	Power Intake	LS	1.00		2,673,290	-	2,673,290
	Intake Roller gate	EA	1.00	919,150	919,150	919,150	919,150
	Intake Trash rack	LS	1.00	1,504,775	1,504,775	1,504,775	1,504,775
	Intake Crane	EA	1.00	70,865	70,865	70,865	70,865
	Trashrack Cleaning Machine Intake	EA	1.00	178,500	178,500	178,500	178,500
2.4	Penstock	LS	1.00		15,530,052	-	15,530,052
	Penstock	EA	1.00	8,046,785	8,046,785	8,046,785	8,046,785
	Trifurcation	EA	1.00	4,204,306	4,204,306	4,204,306	4,204,306
	Branch pipes downstream from Trifurcations	EA	1.00	969,533	969,533	969,533	969,533
	Stiffener ring	EA	1.00	1,422,012	1,422,012	1,422,012	1,422,012
	Inner supporting	EA	1.00	443,416	443,416	443,416	443,416
	Outer supporting	EA	1.00	444,000	444,000	444,000	444,000
2.5	P/H	LS	1.00		885,386	-	885,386
	Draft tube gate	EA	4.00	100,138	400,552	100,138	400,552
	Gantry crane	EA	1.00	432,844	432,844	432,844	432,844
	GIS Overhead crane	EA	1.00	51,990	51,990	51,990	51,990
2.6	Tailrace	LS	1.00		1,018,438	-	1,018,438
	Tailrace Roller gate	EA	2.00	466,021	932,042	466,021	932,042
	Stoplogs	EA	1.00	86,396	86,396	86,396	86,396
	Sub-Total				32,971,861	-	32,971,861
	Contingency	%	2.5%	32,971,861	824,297	32,971,861	824,297
	Delivery Cost Insurance Freight	%	7%	32,971,861	2,308,030	32,971,861	2,308,030
	Custom Duty(Import Taxes)	%	-	32,971,861	-	32,971,861	-
3	ELECTRO-MECHANICAL EQUIPMENT				42,573,931		42,573,931
3.1	Hydraulic Generation Equipment				30,952,098		30,952,098
	Hydraulic Turbine (60MWx3, 32MWx1)	set	4.00	-	6,339,694	-	6,339,694
	Turbine Inlet Valve	set	4.00	-	1,972,258	-	1,972,258
	Turbine Inlet Valve Oil Pressure Device	set	4.00	-	126,425	-	126,425
	Governor	set	4.00	-	1,604,023	-	1,604,023
	Governor Oil Pressure Device	set	4.00	-	207,338	-	207,338
	Generator	set	4.00	-	13,851,928	-	13,851,928

Cost Estimates of Kalam-Asrit Hydropower Project

CODE	DESCRIPTION	UNIT	Quantity	FS Estimate		POE Approved (15% Reduction by POE)	
				Unit Price (US\$)	TOTAL (US\$)	Unit Price (US\$)	TOTAL (US\$)
	Generator CO2	set	4.00	45,698	182,794	45,698	182,794
	Excitation System	set	4.00	-	1,446,307	-	1,446,307
	Automation Component	set	4.00	-	741,696	-	741,696
	Spare Parts	set	1.00	1,534,107	1,534,107	1,534,107	1,534,107
	Special Installation Tools	set	1.00	367,814	367,814	367,814	367,814
	Design for Electric and Mechanic EM	set	1.00	1,459,512	1,459,512	1,459,512	1,459,512
	Turbine Model Test	set	2.00	343,007	686,013	343,007	686,013
	Training	set	1.00	432,188	432,188	432,188	432,188
3.2	Hydraulic Generation Auxiliary System				7,928,205	-	7,928,205
	Overhead Bridge Crane(150/25ton, 8ton)	set	2.00	-	1,809,137	-	1,809,137
	Elevator Passenger/Freight	set	1.00	77,657	77,657	77,657	77,657
	Oil Purifying System	set	1.00	302,108	302,108	302,108	302,108
	Low Pressure System (Compressed Air)	set	1.00	141,609	141,609	141,609	141,609
	High Pressure System (Compressed Air)	set	1.00	229,250	229,250	229,250	229,250
	Water Supply System	set	1.00	1,733,524	1,733,524	1,733,524	1,733,524
	Dewatering and Drainage System	set	1.00	143,467	143,467	143,467	143,467
	Ventilation and Air Condition System	set	1.00	211,840	211,840	211,840	211,840
	Fire Extinguishing System	set	1.00	296,484	296,484	296,484	296,484
	Hydraulic Monitoring and Measurement	set	1.00	1,239,810	1,239,810	1,239,810	1,239,810
	Drainage and Dewatering System for Dam	set	1.00	730,863	730,863	730,863	730,863
	Oil Testing Device	set	1.00	25,727	25,727	25,727	25,727
	Electrical Test Laboratory	set	1.00	260,794	260,794	260,794	260,794
	Station Repair Shop	set	1.00	167,422	167,422	167,422	167,422
	Metal Material and Others	set	1.00	558,512	558,512	558,512	558,512
	Sub-Total				38,880,302	-	38,880,302
	Contingency	%	3%	38,880,302	972,008	38,880,302	972,008
	Delivery Cost Insurance Freight	%	7%	38,880,302	2,721,621	38,880,302	2,721,621
	Custom Duty(Import Taxes)	%	-	38,880,302	-	38,880,302	-
4	Equipment Cost including Delivery, Insurance & Shipping (92% of E&M Cost)	%	92%		96,966,863		96,966,863
5	Installation, Erection & Commissioning (8% of Total E&M Cost)	%	8%		8,431,901		8,431,901
C	PRELIMINARY WORKS & EPC CAMP ESTABLISHMENT COST				32,970,565		31,648,106
C-1	BUILDINGS (2.0 % of Civil)		2%		4,497,077		4,162,026
C-2	ESTABLISHMENT (6.0 % of Civil)		6%		13,473,488		12,486,080
C-3	Design (Basic & Detail)		-	15,000,000	15,000,000	15,000,000	15,000,000
TOTAL EPC COST					385,383,287		365,958,331

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Unit Rate Analysis

Annex - B

**ASRIT KADAM HYDRO POWER PLANT
KALAM - ASRIT HYDRO POWER PROJECT**

**FEASIBILITY STUDY
UNIT RATE ANALYSIS**

Serial No.			Unit : 450			
Item Name : Embankment Fill						
Detail	Qty	Unit	Rate (Rs)			Amount
Labour /Manpower						
SITE ENGINEER	1	Hour	500.00	5.00	Hour	2,500.00
FOREMAN EARTH WORK	1	Hour	250.00	10.00	Hour	2,500.00
SUPERVISOR	1	Hour	151.25	10.00	Hour	1,512.50
ASSISTANT SURVEYOR	2	Hour	137.50	8.00	Hour	2,200.00
HELPER	6	Hour	125.00	10.00	Hour	7,875.00
LABOUR	7	Hour	125.00	10.00	Hour	8,750.00
				0.03		685.13
Total Labour /Manpower				2.07%		26,022.63
Material						
EARTH CHARGES AT SOURCE	550	CM	240.00		Cm	132,000.00
WATER CHARGES	1000	Litres	1.00		Lit	1,000.00
CARRIAGE OF EARTH FROM 37 KM TO SITE	550	CM	1207.20	1	Km	663,960.00
Sub Total Material				63.48%		796,960.00
Equipment & Material						
EXCAVATOR EX-100 (100 HP) TRACK TYPE	10	Hour	3426.00	1	Hour	34,260.00
GRADER 165 HP	10	Hour	5716.80	1	Hour	57,168.00
COMBINATION ROLLER. 18 T.	10	Hour	4041.60	1	Hour	40,416.00
DUMPER. 18 T.	10	Hour	3295.20	1	Hour	32,952.00
WATER TANK BOWSER TYPE 12000 LTR.	10	Hour	1084.80	1	Hour	10,848.00
PUMP 4" DELIVERY (DIESEL)	10	Hour	480.00	1	Hour	4,800.00
WATER	1000	Lit	1.00	1	Lit	1,000.00
Sub Total Equipment				14.45%		181,444.00
		Total (L + M +E) For 10 RM		80.00%		1,004,426.63
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%		200,885.33
Composite Rates		Per Cum Rs.		2,678.00		
Labour Rates		Per Cum Rs.		260.23		
Composite Rates		Per Cum (US\$)		15		

KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS

Serial No.

Unit : 28 Cum

Item Name :

Soil/Overburden Excavation

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Labourer	12.00	Hour	125.00	1.00 Hour	1,500.00
Sundries on Labour				3%	45.00
Total Labour /Manpower				5.94%	1,545.00
<u>Equipment</u>					
Dumper	2.2200	Hour	3020.60	1 Hour	6,705.73
Excavator 100 hp Crawl Type	1.2180	Hour	3140.50	1 Hour	3,825.13
Disposal of spoil Up to 1 KM	28.0000	Cum	312.00	1 Cum	8,736.00
Sub Total Equipment				74.06%	19,266.86
Total (L + M +E)				80.00%	20,811.86
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	4,162.37
Composite Rates		Per Cum Rs.		891.94	
Labour Rates		Per Cum Rs.		1,545.00	
Composite Rates		Per Cum (US\$)		5.00	

ASRIT KADAM HYDRO POWER PLANT
KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS

Serial No.

Unit : 18 Cum

Item Name :
Rock Excavation (Spillway) (Open Air)

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Driller	9.00	Hour	151.25	1.00 Hour	1,361.25
Labourer (Waterman etc.)	30.00	Hour	125.00	1.00 Hour	3,750.00
Blasting Foreman	60.00	Hour	166.38	1.00 Hour	9,982.50
Sundries On Labour				0.03	452.81
Total Labour /Manpower				30.96%	15,546.56
<u>Equipment & Material</u>					
Excavator 100 HP Crawl Type	1.5000	Hour	3140.50	1 Hour	4,710.75
Dumper Truck	1.5000	Hour	3022.80	1 Hour	4,534.20
Blasting material	1.0000	Job	8000.00	1 Job	8,000.00
Disposal of spoil Up to 2 KM	10.0000	Cum	738.00	1 Cum	7,380.00
Sub Total Equipment				49.04%	24,624.95
Total (L + M +E) For 10 RM				80.00%	40,171.51
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	8,034.30
Composite Rates		Per Cum Rs.	2,678.10		
Labour Rates		Per Cum Rs.	1,554.66		
Composite Rates		Per Cum (US\$)	15.00		

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY
UNIT RATE ANALYSIS

Unit : 01 Cum

Item Name :
Lean Concrete

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Mason	1.8000	Hour	156.25	1	Hour 281.25
Labourer	4.0000	Hour	125.00	1	Hour 500.00
Waterman	4.0000	Hour	125.00	1	Hour 500.00
Sundries On Labour				0.03	38.44
Total Labour /Manpower				6.45%	1,319.69
<u>Material</u>					
Ordinary Portland Cement	3.40	Bags	1050.00	1	Bags 3,570.00
Water Charges for construction	1.0000	L/S	400.00	1	L/S 400.00
Coarse sand	0.5000	Cum	4020.00	1	Cum 2,010.00
Crushed Aggregates	0.9610	Cum	5040.00	1	Cum 4,843.44
Carriage of material 135 Km	1.58	Cum	2355.00	1	Km 3,724.11
Sub Total Material				71.11%	14,547.55
<u>Equipment</u>					
Front Loader 1.5 T	0.0320	Hour	3637.70	1	Hour 116.41
Water Pump	0.0320	Hour	400.00	1	Hour 12.80
Batching Plant	0.0450	Hour	4770.70	1	Hour 214.68
Water Tank Bowser Type 12000 Ltr	0.0450	Hour	994.00	1	Hour 44.73
Concrete Transit Mixture	0.0360	Hour	3060.20	1	Hour 110.17
Sub Total Equipment				2.44%	498.79
Total (L + M +E) For 10 RM				80.00%	16,366.03
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	3,273.21
Composite Rates	Per Cum Rs.		19,639.23		
Labour Rates	Per Cum Rs.		1,319.69		
Composite Rates	Per Cum (US\$)		110.0		

KALAM - ASRIT HYDRO POWER PROJECT

**FEASIBILITY STUDY
UNIT RATE ANALYSIS**

Unit : 01 Cum

Item Name :
Structural Concrete

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Mason	2.0000	Hour	156.25	1 Hour	312.50
Labourer	3.0000	Hour	125.00	1 Hour	375.00
Waterman	0.5000	Hour	125.00	1 Hour	62.50
Carpenter for Shuttering	1.0000	Hour	151.00	1 Hour	151.00
Labourer for shuttering	2.0000	Hour	125.00	1 Hour	250.00
Sundries On Labour				0.03	34.53
Total Labour /Manpower				3.43%	1,185.53
<u>Material</u>					
Ordinary Portland Cement	11.25	Bags	1050.00	1 Bags	11,812.50
Water Charges for construction	350.0	Ltr	0.40	1 Ltr	140.00
Coarse sand	0.3900	Cum	4020.00	1 Cum	1,567.80
Crushed Aggregates	0.7700	Cum	5040.00	1 Cum	3,880.80
Carriage of material (Aggregates) for 135 Km	1.56	Cum	2355.00	1 Km	3,669.70
Admixture (approved)	6.00	Ltr	800.00	1 Ltr	4,800.00
Sub Total Material				74.80%	25,870.80
<u>Equipment</u>					
Front Loader 1.5 T	0.0380	Hour	3637.70	1 Hour	138.23
Water Pump	0.0370	Hour	400.00	1 Hour	14.80
Batching Plant	0.0380	Hour	4770.70	1 Hour	181.29
Water Tank Bowser Type 12000 Ltr	0.0370	Hour	994.00	1 Hour	36.78
Concrete Transit Mixture	0.0380	Hour	3060.20	1 Hour	116.29
Concrete Pump	0.0460	Hour	2499.00	1 Hour	114.95
Concrete Vibrator Poker Type	0.0370	Hour	267.30	1 Hour	9.89
Sub Total Equipment				1.77%	612.23
Total (L + M +E) For 10 RM				80.00%	27,668.56
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	5,533.71
Composite Rates		Per Cum Rs.	33,202.27		
Labour Rates		Per Cum Rs.	1,185.53		
Composite Rates		Per Cum (US\$)	186.0		

KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS

Unit : 01 Ton

Item Name :
Steel Reinforcement: Deformed Bars G-60

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Labourer	41.90	Hour	125.00	1.00 Hour	5,237.50
Blacksmith	41.90	Hour	151.00	1.00 Hour	6,326.90
Sundries on Labour				3%	157.13
Total Labour /Manpower				3.18%	11,721.53
<u>Material</u>					
RFCNT Steel	1030.00	Kg	270.40	1 Kg	278,512.00
Binding Wire	2.72	Kg	412.50	1 Kg	1,120.79
Carriage of material for 300 Km	1.03	Ton	3502.50	1 Km	3,617.09
Sub Total Material				76.82%	283,249.88
Total (L + M +E)				80.00%	294,971.41
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	58,994.28
Composite Rates			Per Ton Rs.	353,965.69	
Labour Rates			Per Ton Rs.	11,721.53	
Composite Rates			Per Cum (US\$)	1,983	

KALAM - ASRIT HYDRO POWER PROJECT

**FEASIBILITY STUDY
UNIT RATE ANALYSIS**

Unit : 200 Cum

Item Name :
Rock Excavation (7.4+0.7) = 8.1m, (7.4+1.1) = 8.5m

Description	Qty	Unit	Rate	Amount	Remarks	
MANPOWER						
Description	Qty	Unit	Rate/Day (8 hours)	Working Hours	Amount	Remarks
Geologist	1	No.	500.00	5	2,500.00	
Foreman	2	No.	250.00	10	5,000.00	
Supervisor	4	No.	151.25	10	6,050.00	
Surveyor	1	No.	151.25	5	756.25	
Assistant Surveyor	1	No.	137.50	6	825.00	
Helper	6	No.	125.00	60	45,000.00	
Labour	8	No.	125.00	80	80,000.00	
			Sub total (1)		140,131.25	7.69%
EQUIPMENT						
Description	Qty	Unit	Rate/Hour	Working Hours	Amount	Remarks
Front End Loader 2.5.Cum	1	No.	4601.30	11.0	50,614.30	
Water Tank Bowser Type 400 Ltr.	1	No.	994.40	11.0	10,938.40	
Dumper (10 Ton)	5	No.	3022.80	11.0	166,254.00	
Excavator (Track Type) 100 HP	1	No.	3140.50	6.0	18,843.00	
Generator (Diesel) 300 KVA	1	No.	2654.30	11.0	29,197.30	
Water Pump	1	No.	400.00	11.0	4,400.00	
Jumbo Drill Machine	1	No.	22500.00	3.3	73,125.00	
Disposal Of Excavated material Up to 25 Km	200	CM	780.00	1.0	156,000.00	
			Sub total (2)		509,372.00	27.96%
MATERIAL						
Description	Qty	Unit	Rate	Amount	Remarks	
Super Blaster	200	Kg	735	147000.00		
Super Breaker	400	Kg	455	182000.00		
Detonating Chord	450	Meter	455	204750.00		
Connecting Wire	125	Meter	161	20125.00		
Detonator	330	Nos	770	254100.00		
		Sub total (3)		807,975.00	44.349%	
Total (1+2+3)				1,457,478.25	80.0%	
Contractor's Profit & Overheads & V.A T @ 20%				291,495.65	20.0%	
Rate for 200 Cum.				1,748,973.90	100.0%	
Rate for 01 Cum.				8,745.00		
Per Cum (US\$)				49.0		

KALAM - ASRIT HYDRO POWER PROJECT

**FEASIBILITY STUDY
UNIT RATE ANALYSIS**

Unit : 200 Cum

Item Name :
Rock Excavation (7.4+1.6) = 9.0m

Description	Qty	Unit	Rate	Amount	Remarks	
MANPOWER						
Description	Qty	Unit	Rate/Day (8 hours)	Working Hours	Amount	Remarks
Geologist	1	No.	500.00	6	3,000.00	
Foreman	2	No.	250.00	12	6,000.00	
Supervisor	4	No.	151.25	12	7,260.00	
Surveyor	1	No.	151.25	6	907.50	
Assistant Surveyor	1	No.	137.50	8	1,100.00	
Helper	8	No.	125.00	100	100,000.00	
Labour	10	No.	125.00	120	150,000.00	
			Sub total (1)		268,267.50	12.92%
EQUIPMENT						
Description	Qty	Unit	Rate/Hour	Working Hours	Amount	Remarks
Front End Loader 2.5.Cum	1	No.	4601.30	11.0	50,614.30	
Water Tank Bowser Type 400 Ltr.	1	No.	994.40	11.0	10,938.40	
Dumper (10 Ton)	5	No.	3022.80	11.0	166,254.00	
Excavator (Track Type) 100 HP	1	No.	3140.50	6.0	18,843.00	
Generator (Diesel) 300 KVA	1	No.	2654.30	10.0	26,543.00	
Water Pump	1	No.	400.00	10.0	4,000.00	
Jumbo Drill Machine	1	No.	22500.00	3.6	80,325.00	
Disposal Of Excavated material Up to 25 Km	200	CM	780.00	1.0	156,000.00	
			Sub total (2)		513,517.70	24.73%
MATERIAL						
Description	Qty	Unit	Rate	Amount	Remarks	
Super Blaster	250	Kg	735	183750.00		
Super Breaker	425	Kg	455	193375.00		
Detonating Chord	465	Meter	455	211575.00		
Connecting Wire	130	Meter	161	20930.00		
Detonator	350	Nos	770	269500.00		
		Sub total (3)		879,130.00	42.344%	
Total (1+2+3)				1,660,915.20	80.0%	
Contractor's Profit & Overheads & V.A T @ 20%				332,183.04	20.0%	
Rate for 200 Cum.				1,993,098.24	100.0%	
Rate for 01 Cum.				9,965.00		
Per Cum (US\$)				55.8		

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY
UNIT RATE ANALYSIS

Unit : 01 Cum

Item Name :
SHORTCRETE

Detail	Qty	Unit	Rate (Rs)		Amount
Labour /Manpower					
Foreman Concrete	0.5000	Hour	187.5000	1.0000 Hour	93.7500
Supervisor	1.0000	Hour	151.25	1.0000 Hour	151.2500
Helper	1.0000	Hour	125.0000	1.0000 Hour	125.0000
Labourer	2.0000	Hour	125.0000	1.0000 Hour	250.0000
Nozzel Man	1.0000	Hour	151.0000	1.0000 Hour	151.0000
Waterman	1.0000	Hour	125.00	1 Hour	125.00
Sundries On Labour				0.03	896.00
Total Labour /Manpower				1.15%	896.00
Material					
Ordinary Portland Cement	13.13	Bags	1050.00	1.00 Bags	13,781.25
Water Charges for construction	380	L/S	0.40	1 Ltr	152.00
Coarse Sand	0.6825	Cum	4020.00	1 Cum	2,743.65
Aggregates No.4 No 200	0.8085	Cum	5005.00	1 Cum	4,046.54
Admixture	12.80	Kg	800.00	1 Kg	10,240.00
Steel Fiber	36.00	Kg	650.00	1 Kg	23,400.00
Carriage of material for 135 Km	1.96	Cum	2355.00	1 Km	4,605.52
Sub Total Material				75.51%	58,968.96
Equipment					
Shortcrete machine	1.0000	Hour	2187.50	1 Hour	2,187.50
Front Loader 1.5 T	0.0270	Hour	3878.60	1 Hour	104.72
Water Pump	0.0270	Hour	400.00	1 Hour	10.80
Batching Plant	0.0420	Hour	3977.60	1 Hour	167.06
Water Tank Bowser Type 12000 Ltr	0.0420	Hour	994.40	1 Hour	41.76
Concrete Transit Mixture	0.0330	Hour	3060.20	1 Hour	100.99
Sub Total Equipment				3.35%	2,612.83
Total (L + M +E) For 10 RM				80.00%	62,477.79
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	12,495.56
Composite Rates		Per Cum Rs.	74,973.35		
Labour Rates		Per Cum Rs.	896.00		
		Per Cum (US\$)	420.02		

ASRIT KADAM HYDRO POWER PLANT
KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS

3.33 Sm (300 mm Thick)
Unit : 1 CM

Item Name :
Concrete Lining

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Mason	4.000	Hour	156.25	1 Hour	625.00
Labourer	8.000	Hour	125.00	1 Hour	1,000.00
Waterman	1.000	Hour	125.00	1 Hour	125.00
Carpentar for Shuttering	3.000	Hour	151.00	1 Hour	453.00
Labourer for shuttering	3.000	Hour	125.00	1 Hour	375.00
Sundries On Labour				0.03	77.34
Total Labour /Manpower				7.12%	2,655.34
<u>Material</u>					
Ordinary Portland Cement	8.06	Bags	1050.00	1.00 Bags	8,463.00
Water Charges for construction	250	Litre	0.40	1 Ltr	100.00
Coarse sand	0.4200	Cum	4020.00	1 Cft	1,688.40
Crushed Aggregates	0.8400	Cum	5040.00	1 Cft	4,233.60
Carriage of material for 135 Km	1.00	Cum	2355.00	1 Km	2,355.00
Admixture (approved)	4.00	Ltr	800.00	1 Ltr	3,200.00
Special form work	2.50	Sm	2250.00	1 Sm	5,625.00
Sub Total Material				68.83%	25,665.00
<u>Equipment</u>					
Front Loader 1.5 T	0.0320	Hour	3637.70	1 Hour	116.41
Water Pump	0.0270	Hour	400.00	1 Hour	10.80
Batching Plant	0.0420	Hour	4770.70	1 Hour	200.37
Water Tank Bowser Type 12000 Ltr	0.0420	Hour	994.40	1 Hour	41.76
Concrete Transit Mixture	0.3330	Hour	3060.20	1 Hour	1,019.05
Concrete Pump	0.0450	Hour	2499.00	1 Hour	112.46
Concrete Vibrator	0.0360	Hour	267.30	1 Hour	9.62
Sub Total Equipment				4.05%	1,510.47
Total (L + M +E) For 10 RM				80.00%	29,830.81
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	5,966.16
Composite Rates		Per Cum Rs.	35,796.97		
Labour Rates		Per Cum Rs.	2,655.34		
		Per Cum (US\$)	200.54		

KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS

Unit : 01 Ton

Item Name :
Steel Reinforcement

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Labourer	41.90	Hour	125.00	1.00 Hour	5,237.50
Blacksmith	41.90	Hour	151.00	1.00 Hour	6,326.90
Sundries on Labour				3%	157.13
Total Labour /Manpower				3.18%	11,721.53
<u>Material</u>					
RFCNT Steel	1030.00	Kg	270.40	1 Kg	278,512.00
Binding Wire	2.72	Kg	412.50	1 Kg	1,120.79
Carriage of material for 300 Km	1.03	Ton	3502.50	1 Km	3,617.09
Sub Total Material				76.82%	283,249.88
Total (L + M +E)				80.00%	294,971.41
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	58,994.28
Composite Rates		Per Ton Rs.		353,965.69	
Labour Rates		Per Ton Rs.		11,721.53	
Composite Rates		Per Ton (US\$)		1,983	

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY
UNIT RATE ANALYSIS

Unit : 01 Ton

Item Name :
Steel Rib Support

Detail	Qty	Unit	Rate (Rs)		Amount
Labour /Manpower					
Labourer	5.00	Hour	125.00	1.00	Hour 625.00
Blacksmith Welder	10.00	Hour	151.00	1.00	Hour 1,510.00
Sundries on Labour				3%	18.75
Total Labour /Manpower				0.42%	2,153.75
Material					
Steel (Struct. Sections)					
Including Cutting in size & Profile,bending, stacking lifting, Carriage Yard to site,Welding sections with specified thickness , including all electrical and equipment charges.	1000.00	Kg	400.00	1	Kg 400,000.00
Welding Electrodes E7018	2.00	Pack	900.00	1	Kg 1,800.00
Carriage of material for 300 Km	1.00	Ton	2355.00	1	Km 2,359.71
Sub Total Material				79.58%	404,159.71
Total (L + M +E)				80.00%	406,313.46
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	81,262.69
Composite Rates			Per Ton Rs.	487,576.15	
Labour Rates			Per Ton Rs.	2,153.75	
			Per Ton (US\$)	2,732	

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY

UNIT RATE ANALYSIS

CEMENT GROUTING

Unit (Ton): 3.4

Item Name : Providing, Injecting Cement Grout (in any stage) Incl Contact Grouting or Consolidating Grouting with all Operations including Drilling, Pipeing , making all arrang ment for operation Using SPGP. Complete. Nomonal Ratio 1:1					
Detail	Qty	Unit	Rate (Rs)		Amount
Material /Labour					
Ordinary Portland Cement Including all Grouting Operations	20.00	Bags	1050.00	1.00	Bags 21,000.00
Fine Cement Including all Grouting Operations	10.0	Bags	1470.00	1	Bags 14,700.00
Water Charges for construction	1000.0	Ltr	0.50	1	Ltr 500.00
Fine sand in grout injected into rock.	500	Kg	50.00	1	Kg 25,000.00
Plasticiser in grout injected into rock.	10.0000	Kg	980.00	1	Kg 9,800.00
Bentonite	50.0000	Kg	680.00	1	Kg 34,000.00
Drilling Set Up and drilling	178	M	8250.00	1	No 1,471,800.00
Carriage of material for 300 Km	2.06	Ton	2336.00	1	Ton 4,812.16
Labour & 18% of material Cost	L/S				284,690.19
Sub Total Material				80.00%	1,866,302.35
Total (L + M +E) For 10 RM				80.00%	1,866,302.35
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	373,260.47
Composite Rates					
	Per Cum Rs.		658,694.95		
	Deduct 35%		230,543.23		
	Drilling				
	Grouting		285,577.19	62,826.98	Grouting /SM
	Per Cum (US\$)		1,600		

KALAM - ASRIT HYDRO POWER PROJECT

**FEASIBILITY STUDY
UNIT RATE ANALYSIS**

UNIT RATE ANALYSIS OF SUPPLYING AND FIXING OF 3"x3" SPOT WELDED 8 SWG (SIZE 8"x4'=32 SFT) OR 2.98 SM.

Lattice Girders

Analysis for 2.98 SM.

S.No.	Description	Qty	Unit	Rate	Amount	Remarks
1	MATERIAL					
1-1	Steel Mesh 5mm dia plain bar. For (32 SM /2.98 Sm) long Bars 8x13=104 Rft, Short bars 25x4=100 Rft =204x0.121=24.6	25.70	Kg	325	8353.80	
			Sub total (1)		8,353.80	
2	CHARGES FOR COMPLETE FABRICATION, TRANSPORTATION AND FIXING/FITTING AT SITE OF WORK.					
2-1	Charges for Transportation and fixing , welding = 20% of the Cost Of Materials.	1	No.	8353.80	20%	1,670.76
			Sub total (2)		1,670.76	
	Total (1+2)				10,024.56	
	Contractor's Profit @ 20%				2,004.91	
	Total.				12,029.47	Per ton
	Rate for 1 SM .				4,038.00	468,000.00
	Rate for 1 SM USD				22.62	

ASRIT KADAM HYDRO POWER PLANT
KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS
PILE CONCRETE

Serial No.			Unit : 01 Cum			
Item Name : Providing and laying concrete for bored cast in situ piles by tremie pipe or skip bucket using Coarse sand and Crushed Aggregate 3/4" (19mm) & down gauge in dense homogeneous concrete nominal mix 1:1.33:2.66 having cube crushing strength of 34.5 N/mm2 at 28 days. The concrete in the piles is to be measured by multiplying the cross-sectional area of the pile by the length of pile as cast, from the head to the butt of the shoe. Reinforcement & boring of pile is to be measured for payment separately. 1 : 1 : 2 mix						
Detail	Qty	Unit	Rate (Rs)			Amount
<u>Labour /Manpower</u>						
Mason	1.5000	Hour	155.00	1	Hour	232.50
Labourer	8.0000	Hour	125.00	1	Hour	1,000.00
Waterman	4.0000	Hour	125.00	1	Hour	500.00
Welder	0.3000	Hour	125.00	1	Hour	37.50
Sundries On Labour				0.03		51.98
Total Labour /Manpower				5.27%		1,821.98
<u>Material</u>						
Ordinary Portland Cement	12.10	Bags	1050.00	1	Bags	12,705.00
Water Charges for construction	350.0	Ltr	0.45	1	Ltr	157.50
Coarse sand	0.3900	Cum	2900.00	1	Cft	1,131.00
Crushed Aggregates	0.7700	Cft	3150.00	1	Cft	2,425.50
Admixture (approved)	4.00	Ltr	800.00	1	Ltr	3,200.00
Carriage of material for 100 Km	1.16	Cum	1730.00	1	Km	2,006.80
Sub Total Material				62.53%		21,625.80
<u>Equipment</u>						
Front Loader 1.5 T	0.0272	Hour	5631.62	1	Hour	153.18
Water Pump	0.0272	Hour	700.00	1	Hour	19.04
Batching Plant	0.0422	Hour	6010.00	1	Hour	253.62
Water Tank Bowser Type 12000 Ltr	0.0422	Hour	1225.0	1	Hour	51.70
Concrete Transit Mixture	0.3330	Hour	4875.0	1	Hour	1,623.38
Skip Bucket	0.3800	Hour	2000.0	1	Hour	760.00
Crane 3 ton capacity	0.3800	Hour	3575.0	1	Hour	1,358.50
Sub Total Equipment				12.20%		4,219.42
Total (L + M +E) For 10 RM				80.00%		27,667.20
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%		5,533.44
Composite Rates		Per Cum Rs.	33,200.63			
Labour Rates		Per Cum Rs.	2,186.37			
Secant Piles 800 mm dia Boring = drilling for 01 RM		Concrete=	15.0816	500,718.62		
		Drilling=	240360	240,360.00		Total 889,294.35
Per Cum USD			186.00			

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY

UNIT RATE ANALYSIS

PILE BORING

Serial No.		Unit : 10 RM				
Item Name : Drilling bore holes with percussion/revrse rotary mehtod in all type of soils i/c shingle gravel and rock.(from 31"to 55"dia) (775 mm to 1375mm)						
Detail	Qty	Unit	Rate (Rs)			Amount
<u>Labour /Manpower</u>						
Technician	8.00	Hour	150.00	1.00	Hour	1,200.00
Forman Concrete	10.00	Hour	125.00	1.00	Hour	1,250.00
Supervisor	10.00	Hour	95.00	1.00	Hour	950.00
Helper	32.00	Hour	93.00	1.00	Hour	2,976.00
Welder	6.00	Hour	125.00	1.00	Hour	750.00
Mason	3.0000	Hour	125.00	1.00	Hour	375.00
Labourer	72.0000	Hour	94.00	1.00	Hour	6,768.00
Total Labour /Manpower				17.10%		14,269.00
<u>Equipment</u>						
Drilling bore holes with percussion/revrse rotary mehtod in all type of soils i/c shingle gravel and rock Complete Boring with all boring materials and Equipments.	10.0000	RM	5250.00	1	RM	52,500.00
Sub Total Equipment				62.90%		52,500.00
Total (L + M +E) For 10 RM				80.00%		66,769.00
Contractor Prifit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%		13,353.80
Composite Rates		Per Cum Rs.	8,012.28			
Labour Rates		Per Cum Rs.	1,712.28			
			Per Cum (US\$)	44.89		

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY

UNIT RATE ANALYSIS

Serial No.

Unit : 01 Cum

Item Name :

Supply and Filling Sand at site,, including handling of materials within 100 Km.

Detail	Qty	Unit	Rate (Rs)		Amount
<u>Labour /Manpower</u>					
Labourer	6.50	Hour	150.00	1.00 Hour	975.00
Sundries on Labour				3%	29.25
Total Labour /Manpower				30.27%	1,004.25
<u>Material</u>					
Clean Sand at Source	1.10	Cum	85.00	1 Cum	93.50
Carriage of material for 100 Km	1.10	Cum	1415.00	1 Km	1,556.50
Sub Total Material				49.73%	1,650.00
Total (L + M +E)				80.00%	2,654.25
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	530.85
Composite Rates		Per Cum Rs.	3,185.10		
Labour Rates		Per Cum Rs.	1,205.10		
		Per Cum (US\$)	17.84		

KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS
OVER BURDEN EXCAVATION

Unit (CM) : 30

Item Name : Clearing and Grubbing of Site.					
Detail	Qty	Unit	Rate (Rs)		Amount
Labour /Manpower					
SUPERVISOR	8	Hour	250.00	1 Hour	2,000.00
LABOURER	50	Hour	150.00	1 Hour	7,500.00
SUNDRIES				3%	225.00
Total Labour /Manpower				4.83%	9,725.00
Material					
COARSE SAND	8.0	CM	2000.00	1 CM	16,000.00
STONE RANDOM CLASS-D	38.0	CM	1280.00	1 CM	48,640.00
CEMENT TYPE-I (OPC)	72.0	BAG	1025.00	1 BAG	73,800.00
WATER	1000.0	LIT	5.00	100 LIT	50.00
Sub Total Material				68.72%	138,490.00
Equipment					
TRACTOR. 80 H.P.	1	Hour	1875.00	4.00 Hour	7,500.00
WATER TANK TOW TYPE 4000 LTR. (INCL.	1	Hour	1200.00	4.00 Hour	4,800.00
PUMP 4" DELIVERY (DIESEL)	1	Hour	700.00	1.00 Hour	700.00
Sub Total Equipment				6.45%	13,000.00
Total (L + M +E)				80.00%	161,215.00
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%	32,243.00
Composite Rates	Per Sm Rs.		6,448.60	Say	6450.00
Labour Rates	Per Sm Rs.		324.17		
	Per Sm (US\$)		36.13		

KALAM - ASRIT HYDRO POWER PROJECT

FEASIBILITY STUDY

UNIT RATE ANALYSIS

GEO TEXTILE

Serial No.			Unit : 01 SM			
Item Name : UV stabilized polypropylene Geotextile consisting of filaments of approximately 40 microns diameter as mentioned in specification or as per manufactures recommendation.						
Detail	Qty	Unit	Rate (Rs)			Amount
<u>Labour /Manpower</u>						
Mason	0.05	Hour	125.00	1.00	Hour	6.25
Labourer	0.05	Hour	84.37	1.00	Hour	4.22
Sundries on Labour				3%		0.19
Total Labour /Manpower				4.20%		10.66
<u>Material</u>						
Geo textile	1.10	SM	150.00	1	Sm	165.00
Carriage of material for 300 Km	1.10	Cum	25.00	1	Km	27.50
Sub Total Material				75.80%		192.50
Sub Total Equipment				0.00%		-
Total (L + M +E)				80.00%		203.16
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%		40.63
Composite Rates		Per Cum Rs.	243.79			
Labour Rates		Per Cum Rs.	12.79			
			Per Cum (US\$)	1.37		

KALAM - ASRIT HYDRO POWER PROJECT
FEASIBILITY STUDY
UNIT RATE ANALYSIS
ROCK FILL

Serial No.			Unit : 01 Cum			
Item Name : Supply and dumping Boulder / Stone at site, without boat, including handling of materials within 100 Km.						
Detail	Qty	Unit	Rate (Rs)			Amount
<u>Labour /Manpower</u>						
Labourer	5.50	Hour	93.75	1.00	Hour	515.63
Sundries on Labour				3%		15.47
		Total Labour /Manpower		18.96%		531.10
<u>Material</u>						
Boulder at Source	1.10	Cum	135.98	1	Cum	149.58
Carriage of material for 100 Km	1.10	Cum	1418.45	1	Km	1,560.30
		Sub Total Material		61.04%		1,709.88
		Sub Total Equipment		0.00%		-
Total (L + M +E)				80.00%		2,240.98
Contractor Profit 10 % + Over Heads on (L + M +E) 2.5% + V.A.T 7.5 %				20%		448.20
Composite Rates		Per Cum Rs.	2,689.17			
Labour Rates		Per Cum Rs.	637.32			
		Per Cum (US\$)	15.07			

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Material Cost Escalation

Annex - C

KALAM - ASRIT HYDRO POWER PROJECT
TABLE OF BASIC PRICES FACTOR FOR ROAD & STRUCTURES

Item No.	Description	Representative Entity of Specified Material	Source of Index	Unit	Value of Factor "C"
1	Fixed Portion				
2	Fuel	High Speed Diesel	Pakistan State Oil / Pakistan Bureau of Statistics	Liter	0.08
3	Labour	Skilled & Unskilled	Market Rate	Per Day	0.15
4	Steel	Iron Bar (M.S. Bar) 1/2"	Market Rate	Tonne	0.13
5	Cement	Ordinary Portland Cement	Market Rate	Per Tonne	0.08
					43.51%

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Tunnel Cost Variation Annex - D

Tunnel Cost Variation							
Rock Classification	Quantity (meter)	Unit Rate (PKR/meter)	Construction Cost (PKR)	Construction Cost (Eq. USD)	Unit Rate (USD/meter)	Construction Cost (USD)	Construction Cost (TOTAL USD)
Bypass Tunnel	Type III	312.60	1,303,458,419	7,302,288	432	134,949	7,437,237
	Type IV	156.30	673,978,548	3,775,790	946	147,891	3,923,681
	Type V	52.10	339,910,325	1,904,260	1,128	58,743	1,963,002
	Total	521.00	2,317,347,293			341,583	13,323,921
	Type III	200.00	381,749,922	2,138,655	407	81,340	2,219,995
Adit to Headrace Tunnel	Type IV	150.00	292,051,741	1,636,144	921	138,180	1,774,324
	Type V	150.00	624,728,082	3,499,877	1,103	165,375	3,665,252
	Total	500.00	1,298,529,745			384,895	7,659,571
	Type II	282.23	541,744,746	3,034,985	113	31,807	3,066,792
	Type III	188.15	391,827,974	2,195,115	309	58,083	2,253,198
Headrace Tunnel (NATM)	Type IV	94.08	248,034,951	1,389,552	715	67,303	1,456,854
	Type V	62.72	385,850,744	2,161,629	857	53,781	2,215,410
	Pilot	100.00	1,373,644,991	7,695,490	588	58,800	7,754,290
	sum	727.18	2,941,103,406			269,774	16,746,544
	Type II	102.97	181,182,490	1,015,028	318	32,785	1,047,813
Vertical Pressure Tunnel	Type III	61.78	264,540,402	1,482,019	309	19,065	1,501,084
	Type IV	41.19	118,920,209	666,220	715	29,458	695,677
	sum	205.94	564,643,101			81,307	3,244,574

Tunnel Cost Variation

Rock Classification		Quantity (meter)	Unit Rate (PKR/meter)	Construction Cost (PKR)	Construction Cost (Eq. USD)	Unit Rate (USD/meter)	Construction Cost (USD)	Construction Cost (TOTAL USD)
Horizontal Pressure Tunnel	Type II	59.44	3,211,824	190,910,789	1,069,528	113	6,698	1,076,227
	Type III	35.66	3,069,976	109,475,339	613,307	309	11,008	624,316
	Type IV	23.77	2,960,119	70,362,024	394,185	716	17,008	411,193
	sum	118.87		370,748,152			34,715	2,111,735
	Type III	111.96	1,468,533	164,416,979	921,104	407	45,521	966,625
Adit to Horizontal Pressure Tunnel	Type IV	83.97	2,018,233	169,470,991	949,417	921	77,371	1,026,788
	Type V	83.97	4,235,061	355,618,064	1,992,258	1,102	92,561	2,084,819
	sum	279.90		689,506,034			215,453	4,078,232
	Type II	95.00	2,983,478	283,430,413	1,587,845	113	10,707	1,598,552
	Type III	57.00	3,109,327	177,231,649	992,894	309	17,596	1,010,490
Steel Penstock Tunnel	Type IV	38.00	3,643,270	138,444,247	775,598	715	27,185	802,783
	sum	190.00		599,106,308			55,488	3,411,825
	Type II	63.42	1,140,564	72,334,540	405,236	64	4,040	409,275
	Type III	42.28	1,220,488	51,602,242	289,088	245	10,359	299,447
	Type IV	21.14	1,466,494	31,001,680	173,679	593	12,534	186,213
Steel Penstock Tunnel (Mainfold)	Type V	14.09	3,532,153	49,768,031	278,813	711	10,013	288,826
	sum	140.93		204,706,493			36,945	1,183,760

APENDIX-M

QUOTATIONS OF E&M
EQUIPMENT

238 MW KALAM ASRIT HYDROPOWER PROJECT

Budgetary Proposal Kalam Asrit



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Rev.	Page	Description	Created by	Checked by	Date
-		Budgetary Proposal	TAt	cleassm	2022-06-30

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Voith Hydro GmbH & Co. KG, Postfach 20 10, 89510 Heidenheim, Germany

Group Division Hydro

Mr. Muhammad Saleem Cheema,

Chief Hydel Power Plants and Mechanical,
Power & Mechanical Division
National Engineering Services Pakistan (Pvt.) Limited
(NESPAK)
1-C, Block N, Model Town Extn. Lahore
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Your message

Our ref.

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Date 2022-06-30

E-mail torsten.abert@voith.com

Budgetary Proposal for the Hydro Power Plant "Kalam Asrit" in Pakistan

Dear Mr. Cheema,

herewith we would like to inform you about our estimates for the budget pricing and main data of this Project.

Power Train description:

3 (three) vertical Francis-Turbines and Generators

Qr ~ 37,3 m³/s; Prt ~ 70 MW; Hrat. = 204,3 m; n = 333,3 rpm; D ~ 2,6 m
Smax = 86 MVA; cosφ = 0,8 lagging. 0.9 leading; U = 11 kV; n_{max} = 582 rpm

and

1 (one) vertical Francis-Turbine and Generator

Qr ~ 18 m³/s; Prt ~ 33.8 MW; Hrat. = 204,3 m; n = 428,6 rpm; D ~ 2,0 m
Smax = 41.5 MVA; cosφ = 0,8 lagging. 0.9 leading; U = 11 kV; n_{max} = 737 rpm

1. Scope of supply

- Francis Turbine (runner, shaft, bearing, stay ring /spiral case, distributor mechanism, draft tube and accessories)
- Abrasion resistance coatings for runner and wicket gates
- Governor (digital governor and hydraulic pressure unit)
- Main inlet valve (butterfly valve)
- Generator (incl. air/water coolers and accessories)
- Excitation System

Board of Management of the
Voith Hydro Holding Verw. GmbH
Uwe Wehnhardt, Chairman
Jürgen Häckel
Uwe Kaipf
Dr. Tobias Keitel

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Voith Hydro Holding GmbH & Co. KG
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Registered Office Heidenheim
General Partner of the
Voith Hydro Holding GmbH & Co. KG

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VAT Reg.No.
DE183806124
Tax No.64004/08669

Bank Account
Commerzbank AG, Heidenheim
IBAN DE 79 6324 0016 0206 3014 00
BIC / SWIFT-Code COBADEFF632

- Control, monitoring and protection system (redundant acc. specified control system configuration)
- Communication system
- Cooling water system
- Drainage and dewatering system
- Compressed air system
- Bus duct system (incl. GCB)
- MV Switchgear
- LV Switchgear
- Security System (CCTV and Door Access)
- Emergency diesel sets (in power house and dam)
- DC system (redundant; for 24 V, 48 V and 110 V)
- Generator Step-up Transformer (three phase)
- Station Service Transformers
- HV Switchyard (GIS 220 kV)
- 400 V AC Auxiliary Power Supply
- Lighting and small power system
- Earthing and lightning protection system
- Cable systems (control, LV, MV, HV)
- Heating, ventilation and air conditioning system
- Powerhouse crane
- Fire fighting system (for power house, generator CO2 and transformer)
- Workshop equipment

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Page 3 of 4
Of letter dated 2022-06-30

Including:

- engineering
- manufacturing
- workshop testing
- packing
- transportation
- erection and commissioning

Not including:

- other mechanical or electrical components (e.g. hydraulic steel structures and other "Balance of Plant" components)
- interfacing to other components
- training

✓

2. Incoterms

- CIP site

Group Division Hydro

Mailing address:
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3. Budget price in EURO:

For the above listed scope of supply:

122,500,000 €

Page 4 of 4
Of letter dated 2022-06-30

4. Comments:

The hydraulic application is a first calculation based on the specification and drawings given. An optimisation may lead to slightly modified results.

Voith Hydro is looking forward to working with National Engineering Services Pakistan (Pvt.) Limited (NESPAK), to contribute to the success story of this project by leveraging our 150 years plus of hydro experience. This proposal was prepared taking into consideration the data available up to now and is adaptable to change with respect to final specifications, if technically or economically necessary.

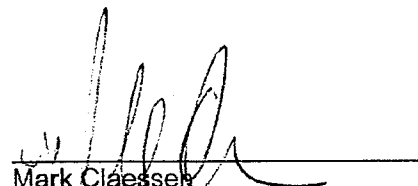
Hence, our proposal is a non-binding budgetary proposal based on today's cost level, in line with applicable international standards and does not consider special requirements. Especially considering the volatile raw material price markets, caused by the Ukraine war, pandemic, supply chain disruptions, etc. it is actually complex to forecast price development. Please note, that in this proposal, taxes and duties are not included.

Our budget offer is furthermore based on our "Voith General Terms of Sale international"


We hope you find our budgetary offer to be helpful and look forward to hearing from you soon.

With kind regards

Voith Hydro GmbH & Co. KG



Mark Claessen
Head of Sales & Proposal



Torsten Abert
Director Sales - Pakistan

Voith Hydro GmbH & Co. KG, Postfach 20 10, 89510 Heidenheim, Germany

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Budgetoffer for Hydro Power Plant "Kalam Asrit" in Pakistan
Request for Budgetpricing and main data for new Francis-Turbine
Generator units and additional equipment

Dear Sirs

herewith we would like to inform you about our estimates for the budget pricing and main data of this Project.

Variant 3 + 1:

3 (three) vertical Francis-Turbines and Generators

Qr ~ 37,3 m³/s; Pr_{at} ~ 70 MW; H_{rat}. = 204,3 m; n = 333,3 rpm; D ~ 2,6 m
S_{max} = 76 MVA; cosφ = 0,9; U = 11 kV; n_{max} = 582 rpm

and

1 (one) vertical Francis-Turbine and Generator

Qr ~ 18 m³/s; Pr_{at} ~ 34 MW; H_{rat}. = 204,3 m; n = 428,6 rpm; D ~ 2,0 m
S_{max} = 37 MVA; cosφ = 0,9; U = 11 kV; n_{max} = 737 rpm

Variant 2 + 2:

2 (two) vertical Francis-Turbines and Generators

Qr ~ 50 m³/s; Pr_{at} ~ 93,5 MW; H_{rat}. = 204,3 m; n = 300 rpm; D ~ 3,0 m
S_{max} = 102 MVA; cosφ = 0,9; U = 11 kV; n_{max} = 527 rpm

and

2 (two) vertical Francis-Turbines and Generators

Qr ~ 15 m³/s; Pr_{at} ~ 28 MW; H_{rat}. = 204,3 m; n = 500 rpm; D ~ 1,7 m
S_{max} = 31 MVA; cosφ = 0,9; U = 11 kV; n_{max} = 867 rpm

Board of Management of the
Voith Hydro Holding Verw. GmbH
Uwe Wehnhardt, Chairman
Uwe Kalpf
Dr. Tobias Keitel
Merkus Mader
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Page 2 of 3
Of letter dated

1. Scope of supply

- Francis Turbine (runner, shaft, bearing, stay ring /spiral case, distributor mechanism, draft tube and accessories)
- Abrasion resistance coatings for runner and wicket gates
- Governor (digital governor and hydraulic pressure unit)
- Main inlet valve (butterfly valve)
- Generator (incl. air/water coolers and accessories)
- Excitation System
- Control, monitoring and protection system (redundant acc. specified control system configuration)
- Communication system
- Cooling water system
- Drainage and dewatering system
- Service air
- Bus duct system (incl. GCB)
- MV Switchgear
- LV Switchgear
- Emergency diesel sets (in power house and dam)
- DC system (redundant; for 24 V, 48 V and 110 V)
- Generator Step-up Transformer (three phase)
- HV Switchyard (GIS 220 kV)
- Lighting and small power system
- Earthing and lightning protection system
- Cable systems (control, LV, MV, HV)
- Ventilation and air conditioning system
- Powerhouse crane
- Fire extinguishing system (for power house, generator and transformer)
- Workshop equipment
- Including
 - engineering
 - manufacturing
 - workshop testing
 - packing
 - transportation
 - erection and commissioning
- Not including
 - other mechanical or electrical components (e.g. hydraulic steel structures and other "Balance of Plant" components)
 - interfacing to other components
 - training

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Page 3 of 3
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2. Incoterms

- CIP site

3. Budget price

for 4 (four) Francis units including above mentioned scope

Variant 3+1:

88.500.000 €

Variant 2+2:

85.500.000 €

4. Comments:

The hydraulic application is a first application based on the information and guidelines given in the inquiry dated October 21st, 2019.

An optimisation may lead to slightly modified results.


The Budget price is not binding. It is based on today's cost level, in line with applicable international standards and do not consider special requirements. Taxes and duties are excluded.

Our budget offer is furthermore based on our "Voith General Terms of Sale international"

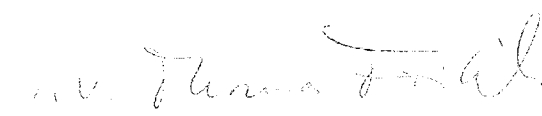
We hope you find our budgetary offer to be helpful and look forward to hearing from you soon.

With kind regards

Voith Hydro GmbH & Co. KG



Peter Marleaux
Head of Sales & Proposal



Thomas Foitzik
Head of Proposal Engineering

Enclosures:

- Main data and dimensions of Francis turbine (for all sizes of both variants)
- Sheet "technical specification of turbine-generator & auxiliaries" filled

APENDIX-N

QUOTATIONS OF PROJECT
INSURANCES

238 MW KALAM ASRIT HYDROPOWER PROJECT

Kalam Asrit Hydropower 보험건적

1) 건설기간 (60 개월)

보험종목	가입금액	공제금액	요율	보험료	비고
CAR (건설공사)	Property Damage (물적손해)	\$356,958,331	3.9%	\$13,921,374	자연재해(지진포함) 최소 사고액의 15% 최대 \$20Mil 터널, 시운전, Under Ground, Wet Work 기타사고 : \$1,000,000
		Minimum : 15% Maximum : \$20,000,000 Others : \$1,000,000			
	Third Party Liability (제 3 자 배상책임)	\$15,000,000			
ALOP (예정이익상실)	\$118,742,141	Time Excess : 180	4.5%	\$5,343,396	
합계				\$19,264,770	

보 험 종 목		가 입 금 액	공제금액	요 율	보 험 료	비 고
Cargo (적 하)	Property Damage (물적손해)	\$130,000,000	\$50,000	0.08%	\$104,000	
	DSU (예정이익상실)	\$118,742,141	60 일	0.36%	\$427,471	Estimated Survey Cost \$70,000
	합계				\$601,471	Survey Fee 포함
	테러보험	\$100,000,000	60 일		\$937,500	공사기간 60 개월
합계					\$20,803,741	

2) 운영기간 (1 년 단위 갱신)

보 험 종 목		가 입 금 액	공제금액	요 율	보 험 료	비 고
CCAR (완성토목)	Property Damage + BI	\$475,700,472	\$300,000	0.65	\$3,092,053	
	Nat Cat (지진/ 홍수)	\$200,000,000			\$350,000	
	합계				\$3,442,053	
	테러보험	\$100,000,000	14 일		\$265,000	
제 3 자 배상책임보험		\$25,000,000			\$170,000	
합계					\$3,877,053	

* 모든 보험종목에 부가세 17% 포함됨

* SPC 에서 필요한 보험은 건설공사보험 (Construction All Risk), 적하보험 (Project Cargo), 테러보험으로 파키스탄 프로젝트에 Lender 측에서 요구하는 보험종목이며, 건설사는 WC/EL (Worker's Compensation/ Employee Liability), 장비보험 등 임



NON-BINDING INDICATION
MARINE CARGO INSURANCE

Date: June 23, 2022

1. Insured	KA Power Limited
2. Policy Period	From effective date to completion of project
3. Type	Marine Project Cargo/ Delay in Start Up (DSU)
4. Limits	<p>Section 1 – Marine Cargo Estimated sendings: USD 130,000 for both projects. These are subject to changes as the project progresses. Maximum limit per conveyance: Estimated USD 20,000,000 – USD 25,000,000 Deductible: USD 25,000 each and every loss (suggested)</p> <p>Section 2 – Marine DSU Limit: Approx. USD 118,742,141 Basis of indemnity: Fixed costs and debt servicing (TBC) Indemnity Period: 18 months (estimated) Deductible: 45 days in the aggregate (for each project)</p>
5. Premium Rate	
Section 1 – Marine Cargo	0.06% gross
Section 2 – Marine Dsu	0.36% gross



6.Reinsurer

Munich Re Syndicate Singapore Pte Limited

**7.Marine Warranty
Survey Fee**

Estimates between USD50,000 to USD 75,000 in addition to the premiums.

**8.Additional
Information Required**

1. List of critical items and the replacement lead time (to re-manufacture, ship and install)
2. Est. shipment schedule for these critical item
3. A copy of the route survey report for review.
4. Full breakdown of the DSU calculation

Please take note that the above is only a very rough indicative quote from the local market as underwriters would require more information such as proposal form and other documents.

Sincerely yours,
Reinsurance Department



NON-BINDING INDICATION
TERRORISM INSURANCE

Date: June 26, 2022

INSURED	KA Power Limited
POLICY PERIOD	July 1, 2024 to June 30, 2029 both days inclusive local standard time at the location of the Property Reinsured (60 months)
TYPE	Terrorism & Sabotage and Riots, Strikes, Civil Commotions, Malicious Damage as Original Policy
REINSURED	EFU General Insurance Limited or to be advised
INTEREST	Real and Personal Property of every kind, nature and description, and Business Interruption (Delay In Start-Up), all as more fully defined in the Original Policy
SUM INSURED	Option 1) USD 100,000,000 each occurrence and in the aggregate for the period Option 2) USD 200,000,000 each occurrence and in the aggregate for the period
INDEMNITY PERIOD	18months
DEDUCTIBLES	
- Property Damage	: USD500,000 each occurrence
- Business Interruption/ Delay In Start-Up	60 days waiting period each occurrence
SITUATION	Pakistan
REINSURANCE	All terms, clauses and conditions as Original Policy in so far as may be applicable to this reinsurance. LMA 3100 Sanction Limitation and Exclusion Clause, as attached Claims
SITUATION	Pakistan



PREMIUM

Option 1) USD 937,500.00 (100% for the period)

Option 2) USD 1,250,000.00 (100% for the period)

INFORMATION:

Occupancy:

Construction of a Hydropower Plant located between the Asrit and the Kedam Villages, In the Khyber Pakhtunkhwa Province, Pakistan.

VALUES

Property Damage USD 365,958,331

Delay in Start Up USD 118,742,141

Total Contract Value USD 484,700,472

Please take note that the above is only a very rough indicative quote from the local market as underwriters would require more information such as proposal form and other documents.

Sincerely yours,
Reinsurance Department

Willis Towers Watson
7F Center 1 West Tower, 26, Euljiro 5-gil Jung-gu,
Seoul 04589, Korea
Tel: 82-2-6353-6000 / Fax: 82-2-6353-6050



FACULTATIVE REINSURANCE PLACEMENT SLIP **COMPREHENSIVE PROJECT INSURANCE**

1. Original Insured:

Section 1) Project Works

1. KA Power Limited as Principal and/or
2. Korean South East Power Co. Ltd
3. Project Manager and/or EPC Contractor and/or all other Contractors and/or Sub-contractors including direct or indirect contractors of any tier and/or others (not included in Insured 3) engaged to provide goods or services in connection with the Project; and/or
4. Any other Lenders to the Project; and/or
5. Architects, surveyors, suppliers and engineers and other professional consultants engaged by the Insured 1 and/or 3 solely to provide professional services for their site activities only).

All for their respective rights and interests.

The Insurers agree to waive all rights of subrogation or action which they may have or acquire against any of the parties comprising the Insured or their directors agents or employees or their insurers arising out of any occurrence in respect of which any claim is admitted hereunder or which but for the application of any deductible/excess mentioned in the Schedule hereto would be made hereunder.

The terms Principal, Contractor, Sub-contractors shall also mean all their affiliated, subsidiary and associated companies and corporations as now exist or may hereafter be constituted or acquired.

Section 2) Delay in Start-Up

1. KA Power Limited (the Owner)
2. The Finance Parties



Section 3) Third Party Liability

The Insured's named under Section 1 above

2. Reinsured:

To be Advised

3. Interest Insured:

Section 1) Project Works

"All Risks" of physical Loss and/or Damage to the preliminary permanent and temporary works, materials, including materials supplied by the Owner (provided that the value of such is included in the Sum Insured), temporary buildings and contents thereof and all other property used or for use in connection with the Project.

Section 3) Delay in Start-Up

Fixed operating costs and/or debt service and/or Loss of ROEC and/or penalties payable under the Power Purchase Agreement and/or increased cost of working arising from a delay in commencement of the Insured Business consequent upon Damage insured by Section 1a) Project Works

Indemnity Period

18 months commencing on the Scheduled Date of Commencement of Commercial Operations.

Scheduled Date of Commencement of Commercial Operations

July 1, 2029 or such other date as may be agreed by Insurers.

Section 3 - Third Party Liability

The Insured's legal liability for accidental third party death and/or bodily and/or personal injury and/or property Damage arising directly out of the performance of the Project.

4. Project:

The design, engineering, procurement, supply, delivery, erection, construction, installation, start-up, Testing, Commissioning, Performance Testing, Initial Operations and maintenance of the Kalam Asrit Hydropower, Pakistan (the Project) together with all associated and/or ancillary works.



- 5. Project Site:** Where work is carried out in connection with the Project.
- 6. Policy Period:** From July 1, 2024 to June 30, 2029 both days inclusive local standard time at the location of the Property Reinsured (both days inclusive, 60 months)
- Followed by a Defects Liability Period of 24 months from the Commercial Operation Date as defined in the Contract.
- 7. Sum Insured/
Sub Limit**
- | | |
|---------------------------------------|------------------------|
| Section 1 – Project Works: | USD 365,958,331 |
| <u>Section 2 – Delay in Start-Up:</u> | <u>USD 118,742,141</u> |
| Total Contract Value: | USD 484,700,472 |
- In respect of Property Damage : USD100,000,000 a.o.o
- 8. Limit of liability:** Section 3 – Third Party Liability
USD 15,000,000 each and every Occurrence and/or series of Occurrences arising out of one event unlimited in all but in the aggregate in respect of Seepage, Pollution and Contamination.
- 9. Deductible:** Section 1 – Project Works
Each & every occurrence:-
1. 15% VARTOL subject to a minimum and a maximum of USD 20,000,000 each and every occurrence in respect of Natural Catastrophe Damage.
 2. USD 1,000,000 each and every occurrence in respect of all others.
- Section 2 – Delay in Start-Up
1. In respect of Delays resulting from Natural Catastrophe Damage or underground works:
180 days in the aggregate commencing on the Scheduled Date of Commencement of Commercial Operations.



2. In respect of Delays resulting from any other Loss:
120 days in the aggregate commencing on the Scheduled
Date of Commencement of Commercial Operations.

Section 3 – Third Party Liability

USD 50,000 each and every Occurrence in respect of Property
Damage only.

**10. Choice of Law and
Jurisdiction:**

Section 1 & 2 Construction "All Risks" & Delay in Start-Up

Anywhere in Pakistan in connection with the Contract

Section 3 Third Party Liability

Worldwide excluding USA, Canada, Australia

11. Gross Premium:

Section 1 & 3) Project Work: **3.9%** and to be adjustable at expiry
on final contract value

Section 2) Delay in Start-Up: **4.5%** on the Sum Insured

APENDIX-O

238 MW KALAM ASRIT HYDROPOWER PROJECT

JUSTIFICATION OF 17% IRR

JUSTIFICATION OF THE 17% IRR

JUSTIFICATION OF 17% IRR

KOEN, the main sponsor of the Project, is a reputable international investor and has the experience of investing in number of countries. The applicant is concerned that no official document, except for "Concept Paper on Determination of Rate of Return for Power Sector" by NEPRA, is available for explanation of basis of IRR calculation. The approved IRR to different hydropower projects ranges between 13%-17%. The applicant has requested an IRR of 17% which has been justified from various perspectives. In the following sections we have attempted to give an overall viewpoint on IRR for the consideration of honorable Authority so that an informed decision can be taken to attract the FDI in Pakistan.

In cost plus tariff regime the IRR allowed to a sponsors should consider the sufficiency and bankability of the proposed investment. There are number of factors which affect the IRR of the investors to which consideration should be given to attract the much-needed FDI in the country.

Some of the key take aways in this respect are as follows:

- 1) Economic and Political Stability and its impact on foreign direct investment and required rate of return
- 2) Sector Specific Risks and its impact on IRR
- 3) Hydropower Specific risks and its impact on IRR
- 4) Gross IRR vs Net IRR – impact of cost overruns, delayed payments, sponsors costs and taxes on IRR
- 5) Testing the consistency of "IRR" with internationally acceptable criteria like CAPM, UNFCCC hurdle rates, sovereign risks, and defaults spreads.

Based on aforesaid factors we believe that an IRR of 17% is fully justified for hydropower projects in Pakistan as further explained in below section.

1) ECONOMIC AND POLITICAL STABILITY

The investment made by KOEN in Pakistan is a "Foreign Direct Investment" which is bloodline for a country like Pakistan, which has a huge current account deficit and lackluster economic growth. Foreign direct investment not only stimulates the economic growth and employment but also provides much stability to the foreign currency exchange rate and reserves.

Compared with local investors, foreign investors gauge host country from distinct perspective while taking the investment decision. Some of the fundamental considerations are as follows:

JUSTIFICATION OF THE 17% IRR.

- 1) Economic and Political Environment
- 2) Regulatory and legal Environment
- 3) Exchange risk coverage and repatriation rights
- 4) Capability of the off taker to pay for tariff on timely basis
- 5) Ranking or rating of the country like corruption index, terrorism index, ease of doing business and credit ratings etc.
- 6) Infrastructure and institutional strength

Therefore, while taking the decision about the applicable IRR, the aforementioned factors should be given consideration and such decisions should comply with then prevailing economic, political and governance indicators. One of the major reasons for decline in FDI is that available returns do not compensate for the risks to which foreign investors are prone to. It should be appreciated that whenever a reputable foreign investor decides to invest in a country, he considers, amongst others, aforementioned factors to reach at the required "hurdle rate" and compares the same with other competing investment opportunities in other countries.

Other than sector specific risks, the investors rely on many data providers to assess the risks of investing in any country. For example, the Worldwide Governance Indicators (WGI) project by World Bank reports aggregate and individual governance indicators for over two hundred countries and territories over the period 1996–2020, for six dimensions of governance. Governance consists of the traditions and institutions by which power in a country is exercised. This includes the process by which governments are selected, monitored, and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.

Following are the components of WGI. Estimated score gives the country's position on the aggregate indicator, in units of a standard normal distribution, i.e., ranging from approximately -2.5 to 2.5.

A. CONTROL OF CORRUPTION

Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

B. GOVERNMENT EFFECTIVENESS

Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

C. POLITICAL STABILITY AND ABSENCE OF VIOLENCE/TERRORISM

JUSTIFICATION OF THE 17% IRR.

Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.

D. RULE OF LAW

Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

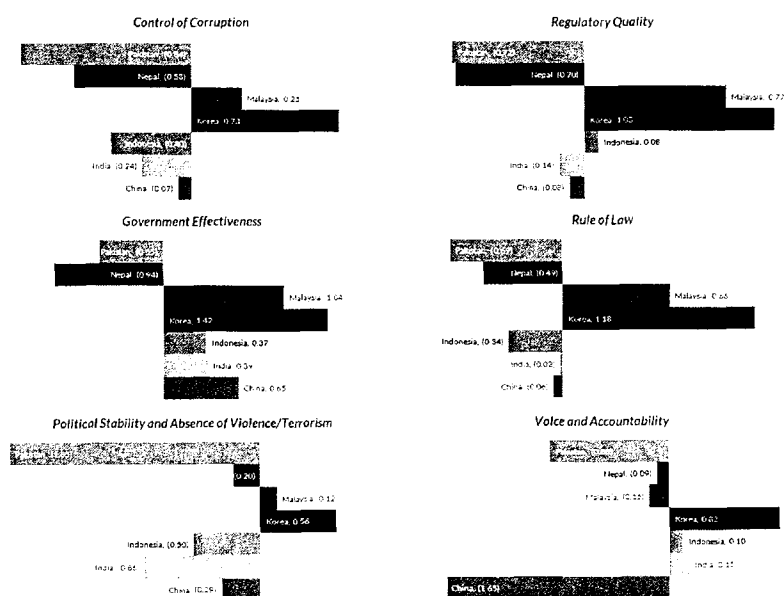
E. REGULATORY QUALITY

Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

F. VOICE AND ACCOUNTABILITY

Voice and Accountability captures perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

It is clear from the figure below that in most indicators, Pakistan falls behind the other regional countries and therefore investors assign a higher risk score while determining their hurdle rates. While it is duly acknowledged that current Power Generation Policy 2015 of Pakistan offers reasonably attractive incentives to the foreign investors and promise to cover risk related to political force majeure, changes in law, tariff indexations and repatriation rights, however, Pakistan is seriously lagging in other fundamental areas which results in higher "hurdle rate" for Pakistan.



JUSTIFICATION OF THE 17% IRR.

United Nations Framework Convention on Climate Change (UNFCCC), through its investment analysis tool (Tool 27) measures the required rate of return in member countries based on numerous factors including those discussed above. As per version 8.0 of the document, which was prevailing during the time of approval of investment in the Project by KOEN board, following are the required rate of returns determined by UNFCCC.

Country	Expected ROE
India	10.73%
Indonesia	10.73%
Nepal	15.42%
China	8.46%
Malaysia	9.31%
Korea	8.31%
Pakistan	16.85%

Based on above discussions, analytics, and situation, it can be clearly demonstrated that required IRR for investment in the Project should be greater than hurdle rate of 16.85% (in USD terms).

2) SECTOR SPECIFIC RISKS

The aforesaid hurdle rate of 16.85% does not fully consider the sector specific risks as this rate has been calculated using a model for whole energy sector.

As explained in previous section that Power Policy 2015 provides attractive set of incentives, however, recent deviations from the Policy by various institutions has seriously shaken the confidence of foreign investors and has increased the hurdle rate for Pakistan. KOEN is not challenging or criticizing these actions of Government, however, would like to register a point that consistency of policies should be ensured and foreign investors (who have already taken investment decision) should be protected against these changes. Some examples of the recent actions of the government are as follows:

- 1) Reopening of executed PPAs to reduce the IRR of investors
- 2) Introduction of new National Electricity Plan and Power Policy aimed to reduce certain incentives available to foreign investors
- 3) Significant changes in tax regime whereby various tax concessions are being withdrawn gradually
- 4) Reversal of certain approved cost and tariffs at COD stage of the projects.
- 5) Significant payment delays by the off takers.

NEPRA was approving IRRs in the tune of 17% for hydropower projects until 2015 when the aforesaid deviations were not in sight and overall situation of the economy and sector was in better shape. In our humble opinion, reduction of IRR in current situation does not make any economic sense for the country

JUSTIFICATION OF THE 17% IRR.

like Pakistan and it should be allowed @17% after considering the sector specific risk to reach the required IRR for the Power Sector.

3) HYDROPOWER SPECIFIC RISKS AND ITS IMPACT ON IRR

Hydropower is a capital-intensive technology with long lead times for development and construction due to the significant feasibility, planning, design, and civil engineering works required. The capital costs of large hydropower projects are dominated by the civil works, the costs of which are influenced by numerous factors pertaining to the site, high volatility of construction material prices, the scale of development and the technological solution that is most economical. Hydropower is a highly site-specific technology where each project is tailor-made for a particular location within a given river basin to meet specific needs for energy and water management.

An analysis reveals that around three-quarters of the total investment costs of hydropower projects are driven by site-specific elements that impact on the civil engineering design and costs. Proper site selection and hydro scheme design are therefore key challenges, and detailed work at the design stage can avoid expensive mistakes.¹

Therefore, while offering an IRR to the daring sponsors who decide to invest in hydropower, a reasonable premium should be added compared with other technologies like wind, solar and thermal who have significantly lesser risks especially in following areas.

A. LONG GESTATION PERIOD:

A typical hydropower project has a gestation period of about 9-10 years. (Initial Due Diligence (6 months) → LOI and Feasibility (1.5 years) → (LOS and Financial Close (2 years) → Construction and Commissioning (5-6 years)). The gestation period of other technologies typically falls within the range of 3-5 years.

B. CONSTRUCTION RISK:

Hydropower is prone to higher construction risks compared with other technologies. Under the construction contract the EPC contractor is required to take the risks related to unforeseeable site condition (geotechnical risk, rock conditions, underground flooding, seismic risks, weather conditions, and flooding risks). Insurance coverage is only available for acts of God; however, the higher deductibles of insurance program expose the contractor and sponsors to significantly higher risks compared with other technologies.

¹ Ecofys, et al., 2011

JUSTIFICATION OF THE 17% IRR.

C. FINANCING AND SPONSOR SUPPORT PROGRAM RISK:

Hydropower has limited access to the financing due to its inherent risks. In most of the cases only development/multilateral banks consider financing hydropower with higher spreads. Additionally, under the financing arrangements, the sponsors are required to provide significantly higher sponsor support program in the form of bank guarantees/LCs for negative cost overruns, initial debt servicing and excess debt (the debt which is not approved by NEPRA). This sponsor support program not only exposes the sponsors to significant risk but also results in spending significant costs to arrange bank guarantees which are not considered as admissible cost in the tariff.

D. DESIGN RISK:

Most of competing technologies have standard and off the shelf designs, however, each hydropower site is unique and needs to be designed from scrap. This sometimes results in unexpected design changes during detailed design stage, exposing the sponsors to bear additional costs and delays. Additionally, such design changes may require approvals of POE resulting into further delays.

We appreciate that NEPRA do recognizes this fundamental aspect of risk profile of hydropower projects and has allowed an IRR premium of 2% to hydropower projects compared with other technologies. Therefore, we expect that same approach shall be taken by honorable authority while deciding the required IRR for the Project.

4) GROSS/NOMINAL IRR VS NET IRR

Honorable Authority would appreciate that gross IRR allowed to any project does not reflect the actual IRR (net IRR) earned by the Sponsors. There are number of risks and items which are not considered by honorable Authority for calculation of IRR. If such factors are duly considered, the net IRR to the Sponsors is significantly lesser than the nominal IRR allowed. Some of the key factors, which bear negative impact on IRR are as follows:

A. NEGATIVE COST OVERRUNS AND DELAYS:

Negative cost overruns and delays incurred by the Project which are to be covered through Sponsors Support Program. Notwithstanding the fact that a robust contractual structure is devised by the Lenders and Sponsors to allocate the risks, however, it must be appreciated that all hydropower projects suffer cost overruns and delays due to its unique nature and high and unforeseeable construction risks.

JUSTIFICATION OF THE 17% IRR.

Typically, Lenders requires from the sponsors to provide cost overrun support in the form of bank guarantee to the tune of 15% of construction cost or 45% to 50% of equity investment. For our Project this translates into about approx. USD 55 million. While this amount is conditional upon actual incidence of cost overrun, however, international, and local experience shows in most of the cases such cost overrun occurs and seriously deteriorate the IRR of the sponsors. To see the things in perspective for every 3% cost overrun an approximate reduction of approx. 1% in IRR is expected. In case of 15% overrun in construction cost, a reduction of approx. 5% in IRR is evident.

IMPACT OF NEGATIVE COST OVERRUNS ON EQUITY IRR

Construction Cost Status	Effective IRR
No Cost Overrun	17%
3% Cost Overrun	16.01%
5% Cost Overrun	15.38%
7% Cost Overrun	14.76%
10% Cost Overrun	13.86%
15% Cost Overrun	12.41%

The indirect impact of these overruns is in addition to loss of IRR. For example, the debt covenants are disrupted, and sponsors must provide additional risk guarantees for meeting the target ratios & reserves. Moreover, the insurance amount increases due to increase in cost of installed assets.

B. DELAYED REVENUES FROM THE POWER PURCHASER:

Unfortunately, power sector of Pakistan is trapped into menace of "circular debt" which results in significant delays from the Power Purchaser. Typically, Power Purchaser pays about 70% of invoiced amount and remaining 30% essentially represents the equity returns of the sponsors. While a delayed payment interest will accrue on overdue payments, however, it must be appreciated PKR based delayed payment interest is significantly less than the USD based IRR of the sponsors. This reduction in dividend coupled with delayed impact of time value of money significantly hurt the IRR of the sponsors & overall project.

Following is the demonstration of impact on project IRR & equity IRR due to delayed payment. The matrix shows the resultant IRR for various combinations of percentage payments against invoice value and number of years after which the balance/withheld amount is paid to the company. The PPA allows an interest on unpaid amount, however this does not cover the whole loss of IRR due to overdue payment.

JUSTIFICATION OF THE 17% IRR.

YEARS/ %AGE PAYMENT	90.00%	80.00%	70.00%	60.00%
3	16.53%	16.11%	15.71%	15.33%
5	16.37%	15.80%	15.27%	14.79%
6	16.31%	15.70%	15.15%	14.65%
10	16.27%	15.66%	15.15%	14.72%

Table above shows that even at 17% IRR, the delayed payment can reduce the effective IRR to ~14%. Similarly, the table below shows that delayed payments have similar impact on overall IRR of the Project as well. This reduction may impede the viability of the Project because longer delays may cause the negative NPV of the Project as well.

Another aspect of the late and partial payments is delay in declaration of dividends. All financing documents include a schedule/ waterfall of cash distribution. The dividend to sponsors is available only when the model passes the test for DSCR and other covenants for such purpose. The DSCR ratio depends on the quantum of free cashflows to the Project. If the cashflows are low (which they become in result of partial payment by the power purchaser), the DSCR test fails and therefore dividend declaration is delayed. This delay of dividend directly impacts the actual IRR of the sponsors, which is reduced by ~1% to 3% depending on the duration of delay.

C. NON-PERMITTED COSTS

Under the limited course financing, the sponsors are required to provide following bank guarantees and LCs to provide security to the Lenders as a Sponsors Support Program:

- i) Bank Guarantee to cover Negative Cost Overruns (about USD 55 million).
- ii) Bank Guarantee to cover undrawn equity (starting from USD 90 million and reducing gradually).
- iii) Bank Guarantee/LC covering first debt repayment (approx. USD 22 million).

While these instruments are conditional, however, it must be appreciated that in most of the cases such guarantees are encashed/used, keeping in view the cost overrun risks related to hydropower and payment delays by the Power Purchaser. In the instant case of our sister concern (Mira Power Limited), all the aforesaid guarantees were used resulting in the drastic reduction in IRR of the sponsors.

JUSTIFICATION OF THE 17% IRR.

In addition to aforesaid risk, bank charges to arrange such guarantees and other expenses of Sponsors (like initial due diligence cost, head office support, travelling etc.) are not allowed as permissible cost item under the Project cost. This also has direct impact on Sponsors IRR.

Estimated amount of these expenses (guarantee charges and other items) is ~ US\$ 8 million, which is approximately 9%-10% of the total non-EPC costs. The impact of these extra costs reduces the IRR of 17% to 16.23%.

D. DIVIDEND TAX

KOEN took the investment decision relying on currently prevailing Power Generation Policy 2015 and then prevailing concession documents of Mira Power Limited under which the dividend tax was a pass-through item and Sponsors were allowed net of dividend tax IRR. Following table explains the effective IRR allowed to different IPPs before 2018.

EFFECTIVE EQUITY IRR TO IPPS BEFORE 2018

IRR CASE	IRR ALLOWED	WITHHOLDING TAX	EFFECTIVE IRR
Case-1	17%	Pass Through	17%
Case-2	17%	7.5%	15.72%

Finance Bill, 2022 proposed to enhance the applicable tax rate including collection of advance tax from 7.5% to 25% on dividend distributed by company set-up for power generation. The Finance Act has re-instated the reduced rate of 15% only in case of dividend paid by IPPs where such dividend is a Pass-Through item under an IA or PPA or EPA and is required to be reimbursed by CPPA or its predecessor or successor entity. After this change, the effective IRR of Investors has reduced to an unattractive level, as demonstrated below.

EFFECTIVE EQUITY IRR TO IPPS AFTER 2018

IRR CASE	IRR ALLOWED	WITHHOLDING TAX	EFFECTIVE IRR
Case-1	17%	25%	12.75%
Case-2	15%	25%	11.25%
Case-3	13%	25%	9.75%

E. EQUITY INSURANCE & SHARING OF 1% IRR WITH GOKPK

While awarding the Project, KPK Government has put a condition that Project shall share an IRR of 1% with GoKPK as facilitation fee. Therefore the impact of this 1% sharing should be considered while allowing the IRR to the Project. Net effective IRR after this sharing will reduce to 16.14% from 17% allowed by NEPRA.

JUSTIFICATION OF THE 17% IRR.

Foreign investors are often required by their respective governments to insure the equity investment in Pakistan. Korean Development Institute required the Korea based sponsors to get insurance for the amount invested in Pakistan. This practice has been followed by all Korean investments in Pakistan including Patrind & Gulpur sponsors.

The Sponsors therefore contacted the Multilateral Investment Guarantee Agency (MIGA) for covering risks of equity investments. A non-binding indication of price has been offered to the sponsors, where an insurance premium between 180 bps and 190 bps. In our financial model we used the figure of 1.85% to assess the impact on IRR and found that this cost will reduce the IRR from 17% to 15.65%.

Combined impact of IRR sharing with GoKPK and MIGA insurance will bring down the IRR from 17% to 14.85%.

5) QUANTIFICATION/ VERIFICATION OF 17% IRR

The rationale for 17% IRR for hydropower is provided in succeeding paragraphs, however in following sections, we have used the mathematical models employed worldwide for determination of cost of equity to verify our claim of 17% IRR. It should be noted that these methods are used for calculation of cost of equity for an ongoing business and therefore does not consider the risks associated with the greenfield projects, especially the hydropower projects.

(1) UNFCCC INVESTMENT HURDLE RATE

United Nations Framework Convention on Climate Change has devised a tool to help applicants demonstrate the “additionality” of the proposed project. Methodological Tool for Investment Analysis, also known as Tool 27 aims to undertake an investment analysis to determine whether the project activity would be financially viable without the incentive of the CDM.

The Tool 27 suggests that the applicant should use CAPM or other relevant method to calculate the cost of equity for investment in any country. At the same time, the tool also provides the benchmark hurdle rates for equity investment for all member countries. If the available return on equity is lower than the approved hurdle rates of the UNFCCC, the additionality is proved thereof.

JUSTIFICATION OF THE 17% IRR.

Country	Group 1	Group 2	Group 3	Meeting criteria (a)-(c) and (e) in paragraph 21?
Haiti	18.52	19.52	18.02	
Honduras	15.42	16.42	14.92	
India	10.73	11.73	10.23	Y
Indonesia	10.73	11.73	10.23	Y
Oman	9.87	10.87	9.37	
Pakistan	16.85	17.85	16.35	
Panama	10.31	11.31	9.81	
Papua New Guinea	15.42	16.42	14.92	

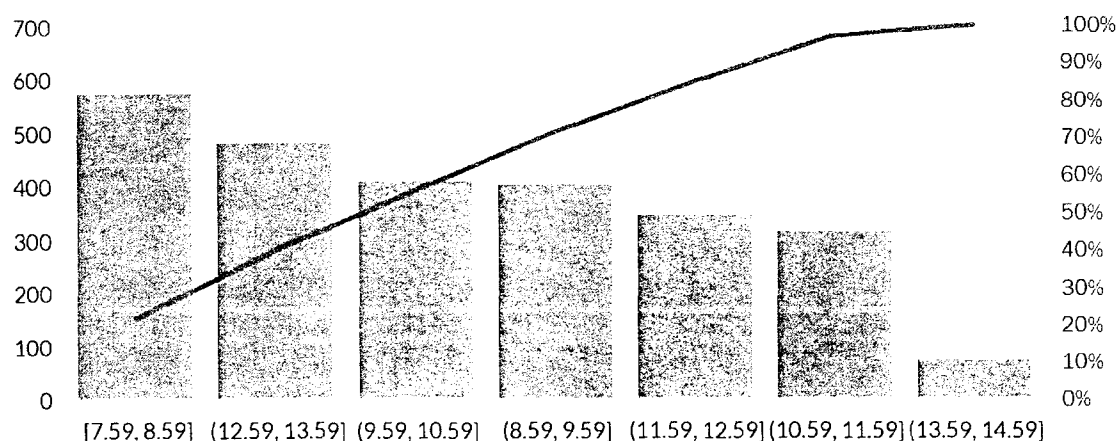
The default values in the benchmark hurdle rate are based on long term historical returns and are recommended to be applied by projects with a start date prior to the adoption of the default values by the Board. The hurdle rates in the Tool 27 reflect, as an approximate value, the returns on equity expected by the market for different sectors and countries. The expectation of return depends on conditions of the market that can be modelled, considering the history (time series) of the market key variables (explaining variables proper of the technology and/or sector under analysis). To determine the adjustment factor to reflect the risk of projects in different sectoral scopes, three different project categories are distinguished according to the sectoral scopes used under the CDM. Energy Industry falls into group 1 of the classification.

it may be noted that LOI for the Project was awarded by the PEDO in April 2018 and accordingly the KOEN initiated the bankable feasibility study in October 2018 by execution of agreement with M/s SAMAN Corporation, Korea. Version 8.0 of the Tool 27 was applicable at the time of this decision. Expected Return on Equity for Pakistan was determined as 16.85%. At the time of execution of agreement for feasibility study, the allowed IRR by the NEPRA was 17% and therefore while comparing the hurdle rate of 16.85%, the sponsors committed to invest in the Project. Any negative change in return on equity will impact the decision of the Sponsors to invest in the Project.

(2) COMPARISON OF IRR WITH SOVEREIGN BONDS

As on June 15, 2022, the yield on Pakistan's 10-year & 20-year bonds are 13.28% & 13.61% respectively. The yield on 10-year bond changed +4.1 bp during week of June 15, 2022, +8.7 bp during month of May 2022, +335.6 bp during last year. The Pakistan credit rating is B-, according to Standard & Poor's agency.

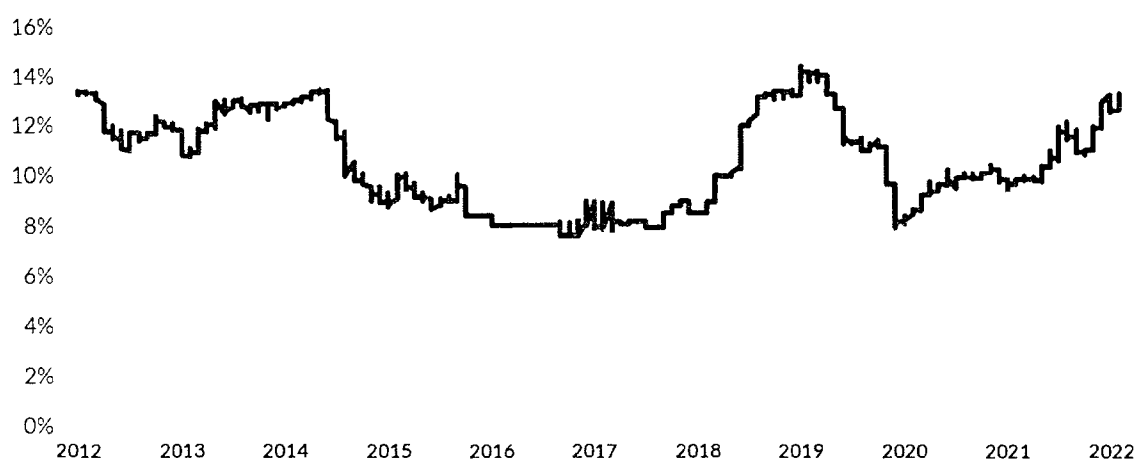
JUSTIFICATION OF THE 17% IRR.



YIELD ON BONDS- PARETO DIAGRAM

A daily analysis of past ten years for 10-year sovereign bond reveals that more than 42% of the observations, the yield on the bond stayed above 11%.

As discussed in section above, the Sponsors undertook the decision to invest in country when bond rates were in the range of 8-9% (October 2018). Current yield rates indicate investors of bonds are unwilling to accept that return for holding government debt. High bond yields shows that government will be unable to raise inexpensive funds that can be used to fund infrastructure investment. High yields also extend fiscal pressure by increasing interest costs.



HISTORICAL YIELD ON PAKISTAN'S 10- YEAR SOVEREIGN BOND

Sovereign bonds investment, when compared with equity investment is a safer investment and does not involve risks which a hydropower project is prone to. It is therefore unfair to reduce the IRR of the investors when yield on sovereign bond, which is considered a safer and risk-free investment, has increased more than 50%, since the initial decision of the equity investment in the Project.

JUSTIFICATION OF THE 17% IRR.

(3) Determination of IRR using Capital Asset Pricing Model

A. METHOD-1: NEPRA METHOD

The existing generation tariff regime of NEPRA, both upfront and cost-plus, allows for a fixed Internal Rate of Return (IRR). The IRR presently ranges in-between 15% and 20%. In November 2016, NEPRA presented a concept paper on determination of rate of return for power sector. The paper argues that working out of power sector IRR needs to be effectively depicted against specific risk and return matrix and its adjustment for a particular technology. The IRR thus allowed should clearly spell out and be reflective of a return which has built-in approach to account for various parameters, such as (a) prevailing power sector incentive packages, (b) associated country risks, (c) variants of that specific technology, (d) level of incentive to be created for investors and e) whether the investor is opting for upfront or cost- plus regime.

The paper recommended following formula to calculate the required rate of return.

EQUATION: NEPRA CAPM MODEL FORMULA

$$R_e = R_f + \beta(R_m - R_f) + CRP$$

Where.

- R_e = Required Rate of Return on Equity
- R_f = Risk Free Rate on US 5-year bond
- R_m = Expected Return on Portfolio of Stock
- β = The Systematic Risk Factor
- CRP = Country Risk Premium

We have followed the same source of information, numbers and indicators as used in NEPRA's Model, however updated the variables as latest as available.

REFERENCE & UPDATED ASSUMPTIONS OF CAPM

DESCRIPTION	NEPRA MODEL [2016]	LATEST [2021-22]
R_f^2	1.38%	3.303%
$R_m - R_f$ [Actual Market Risk Premium]	4.62%	4.72% ³

² <https://www.bloomberq.com/markets/rates-bonds/government-bonds/us> [Data as on June 17, 2022]

³ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3825823 [Data as on March 23, 2021]

JUSTIFICATION OF THE 17% IRR.

DESCRIPTION	NEPRA MODEL [2016]	LATEST [2021-22]
R _m -R _f [Rounded Market Risk Premium]	5%	5%
Unlevered β	0.36	0.59 ⁴
Levered β [Gearing 70:30]	1.20	1.97
Country Risk Premium [CDS] ⁵	5.53%	3.59%
Adjusted Country Risk Premium [CDS]	6.14%	3.98%

As per references and explanations provided in footnotes, it is evident that for some critical variables, data is available only for mid-year 2021. Economic and fiscal condition of the country has deteriorated (especially CDS) since that time and these variables have increased sharply during first half of year 2022, however, to line up with the data sources used in NEPRA model, we did not take advantage of the latest available numbers from other sources.

Based on values shown in table above and using the formula proposed by NEPRA for calculation to Rate of Return, we have updated the results as follows.

UPDATED ROR USING NEPRA CAPM MODEL

SENSITIVITY OF ROE	EQUITY RISK PREMIUM @ 4.72%		EQUITY RISK PREMIUM @ 5%	
	CDS	Adjusted CDS	CDS	Adjusted CDS
Unlevered Beta	9.71%	10.11%	9.88%	10.27%
Levered Beta @ D/E of 50:50	12.50%	12.89%	12.83%	13.22%
Levered Beta @ D/E of 70:30	16.21%	16.61%	16.76%	17.16%
Levered Beta @ D/E of 80:20 ⁶	20.85%	21.25%	21.68%	22.07%

As evident from recent NEPRA determination of the similar hydropower project, a ROR of 13% was awarded which is the same number as calculated in NEPRA's Model with assumption of unadjusted CDS, D/E ratio of 70:30, and Equity Risk premium of 5%. On current assumptions, this number has now been calculated as 16.76%.

⁴ https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html [Data used is as of January 2022]

⁵ https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html [Data updated till June 2021]

⁶ Debt Equity Ratio of the applicant

JUSTIFICATION OF THE 17% IRR.

NEPRA's Concept Paper also argues that ROE once fixed for a particular period cannot be applied indefinitely to all projects. ROE and its underlying assumptions change from one period to another. In Principal ROE should be dynamic and the formula should offer flexibility to change one or more variable so that the sector exposure to risk is adequately and timely addressed. A review period of 5 years has been recommended in the Concept Paper and therefore a revision is already due for reassessing the number for ROE.

When these values are revised as per market conditions mentioned above, the ROE determined by NEPRA revises to 16.76%. If we further adjust the CDS as per recommended financial methods, the return reaches to 17.16%. Please note that these numbers are calculated based on D/E ratio of 70:30 and if we match it with our proposed capital structure of 80:20, the required ROE further increase to 21.68% with unadjusted CDS and 22.07% with adjusted CDS.

As advocated in the NEPRA concept paper, technology specific risk should be considered while deciding the return for any project. In past NEPRA has allowed an IRR to hydropower project which included a technology margin of 2% (Higher than thermal power projects)

Concept paper also explains that under cost plus regime, the investor doesn't have the option to keep the saving arising from achieving better efficiency or reducing the cost of major CAPEX item i.e., EPC, post NEPRA approval. The investor primarily relies on the Authority approved return. This is not the case in upfront tariff, wherein the investor is entitled to keep among many things, the project cost/efficiency saving and thus can attain ROE higher than the approved one. This means that the potential of earning profit is more in upfront tariff than under cost plus regime and thus the return offer on upfront tariff regime should be lower than the Cost Plus.

B. CAPM FROM THE PERSPECTIVE OF SOVEREIGN RISK

The most observable measure of country risk, at least in financial markets, is the default risk when lending to the government of that country. This risk, termed sovereign default risk, has a long history of measurement attempts, stretching back to the nineteenth century. If governments can default, we need measures of sovereign default risk not only to set interest rates on sovereign bonds and loans but to price all other assets. Following are three well known methods of measuring the country risk premium.

I. CREDIT DEFAULT SWAP RATE

NEPRA's CAPM Model uses CDS to measure the country risk premium, however there are inherent

JUSTIFICATION OF THE 17% IRR.

limitations with using CDS prices as predictors of country default risk. The first is that the exposure to counterparty and liquidity risk, endemic to the CDS market, can cause changes in CDS prices that have little to do with default risk. Thus, a sizable portion of the surge in CDS prices in the last quarter of 2008 can be traced to the failure of Lehman and the subsequent surge in concerns about counterparty risk. The second and related problem is that the narrowness of the CDS market can make an individual CDS susceptible to illiquidity problems, with a concurrent effect on prices.

Results based on CDS rate are shown in the Table below.

II. SOVEREIGN RISK BY RATING AGENCIES

An alternative to CDS is the sovereign rating of the country provided by reputable international rating agencies. Moody's, Standard and Poor's and Fitch's have been rating corporate bond offerings since the early part of the twentieth century. To price sovereign bonds (or set interest rates on sovereign loans), investors (banks) need assessments of default risk that are updated and timely. It has long been argued that ratings agencies take too long to change ratings, and that these changes happen too late to protect investors from a crisis. Ratings are mostly driven by the CDS & default spread on bonds.

Results based on sovereign risk of Pakistan [Credit rating of B3 & default risk of 5.37%] are shown in table below

TABLE: ADJUSTED ROR USING DEFAULT RISK OF PAKISTAN

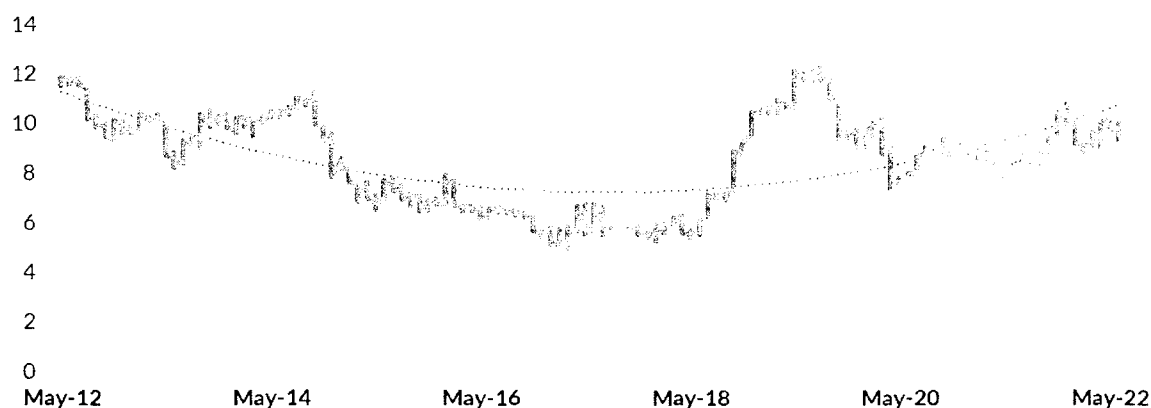
SENSITIVITY OF ROE	ERP@ 4.72%	ERP@ 5%
Unlevered Beta	11.49%	11.66%
Levered Beta @ D/E of 50:50	14.28%	14.61%
Levered Beta @ D/E of 70:30	17.99%	18.54%
Levered Beta @ D/E of 80:20	22.63%	23.46%

III. DEFAULT SPREAD ON BONDS

When a government issues bonds, denominated in a foreign currency, the interest rate on the bond can be compared to a rate on a riskless investment in that currency to get a market measure of the default spread for that country. To illustrate, the Pakistan government had a 10-year dollar denominated bond outstanding in June 2022, with a market interest rate of 13.28%. At the same time, the 10-year US treasury bond rate was 3.29%. If we assume that the US treasury is default free, the difference of 9.99% between the two rates (13.28%- 3.29%

= 9.99%) can be viewed as the market's assessment of the default spread for Pakistan.

JUSTIFICATION OF THE 17% IRR.



DEFAULT SPREAD ON PAKISTAN'S 10 YEAR BOND

While there is a positive correlation between sovereign ratings and market default spreads, there are advantages to using these bond-market based default spreads. The first is that the market differentiation for risk is more granular than the ratings agencies; thus, Pakistan and Ukraine have the same Moody's rating (B3), but the market sees more default risk in Ukraine than in Pakistan [Yield of 54.05% & 13.88% respectively for a bond of 3-year maturity]. The second is that the market-based spreads are more dynamic than ratings, with changes occurring in real time.

When we compared yield of Pakistan's 10-year sovereign bond with yield of US\$ 10-year bond, we find the pattern of default spread as shown in chart above. Based on yields of June 15, 2022, the default spread is 9.998%. When we use this measure of country risk premium to calculate the Return on Equity, they are higher than both CDS and sovereign rating risk.

ADJUSTED ROR USING DEFAULT SPREAD OF PAKISTAN'S SOVEREIGN BOND

SENSITIVITY OF ROE	ERP@ 4.72%	ERP@ 5%
Unlevered Beta	16.12%	16.29%
Levered Beta @ D/E of 50:50	18.91%	19.24%
Levered Beta @ D/E of 70:30	22.62%	23.17%
Levered Beta @ D/E of 80:20	27.26%	28.09%

JUSTIFICATION OF THE 17% IRR.

CONCLUSION

In the aforesaid discussion and analysis which are based on credible sources and information, we have demonstrated that IRR for Pakistan market should be as follows.

CALCULATION OF IRR FROM VARIOUS MODELS

METHODOLOGY	IRR
UNFCCC Tool 27	16.85%
NEPRA CAPM Model	16.76%
Credit Default Swap	16.76%
Sovereign Risk by Rating Agencies	18.54%
Default Spread on Pakistan Bonds	23.17%

In addition to above the IRR will be further eroded due to following factors.

- i) Sector Specific Risks
- ii) Hydropower Specific Risks
- iii) Cost Overruns
- iv) Delayed Payment from Power Purchaser
- v) Non-Permitted Cost
- vi) Dividend Tax
- vii) Equity Insurance
- viii) Sharing of IRR with GoKPK

Overall negative impact due to aforesaid risks and assumptions can range between 5% to 7% on the IRR to the Sponsors. We would take this opportunity to highlight that all the hydel projects which are in development (post LOS), construction or operations phase including Gulpur Hydropower Project has received 17% IRR and that is net of tax (dividend tax as pass through). Therefore we would humbly request the NEPRA to approve 17% (net of tax) IRR for the Project.