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Report No: PAD3508

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
AND
INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN
IN THE AMOUNT OF US$200 MILLION

AND

PROPOSED CREDIT
IN THE AMOUNT OF SDR 177 MILLION
(US$250 MILLION EQUIVALENT)

TO THE

THE ISLAMIC REPUBLIC OF PAKISTAN

FOR A

KHYBER PAKHTUNKHWA HYDROPOWER AND RENEWABLE ENERGY DEVELOPMENT (KHRE)

August 31, 2020

Energy & Extractives Global Practice
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective July 31, 2020)

Currency Unit =	Pakistan Rupee (PKR)
US$ 1 =	PKR 167.33
US$ 1 =	SDR 0.7077

FISCAL YEAR
July 1 - June 30

Regional Vice President:	Hartwig Schafer
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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AGP	Auditor General of Pakistan
ARAPs	Abbreviated Resettlement Action Plan
bcm	Billion cubic meters
CCGT	Combined-cycle gas turbine
CE	Citizen Engagement
CEO	Chief Executive Officer
CO_2	Carbon-dioxide
CT	Combustion turbine
CPPA	Central Power Purchasing Agency
CPS	Country Partnership Strategy
cumec	cubic meter per second
DA	Designated Account
DISCO	Distribution company
E&P	Energy and Power Department
DHP	Dasu Hydropower Project
DPF	Development Policy Financing
EAD	Economic Affairs Division
ECAs	Export Credit Agencies
EOI	Expression of Interest
ERP	Enterprise Resource Planning
ERR	Economic rate of return
ESIA	Environment and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FM	Financial Management
FO	Fuel oil
FY	Fiscal Year
GAP	Gender Action Plan
GDP	Gross domestic product
GKH	Gabral Kalam Hydropower Project
GoKP	Government of Khyber Pakhtunkhwa
GoP	Government of Pakistan
GRM	Grievance Redressal Mechanism
GRS	Grievance Redressal Service
GWh	Gigawatt hour
HPP	Hydropower Project
HR	Human Resources
HSD	High speed diesel
IDA	International Development Association
IDC	Interest During Construction
IFC	International Finance Corporation
IMF	International Monetary Fund
IPOE	Independent Panel of Experts
IPSAS	International Public Sector Accounting Standards
IUFR	Interim Unaudited Financial Reports
KHRE	Khyber Pakhtunkhwa Hydropower and Renewable Energy Development Project
KP	Khyber Pakhtunkhwa
kWh	Kilowatt hours
maf	Million acre-feet
masl	Meters above sea level
mcm	Million cubic meters
MFD	Maximizing Finance for Development
MSC	Management Support Consultants
$MTCO_2e$	Million tonnes of carbon dioxide equivalent
MW	Megawatt
NEPRA	National Electric Power Regulatory Authority
NPV	Net present value
NTDC	National Transmission and Despatch Company
O&M	Operations and maintenance
OHS	Occupational Health and Safety
PDO	Project Development Objective
PEDO	Pakhtunkhwa Energy Development Organization
PESCO	Peshawar Electric Supply Company
PIC	Project Implementation Consultants
PKR	Pakistan Rupees
PMO	Project Management Organization
PPF	Project Preparation Facility
PPSD	Project Procurement Strategy for Development
PSC	Project Steering Committee
PV	Photovoltaic
RAP	Resettlement Action Plan
RE	Renewable energy
REOI	Request for Expression of Interest
RLNG	Re-gasified liquefied natural gas
RPF	Resettlement Policy Framework
SA	Subsidiary Agreement
SDP	Social Development Plan
SRB	Swat River Basin
ST	Steam turbine
TOR	Terms of Reference
WACC	Weighted average cost of capital
WAPDA	Water & Power Development Authority

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Pakistan	Khyber Pakhtunkhwa Hydropower and Renewable Energy Development	
Project ID	**Financing Instrument**	**Environmental Assessment Category**
P163461	Investment Project Financing	A-Full Assessment

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	[ ] Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
24-Sep-2020	30-Nov-2027
Bank/IFC Collaboration	**Joint Level**
Yes	Complementary or Interdependent project requiring active coordination

Proposed Development Objective(s)

The Project Development Objectives are to increase renewable energy generation and strengthen the capacity of associated institutions in Khyber Pakhtunkhwa.

Components

Component Name	Cost (US$, millions)

Development of Hydropower and Renewable Energy Investments	594.00
Institutional Strengthening and Energy Sector Development	25.00
Environment and Social Management	59.00
Project Implementation Support and Technical Assistance	30.00
Financing Charges on the IBRD Loan (Front-end fee, Interest, Commitment & Other Charges)	15.00
Refund of Preparation Advance	4.00

Organizations

Borrower:	The Islamic Republic of Pakistan
Implementing Agency:	Pakhtunkhwa Energy Development Organization Energy and Power Department, Government of Khyber Pakhtunkhwa

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	727.00
Total Financing	727.00
of which IBRD/IDA	450.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	200.00
International Development Association (IDA)	250.00
IDA Credit	250.00

Non-World Bank Group Financing

Counterpart Funding	92.00
Borrower/Recipient	92.00
Commercial Financing	185.00

Unguaranteed Commercial Financing	185.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount
Pakistan	250.00	0.00	0.00	250.00
National PBA	250.00	0.00	0.00	250.00
Total	**250.00**	**0.00**	**0.00**	**250.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2021	2022	2023	2024	2025	2026	2027
Annual	10.00	25.00	75.00	95.00	90.00	90.00	65.00
Cumulative	10.00	35.00	110.00	205.00	295.00	385.00	450.00

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial

7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36	✓	
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37	✓	
Projects on International Waterways OP/BP 7.50	✓	
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Institutional Arrangements:
The Project Implementing Entity shall establish a Steering Committee with attributions and composition acceptable to IBRD/IDA (PA, Section I.A.1(a) of the Schedule)

Sections and Description

Safeguards:

The Borrower and the Project Implementing Entity shall ensure that the Project is carried out with due regard to appropriate health, safety, social, and environmental standards and practices, and in accordance with the Safeguards Instruments (Standard covenants including ToR for TA, financing and implementation of RAP before commencement of the activity, inclusion of contractors obligations in bidding docs and codes of conduct, amendment, reporting, grievance redress mechanism, dam safety plan and IPOE) + Project specific safeguard covenants: restriction on sub-projects which would trigger OP 7.50; finalization of unit of land rates no later than 3 months after the Effective Date, commencement implementation of the social development plan of the first batch of resettlement no later than 6 months after the effective date, (FA, Section I.C of Schedule 2; PA, Section I.C of the Schedule, LA through cross reference)

Sections and Description

Annual Work Plan and Budgets:

Standard covenant with first draft AWPB to be submitted to the Bank for comment no later than one month after the Effective Date and finalized no later than two months after the Effective Date, and then on an annual basis (PA, Section II.B of the Schedule).

Sections and Description

Mid-term review; Standard (PA, Section II.C of the Schedule).

Sections and Description

Financing of IBRD Interest and other financial charges during Construction (FA, Section III.A Category 2 of Schedule 2; and LA, Section 3.02).

Sections and Description

Implementation obligations:

The Project Executing Entity shall comply with all of the obligations of the Project Executing Entity as described in the Project Agreement between the Project Implementing Entity and IBRD/IDA, as if it was a signatory to the Project Agreement (Side Letter from PEDO to IBRD/IDA).

Conditions

Type	Description
Effectiveness	The Project Implementing Entity (KP) and the Project Executing Entity (PEDO) have entered into a Subsidiary Agreement for the on-lending of the proceeds of the Loan and the Credit to the Project Executing Entity.

I. STRATEGIC CONTEXT

A. Country Context

1. **Pakistan is at a crossroads as it deals with the coronavirus disease (COVID-19) pandemic.** Periodic macroeconomic crises and a low human capital basis have constrained the country's growth prospects. Over the last two decades, economic growth in Pakistan has averaged 4.4 percent a year, below the South Asian annual average of 6.3 percent.[1] Low investment in human capital, slow progress of structural reforms, low private investment, and slow export growth due to an overvalued currency, among others, have hindered growth prospects.[2] The country was making good progress in stabilizing its economy and implementing much needed structural reforms. However, the COVID-19 pandemic will have significant negative impacts on the economy. The closure of businesses and disruption to the supply chains are significantly affecting the services and manufacturing sectors, which account for nearly 80 percent of total gross domestic product (GDP). The economy is expected to contract in the range of 2.6 and 3.3 percent in fiscal year (FY)20, and between 0.2 and 4.0 percent in FY21.

2. **The consistent and significant decline in poverty since 2001 is likely to be negatively impacted by the COVID-19 pandemic and its containment measures.** These gains are likely to be reversed due to the COVID-19 pandemic and its associated containment measures. The challenges of poverty reduction can be further exacerbated by climate change and disaster risk-related vulnerabilities. The economic contraction is expected to contribute to a sizeable increase in poverty, reversing the trend of sustained poverty reduction observed over the 14 years. Urban workers employed in the informal sector and daily wage workers employed in the formal sector will bear the brunt of the slowdown. In rural areas, expected decline in off-farm employment opportunities is also likely to increase vulnerability to shocks of households relying on agriculture.

3. **The power sector remains a significant fiscal burden to the country, which is now exacerbated by the COVID-19 pandemic**. In FY20, it incurred a loss of approximately 1.3 percent of GDP on account of: (a) high costs of power generation, (b) losses accumulated from unfunded public policy mandates and lack of timely revision of tariffs, and (c) the poor performance of electricity Distribution Companies (DISCOs). The government is now implementing foundational reforms to restore the financial viability of the sector, in particularly by reducing the sector's *circular debt.* It is also implementing a strategy to move to a low carbon, renewable energy-reliant economy by 2030, requiring the development of 20 giga-watts (GW) of additional hydropower, wind and solar generation capacity. This will also reduce the cost of supply and the dependence on imported fuel. These reforms are jointly supported by Asian Development Bank, International Monetary Fund and the World Bank, including through its Resilient Institutions for Sustainable Economy (RISE) Development Policy Financing (DPF) series and a planned Program for

[1] World Bank estimate.
[2] World Bank. 2019. Pakistan at 100: Shaping the Future. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/31335

Affordable and Clean Energy (PACE) DPF series that aim to support these critical power sector and related fiscal reforms.

B. Sectoral and Institutional Context

4. **Pakistan's energy reforms started in the 1990s but remain unfinished.** The first stages of reform aimed to attract private investment into generation to address growing supply deficits. The Government unbundled the Power Wing of the Water and Power Development Authority (WAPDA), which had been a publicly owned, vertically integrated monopoly with responsibility for generation, transmission, and distribution. In the unbundling, four thermal generation companies, the National Transmission & Despatch Company (NTDC) which is a system operator, and ten distribution companies (DISCOs) were formed, while the hydropower assets remained with WAPDA. The National Electric Power Regulatory Authority (NEPRA) was also set up, with responsibility for licensing, determining tariffs, creating standards, and monitoring sector performance. In 2015, the single buyer function was separated from NTDC and is now the responsibility of the Central Power Purchasing Agency-Guarantee (CPPA-G). CPPA-G's core functions include billing and settlement, power procurement on behalf of DISCOs, and market development.

5. **Despite huge hydropower and renewable energy potential, Pakistan's dependence on imported fossil fuels for power generation is high and has fiscal, financial and environmental implications.** The sector is vulnerable to price volatility and foreign exchange risks, and is the largest contributor to Pakistan's greenhouse gas emissions.[3] In FY19, 40 percent of the total electricity generated (and over 60 percent of thermal generation) used imported fuel, requiring US$4 billion in foreign currency for fuel payment. This is increasing the overall cost of power generation and affecting the balance of payments.

6. **Arrears in the power sector have added to fiscal vulnerability and its rate of accumulation has increased after the onset of the COVID-19 pandemic.** Pakistan's estimated cost of generation in FY20 was over US¢8.5/kilo Watt hour (kWh) (with 21 percent from imported Liquefied Natural Gas (LNG) based plants at US¢13/kWh and 22 percent from imported coal plants at US¢11/kWh). Annually, the power sector incurs substantial losses due to the heavy reliance on costly imported fossil fuels, unbudgeted subsidies, lack of timely determination and implementation of tariffs, and the poor performance of DISCOs. The consumer electricity tariff is distorted because of expensive contractual capacity payments to independent power producers and untargeted subsidies. The high cost of power generation has also exacerbated cost recovery challenges for the DISCOs. As of December 31, 2019, the total stock of circular debt in the power sector was PKR 1,721 billion. After the COVID-19 pandemic, demand fell, recoveries dropped and monthly and quarterly tariff adjustments were suspended. Consequently, the rate of increase in *circular debt* (or flow) went up from an estimated PKR 17 billion per month (during first six months of FY20) to about PKR 100 billion per month (in the last 3 months) and by the end of FY20, the *circular debt* is estimated to be around PKR 2,154 billion (equivalent to 5.3 percent of GDP) with an estimated increase of PKR 538 billion during the year. The increasing level of arrears has affected not only

[3] UNFCCC. 2015. Pakistan's Intended Nationally Determined Contribution (PAK-INDC). http://www4.unfccc.int/ndcregistry/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf

generation but also the investments needed to upgrade and expand to meet the additional generation needed, as well as the transmission and distribution network, thus compounding the problem.

7. **The Government is committed to restoring the financial viability of the sector and reducing the *circular debt* and the deficits that contribute to it. These reforms are being supported through the planned PACE DPF Series.** The multi-prong strategy will address legacy issues such as: (a) addressing the high costs of thermal power generation and moving away from take-or-pay contractual obligations; (b) improving the targeting of subsidies for the bottom 40 percent; (c) improving the performance of distribution companies (including improved management and reduced thefts and losses) by gradually divesting ownership and introducing private sector management; and (d) investing more in transmission infrastructure including attracting private sector participation. The investments in renewable energy, including hydropower, are a core part of this effort.

8. **The Government has decided to move to a renewable energy reliant economy by 2030** – that is, solar, wind and hydropower will contribute 66 percent to the energy mix. This requires the development of additional generation capacity of 20 GW of hydropower, wind and solar. The Renewable Energy Policy for wind and solar power generation was approved in December 2019. Hydropower is expected to have a major contribution to achieve these objectives as reflected in the Indicative Generation and Capacity Expansion Plan (IGCEP) currently with NEPRA for approval. In addition to large infrastructure investments by WAPDA, GoKP plans to develop about 4 GW of hydropower over the next 10 years. These interventions would contribute to lowering the overall cost of generation in Pakistan, making electricity more affordable, and reducing the foreign currency requirements.

9. **Due to the long gestation time required for hydropower projects (HPPs), it is important to plan ahead and secure financing early**. Pakistan has experienced a vicious cycle of power supply deficits and overcapacity during the last decades. The large resource of cheap and clean hydropower has failed to materialize because at times of deficits it takes too long to implement hydropower. Hydropower requires upfront financing to procure the complex and large civil and electro-mechanical works, and therefore needs to be planned and financed 5-8 years ahead of expected commissioning.

10. **There is vast renewable energy potential in Khyber Pakhtunkhwa (KP) that can be developed.** Energy and Power Department (E&P), Government of Khyber Pakhtunkhwa (GoKP) and project executing entity Pakhtunkhwa Energy Development Organization (PEDO), can play a leading role in developing these renewable energy resources in the province. As shown in Table 1, KP has the lowest per capita electricity consumption among all the provinces and about 20 percent of its hydropower potential has been realized with most of the capacity owned by WAPDA.

11. **Although some private investors have started to invest in the development of hydropower projects in KP, the pace and scale of development has been slow because of the risks associated with these projects.** The 2 key constraints are: (i) time required for preparation covering technical, geological, and resource assessment, along with social and environmental assessments; and (ii) the large upfront costs combined with extended construction time.

Table 1: Key Power Sector Statistics

	Pakistan	KP
Installed Capacity, MW		
Hydro	9,761	5,729
Thermal	27,137	-
Renewables (other than Hydro)	2,247	-
Total	**39,145**	**5,729**
Generation, GWh	137,039	16,064
Consumption, GWh	106,927	10,677
Per Capita Consumption, kWh	503	292

Source: *WB staff estimates based on NEPRA State of Industry Report 2019.*

12. **In 2016, PEDO offered 6 HPPs to the private sector through competitive bidding, but NEPRA rejected all bids.** In its order, NEPRA further advised PEDO to prioritize sites with better features and engage independent and reputable consultants to review feasibility studies, to optimize designs and to help with bidding and evaluation. PEDO has also issued Letter of Intent to private sponsors for several raw and semi-raw sites. However, none of the private sponsors have been able to achieve financial close and in the absence of reliable data and prefeasibility studies, the implementation of these projects could face significant delays. The proposed project will help PEDO to prepare bankable projects for public and private sector financing.

C. Relevance to Higher Level Objectives

Impact of the COVID-19 Pandemic on the Country Program and Government Response

13. Pakistan is vulnerable to the impacts of the COVID-19 pandemic due to a weak and chronically underfunded public health system, concentrated poverty, and a weakening economy. The COVID-19 pandemic and its containment measures have impacted the delivery of essential health services due to supply chain disruptions and redeployment of health care workers, while restrictions on movement, lost income and fear of infection have kept people away from primary health care facilities. There is likely to be a reversal of the decade-long poverty reduction trend[4], especially in urban areas which account for a third of Pakistan's population. The pandemic has also exacerbated macroeconomic and fiscal risks, with the closure of non-essential businesses and the disruption to the domestic supply chains significantly affecting the services and manufacturing sectors which account for nearly 80 percent of total GDP. Crisis-response expenditures (see below) and lower revenues are also expecting to increase the fiscal deficit from pre-COVID-19 estimate of 6.3 percent to 9.4 percent. The country's main industrial sector – textiles and apparel – is highly exposed to COVID-19 related disruptions because of its labor-intensive nature. The economy is expected to contract between 2.6 and 3.3 percent in FY20, and between 0.2 and 4.0 percent in FY21, while pre-COVID19 projections for growth stood at 2.4 percent for FY20 and 3.0 for FY21.

[4] The period between 2001 and 2015 was characterized by an uninterrupted and significant decline in poverty, from 64.3 percent in 2001 to 24.3 percent in 2015. World Bank. 2019 *Pakistan@100:Shaping the Future*

14. **In response to the outbreak of COVID-19 in Pakistan, the government announced a fiscal stimulus package of approximately US$7.5 billion[5] (equivalent to 2.6 percent of GDP).** This is aimed to (a) support the medical health sector in combatting the spread of the virus and providing relief to those affected; (b) implement social welfare measures to support the poor and vulnerable whose livelihoods have been affected by the economic slowdown and partial lockdowns across the country; and (c) provide stimulus to businesses and industries to protect productive assets during the economic downturn. The financing of the response package comprises approximately US$2.5 billion of additional resources, and a re-appropriation from the existing budget. Pakistan has also availed of the Debt Service Suspension Initiative (DSSI) and expects US$1.8 billion to US$2.4 billion in temporary fiscal space[6] due to the debt service standstill during the period May 1 to December 31, 2020 from bilateral creditors, including the G20. The country has committed to use the created fiscal space for additional social, health or economic spending and follow the disclosure and other requirements of the DSSI.

15. **The World Bank Group's engagement in Pakistan is guided by the Country Partnership Strategy (CPS)** for fiscal year 2015-20.[7] The CPS, now extended to FY21, is built on four results areas: energy, private sector, inclusion, and service delivery. In response to the COVID-19 pandemic over the next 18 months, the World Bank Country Team has also prepared an Operational Framework aligned with the WBG Crisis Response Approach Paper. The Framework will help Pakistan respond to the crisis and prepare to bounce back stronger and faster. The Framework has four Pillars: (i) protecting lives; (ii) protecting the poor; (iii) protecting livelihoods; and (iv) securing the future. IFC Strategy (FY21-24) was delivered in FY20, which focuses on stepping up engagement in critical sectors and opening of new markets by leveraging reforms in the following areas: housing; inclusion (digital/MSMEs); urban; and energy. The Systematic Country Diagnostic report is being finalized and the Country Partnership Framework will be presented to the Board in Q4-FY21.

16. **The World Bank Group's ongoing and planned support to Pakistan has been realigned with the Government's pandemic response.** The World Bank's immediate support included the US$200 million Pandemic Response Effectiveness in Pakistan project and repurposing of US$40 million from 8 ongoing projects for urgently needed equipment and supplies. Two Development Policy Operations (US$1 billion) supported Pakistan to: (i) enhance human capital accumulation and improve federal safety nets to respond to shocks, including those from COVID-19 pandemic; and (ii) strengthen the fiscal framework, promote growth and transparency, and support foundational energy sector investments which are critical to build resilience and support recovery from the effects of the COVID-19 pandemic on the economy.[8] Two human capital projects provided US$ 236 million to support the response in some of the poorest districts in the country.[9]

17. **The pipeline for FY21 has been revised to frontload investments that support immediate needs as identified by the Framework across the four pillars.** Priority will be given to projects with: (i) direct

[5] Estimated USD equivalent for PKR 1.2 trillion stimulus package.
[6] This includes non-G20 creditors. Specific amount will be determined after data reconciliation has been completed.
[7] World Bank. 2014. Islamic Republic of Pakistan: Country Partnership Strategy, 2015-2020 (Report No. 84645-PK) and the Performance and Learning Review (Report No. 113574)
[8] Securing Human Investment to Foster Transformation (SHIFT P170568) and Resilient Institutions for Sustainable Economy (RISE P171850).
[9] Khyber Pakhtunkhwa Human Capital Project (P188309 US$200 million) and Balochistan (US$36 million P166308) approved June 23, 2020.

COVID-19 interventions contributing to the pillars of the operational framework; (ii) high likelihood to disburse quickly, within 12 to 24 months; (iii) simplified implementation arrangements; and/or (iv) directly linked to medium-term priorities that increase resilience to exogenous shocks. Two emergency projects totaling US$400 million were approved by the Board on July 31 responding to the impacts on education and the compounded impact of COVID-19 and spread of locusts on the agriculture sector and on food security.[10] Preparation of six projects which meet the objectives of the Framework and the selectivity criteria above are being prioritized. Four projects are direct responses to COVID-19 and will create jobs to address unemployment due to COVID-19 through emergency public works initiatives coupled with microenterprises; support COVID-19 related enhancement to the delivery systems for social protection across the country; support Karachi to address the structural vulnerabilities exacerbated by flooding which have been compounded by COVID-19; and contribute to reducing vulnerability to disasters and public health emergencies in Sindh[11]. Two projects, including this one, will support medium-term priorities.[12]

18. **IFC has also engaged with banks to provide non-financial services to support their MSME portfolios**. This includes risk assessments and stress testing. Going forward, IFC is looking to support MSMEs in key sectors impacted by COVID-19, such as textiles, auto, pharma and agro-processing through risk sharing facilities and credit enhancement with local banks. IFC is also in discussion with businesses in the manufacturing and infrastructure sectors to support their investment needs in the post-COVID recovery phase. Additionally, IFC has initiated four upstream projects to support PPPs in healthcare, water and access to finance women entrepreneurs which will provide the necessary impetus for medium term economic recovery. IFC, under its Global COVID-19 facility has approved an increase of US$30 million under existing short-term trade facilities with five banks to support SMEs impacted by the pandemic.

19. **MIGA has continued to support cross-border investors and lenders during these challenging times.** MIGA's US$318 million gross outstanding exposure in Pakistan comprises four projects in the manufacturing, finance and energy sectors. MIGA is monitoring developments in Pakistan, particularly in the energy sector, where the agency is currently supporting two hydropower projects. MIGA's US$6.5 billion fast-track facility to help investors and lenders tackle COVID-19, launched in April 2020, is available to Pakistan, but has not yet been utilized.

20. **Cross sectoral coordination is maintained with multilateral and bilateral institutions through forums such as the Development Partner Meetings hosted by the World Bank**. Aligned with the Bank's initial COVID-19 emergency response, the Asian Development Bank approved a US$300 million emergency assistance loan to strengthen Pakistan's public health response to the COVID-19 pandemic and is also providing US$500 million from its Comprehensive Pandemic Response Option. The IMF disbursed US$1.4 billion under the Rapid Financing Instrument (RFI) to address the economic impact of the COVID-19 shock. An online Partners Platform is managed by UNICEF that coordinates additional financing requirements of

[10] Actions to Strengthen Performance for Inclusive and Responsive Education (ASPIRE, P173399) and Locust Emergency and Food Security (LEAFS, P174314), approved July 31, 2020.
[11] Community Assets and Reviving Employment (CARE, P174368), Crisis Resilient Social Protection (P174484); Karachi Solid Waste Emergency and Efficiency Project (SWEEP, P173021), Sindh Resilience Additional Financing (P173087).
[12] Pakistan Goes Global (PGG P170271); Khyber Pakhtunkhwa Hydropower and Renewable Energy Development (P163461).

the Government, as articulated in the Pakistan Preparedness and Response Plan (PPRP) which estimates US$595 million in additional external financing requirements for the medical health response.

21. **The Khyber Pakhtunkhwa Hydropower and Renewable Energy Development (KHRE) contributes directly to Result Area 1 of the CPS on Energy and all of its sub-outcomes: reduced load-shedding, reduced cost of electricity production and improved financial sustainability of the electric power sector, and Pillar 4 of the Framework related to 'securing the future'.** Development of low-cost renewable energy resources will increase electricity supply benefiting households and enterprises, as they recover from the economic impacts of the COVID pandemic. Therefore, providing reliable and cost-effective electricity is necessary for Pakistan to be able to return quicker to a sustainable development trajectory towards becoming an upper middle-income country. The projects will be located in some of the underserved districts in KP and will improve socio-economic services in those areas through social development program and expanding access to basic services for local communities. The project is structured in a manner that supports commercial financing and private investments for acceleration of Renewable Energy (RE). Increase in RE supply will also provide climate change benefits through abatement of greenhouse gas emission.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

The Project Development Objectives are to increase renewable energy generation and strengthen the capacity of associated institutions in Khyber Pakhtunkhwa.

PDO Level Indicators

22. The PDO-level indicators are as follows:

a) increase in renewable energy generation (to shift the energy mix to domestic clean resources);

b) mobilization of commercial financing to accelerate RE development in KP; and

c) number of RE projects prepared for continued investment in the sector.

B. Project Components

23. **The Khyber Pakhtunkhwa Hydropower[13] and Renewable Energy Development (KHRE) is a transformational program** that would help build capacity and institutions for harvesting the vast RE

[13] Hydropower is also considered renewable energy but in Pakistan there are separate policies for hydropower and other renewable energy sources therefore for clarity the project title mentions both. In this document, renewable energy refers to both hydropower and all other renewable energy technologies.

potential of the KP Province. To achieve the objectives, KHRE will be implemented through four components:

Component A: Development of Hydropower and Renewable Energy Investments (US$372 million; including IBRD's Interest During Construction (IDC))

24. **This component will support development of public sector investments in hydropower and renewable energy projects through following sub-components.**

Sub-component A.1. – Gabral-Kalam Hydropower Plant (GKH)

25. **Sub-component A.1 is 88 MW run-of-river hydropower project that can generate 339 gigawatt hours (GWh) annually.** This subcomponent will finance;

- A.1.1) construction of river diversion, weir, tunnel, powerhouse building/cavern, access roads, project colony offices and houses, and other ancillary infrastructure; and
- A.1.2*)* installation of turbines, generators and electro-mechanical equipment for power plant, the sub-station/switchyard and transmission line, and auxiliary electromechanical equipment.

This project will be the first to be tendered. Feasibility studies, technical design (tender level), environment and social assessment, and safeguard documents have already been prepared. Further details about its designs are given in **Annex 1**.

Sub-component A.2 – Cascade Development of River Basins

26. **This sub-component will finance the construction of Madyan and/or other hydropower facilities on the Swat and other river basins.** Total hydropower potential of the Swat River Basin (SRB) is more than 2,000 MW for which several projects have been identified (See **Annex 1**) and new potential sites would also be assessed during implementation. GoKP has requested 157 MW Madyan HPP on the Swat River for inclusion under this sub-component. Its design, including the environment and social assessment, will be developed to form the basis for financing and implementation under this sub-component.[14] The financing amount and indicators are based on Madyan HPP.

Sub-component A.3 – Solar Photo-Voltaic (PV) on hydropower assets.

27. **This subcomponent will support the installation of floating or land based solar photovoltaic systems on hydropower assets.** This sub-component would support installation of solar plants where possible but preferably in hydropower sites developed under Sub-components A.1 and A.2. Their viability will be determined through feasibility studies to be conducted by the consultants and if found feasible and approved by the government Solar PVs will be added to the hydropower assets. Suitable areas for installation of solar PVs can be selected along the riverbanks and access roads, on floating surfaces behind weir, tunnel, and on other project infrastructure to allow additional generation through solar. When solar PVs are installed along hydropower plants investments can be lower as there are lower land costs and

[14] Initially, Kalkot-Barikot-Patrak HPP (KBPH, 47MW) and Patrak-Sheringal HPP (PSH, 22 MW) were the two candidate projects but Madyan HPP is being considered given its higher expected returns.

existing facilities (roads, transmission lines) can be utilized.[15] It will also help start generation quickly, increase total generation, meet local demand and reduce average generation costs. The detailed scope of solar PV projects would be established during project implementation. A nominal amount of US$12 million has been assumed for installation of about 10-15 MW of Solar PV on hydropower assets of PEDO as pilot projects. Component B, in parallel, will help PEDO/GoKP to prepare feasibilities, engage consultants/transaction advisors and carry-out start-up and preparatory work to scale-up Solar PV through private capital.

Component B: Institutional Strengthening and Energy Sector Development (US$25 million)

28. This component will prepare and implement a strategic roadmap and business plan for development of KP energy systems and associated infrastructure to promote renewable energy, attract investments and enhance government revenue. It will also entail strengthening of institutional systems and processes so that the Energy and Power (E&P) Department, GoKP and PEDO can efficiently and effectively fulfill their mandate as developer of renewable energy program as well as to undertake operations and maintenance (O&M) of existing and future energy projects. The objectives of this component will be achieved through following sub-components.

Sub-component B.1 – Planning and Institutional Strengthening

29. This would cover two aspects, comprehensive and integrated planning to prepare a portfolio of future RE projects and the institutional strengthening.

B.1.1 – Preparation of Integrated Plans, Feasibility and Design Studies

30. **This sub-component will help prepare future portfolio of RE projects:** (a) preparation of integrated plans, feasibility and design studies; development of a framework to: (i) select and prioritize hydropower investments; (ii) ensure their readiness through pre-feasibility, feasibility, design and safeguard studies, geological investigations and surveys required for each stage of development, including essential start-up and preparatory works; (iii) devise the structuring of the operation and financing strategies; (iv) develop power evacuation plan and ensure grid connectivity; (v) secure commercial financing and private investments; and (b) carrying out of related activities, such as the organization of workshops, road shows and consultations to market and finance hydropower investments. The work will be carried out with the support of the Planning Consultants. The safeguard documents will be prepared and reviewed by independent environment and social specialists/consultants.

B.1.2 – Institutional Strengthening

31. **This sub-component will support institutional strengthening**: provision of technical assistance to support PEDO for the management of a growing portfolio of investments, including project and contract management, monitoring and evaluation, planning, financial management, procurement, operation and maintenance, human resources, project implementation and management, development or update of

[15] World Bank report on floating solar is available at http://www.worldbank.org/en/topic/energy/publication/where-sun-meets-water. Also, solar PV potential of various locations in Pakistan can be assessed through http://globalsolaratlas.info

operation manuals, occupational health safety (OHS), environmental and social planning and implementation, and dispute resolution.

32. **The sub-component will help PEDO enhance its capacity as an institution to carry out various functions more effectively for a growing portfolio of investments**. Management Support Consultants (MSC) will be engaged to support PEDO in implementing projects and contract management systems, monitoring and evaluation (M&E) program for various functions, including OHS, planning, financial management, procurement, O&M, and human resources (HR) management. The MSC will also support PEDO in project execution, and its management and carryout day-to-day activities. Specific tasks will include developing financing, legal and institutional strategies, recruitment and management of financial and legal services for mobilizing investments, carrying out of monitoring and evaluation of plans and project implementation including their environment and social management instruments, and contract management including advice on variation orders, settlement of disputes/claims and technical matters. As part of institutional strengthening, MSC will help develop/update manuals/systems for managerial functions, including: Financial Management (FM), procurement, O&M, HR administration, etc. MSC will also help with the implementation of Enterprise Resource Planning (ERP). Under this sub-component, PEDO will also make efforts to improve gender diversity and attract and retain female talent as part of the project staff.

Component C: Environment and Social Management (US$19 million)

33. **This component will support preparation, implementation, evaluation and monitoring of resettlement action plans, social management plans** (including gender action plans) and environmental management plans (but excluding land acquisition and payment of compensation and other assistance to affected people), and provision of support for local area development through tourism, social services and improved electricity supply in the areas where activities are implemented under Component A of the Project.

34. **This component will help improve environment, local living and economic development in the project area**. The sites for subprojects are in areas with limited access but vast potential for development of local economy. In addition to Resettlement Action Plan (RAP) and Environmental and Social Management Plan (ESMP), this component will help align RE development with broader economic development of the local area through tourism, social services and improving electricity supply in the project area. For example, GKH project which is located upstream of main tourist hub will supplement activities under World Bank financed KP Integrated Tourism Development Project (KITE, P163562) by addressing some of the challenges faced in promoting tourism in the Kalam area. This will be done by improving access, meeting energy requirements, and offering tourist attractions (e.g. water park in lake area, walking and bicycle tracks).

Component D: Project Implementation Support and Technical Assistance (US$30 million)

Sub-component D.1 – Project Implementation Support

35. **This sub-component will support provision of technical assistance, equipment and software for implementation of the investments and the provision of the services under the Project**, including:

procurement; contract administration; quality control; financial management; audits; preparation of designs, feasibility studies and bidding documents; construction supervision; implementation of the OHS plans; environmental management plans, and resettlement action plans (RAP); and the establishment and operation of an independent panel of experts.

36. It will finance (i) consulting and other services; (ii) individual experts/advisors and any incremental staff positions; (iii) equipment and software; (iv) financial, operational & technical audits; and (v) setting-up and operating cost of Project Management Organization (PMO). Key activities will be hiring of Project Implementation Consultants (PIC) for construction supervision of GKH and preparation and construction supervision of HPPs under Component A and of Solar PV under Component A3. The PIC's scope of work would cover implementation of all project related activities including; procurement, contract administration, quality control, OHS, financial management, preparation of any additional designs and bidding documents as well as support in implementation of ESMP and RAP. In addition, an Independent Panel of Experts (IPOE) will be engaged to ensure design and construction quality, safety enhancement and any other issues that may have to be addressed.

Sub-component D.2 – Technical Assistance, Strategic Studies and Training

37. **This sub-component will support technical assistance, strategic studies and training** through provision of support (including services, goods including intellectual property rights) for the assessment and implementation of enterprise resource planning in phases, provision of training to the PMO, PEDO and E&P Department, deployment of information systems, carrying out of strategic studies and pilot projects, start-up and preparatory activities, as well as implementation of risk mitigation measures. Under this subcomponent the following will be supported:

a) training programs for the PMO, PEDO and E&P Department, including workshops, seminars and post graduate degrees in relevant fields such as hydraulics; hydrology; electro-mechanical equipment; detailed designs of weirs, dams, tunnels; contract administration and construction supervision; OHS; procurement; O&M and planning of hydropower plants, transmission lines, substations; planning and development; preparation of asset management plans; financial management; hydropower financing; legal issues; water rights; and land and resettlement issues;

b) deployment of information systems and enterprise resource planning (ERP), including hardware, software, licenses, training, goods, equipment and other associated services;

c) strategic studies and pilot projects that may be identified during implementation, start-up and preparatory activities, studies for specific construction, monitoring of key energy and power infrastructure; and

d) activities identified to address project risks.

38. **Project cost and financing plan.** Overall cost is provided in Table 2. The total Bank financing proposed for the estimated project size of US$727 million is US$450 million. Commercial capital of about US$185 million is expected to be mobilized through local commercial banks and Export Credit Agencies (ECAs) and US$92 million will be PEDO/GoKP equity. The financing plan is indicative; efforts will be made

to mobilize as much commercial financing as feasible/possible, and the PEDO/GoKP share will depend upon the level of commercial capital that is mobilized.

Table 2: KHRE Cost Estimates and Indicative Financing Plan (Figures in US$ million)

Components		Estimated Cost	Financing Plan			
			IDA Credit	IBRD Loan	GoKP/ PEDO	Commercial
A	**Development of Hydropower and Renewable Energy Investments**					
A1.1	GKH - Civil	136	45	50	11	30
A1.2	GKH - E&M	46	20	10	6	10
A2.1	Cascade Development - Madyan HPP - Civil	300	60	90	25	125
A2.2	Cascade Development - Madyan HPP - E&M	100	35	35	10	20
A3	Solar PV	12	12	-	-	-
	Sub-total A	**594**	**172**	**185**	**52**	**185**
B	**Institutional Strengthening and Energy Sector Development**					
B1	Planning and Institutional Strengthening	25	25	-	-	-
	Sub-total B	**25**	**25**	**-**	**-**	**-**
C	**Environment and Social Management**					
C1	EMP	9	9	-	-	
C2	RAP including SDP	50	10	-	40	-
	Sub-total C	**59**	**19**	**-**	**40**	**-**
D	**Project Implementation Support & Technical Assistance**					
D1	Project Implementation Support	20	20	-	-	-
D2	Technical Assistance, Strategic Studies & Training	10	10	-	-	-
	Sub-total D	30	30	-	-	-
	Total	**708**	**246**	**185**	**92**	**185**
	Re-financing of PPF Advance	4	4	-	-	-
	Total With Re-financing of PPF Advance	**712**	**250**	**185**	**92**	**185**
	Upfront Fee (0.25%) for IBRD Loan	0.5		0.5		
	IDC + Commitment Charge IBRD Loan	14.5		14.5		
	Grand Total	**727**	**250**	**200**	**92**	**185**
			34.4%	27.5%	12.7%	25.4%

Note: Excludes PEDO overhead, PMO and other administrative costs (approximately US$14 million); and IDC and financing costs, except for IBRD (estimated cost US$45 million).

39. **Improving gender diversity in PEDO.** As part of institutional strengthening sub-component (B1.2), PEDO will make efforts to attract and retain female talent as part of the project staff. In Pakistan, female representation in power sector jobs accounts for only 3.6 percent of total staff, and 4.6 percent of technical staff (including engineers). Women are frequently excluded from field-based work and hands-on experiences.[16] At PEDO, women account for ten out of 384 total staff (2.6 percent). Only two out of

[16] World Bank. 2020. Pathways to Power: South Asia Region Baseline Assessment for Women Engineers in the Power Sector (English). Energy Sector Management Assistance Program (ESMAP). Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/425391580298974587/Pathways-to-Power-South-Asia-Region-Baseline-Assessment-for-Women-Engineers-in-the-Power-Sector

262 total staff at the Head Office are women, of which one is an engineering position. In the two project offices, there are 114 male and eight female staff (6.5 percent). To address this gender gap and offer employment opportunities for qualified women at the project-level, PEDO has committed to a target of 15 percent total female staff by FY23. Towards this goal, PEDO will immediately hire at least 30 percent women (approximately 15) in the PMO at Grade 17 and above – which are senior level technical positions. In parallel, PEDO will also become a WePOWER[17] partner and develop a list of gender commitments under the Five Pillars of WePOWER[18]. PEDO will do targeted job outreach and advertisements, and women staff will be part of the recruitment and interview panels. Some other potential activities can be site visits and internship opportunities for female engineering students, as well as job fairs and informational outreach sessions to engineering programs. The scope of these incremental gender activities will be included in the terms of references (TORs) of the key consultants hired by PEDO, such as a Planning Consultant, MSC and PIC. PEDO will also ensure adequate implementation of enabling policies, such as functional daycare facilities and safe transportation; and having an effective anti-harassment cell. These measures will be documented in PEDO's Gender Strategy or HR Policy.

40. **To measure the outcome of this gender activity in the Results Framework**, **the percentage of total female staff in PEDO (Baseline = 2.6 percent, Target = 15 percent) will be monitored.** Additionally, through the quarterly progress reports, the percentage of technical female staff in PEDO – including female technical/power engineers hired in the PMO (Baseline = 0 percent, Target = 30 percent) will also be monitored.

C. Project Beneficiaries

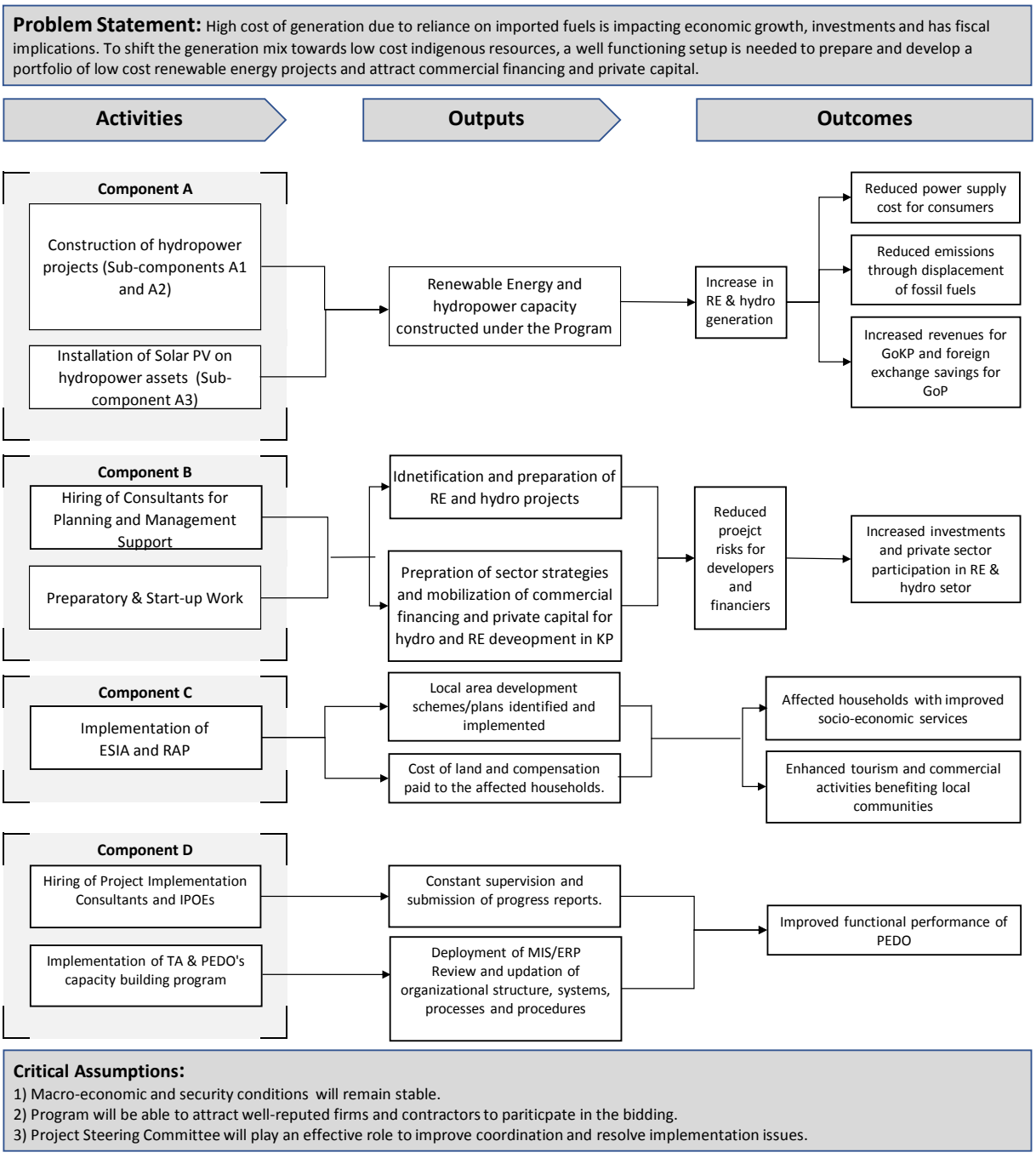
41. **Beneficiaries are all electricity consumers in Pakistan, who will gain from low cost and clean electricity.** At the same time, the KHRE will contribute to socio-economic development of the communities in the project area. Local population are expected to benefit from employment opportunities during the construction phase as well as improvement of local infrastructure, provision of public services and increased tourism/economic activities. The Social Development Plan envisaged under the KHRE is to share project benefits with local communities (see Appraisal Summary sub-section C (ii) and F). The RE projects will increase revenues for the GoKP and will strengthen PEDO's capacity to undertake renewable energy development program in KP. The projects will also create investment opportunities for developers and financiers.

D. Results Chain

42. **KHRE is designed to facilitate expansion of RE in KP by identifying and preparing projects that are technically sound, environmentally and socially sustainable and investment ready.** The Results Chain in Figure 1 delineates how the proposed activities under KHRE will achieve the intended outcomes.

[17] WePOWER is South Asia Women in Power Sector Professional Network – www. wepowernetwork.org
[18] WePOWER's Five Pillars are: i) STEM Education, ii) Recruitment, iii) Development, iv) Retention and ii) Policy and Institutional Change.

Figure 1: Results Chain



E. Rationale for Bank Involvement and Role of Partners

43. **The World Bank Group has been engaged in Pakistan's power sector to help the government overcome sector challenges.** The World Bank Group has been engaged at both federal and provincial levels through development policy and investment financing. The World Bank's current portfolio supports

investments for: i) large hydropower projects on the Indus Cascade to reduce average power generation cost; ii) strengthening the transmission network to reduce losses and meet the growing demand; and iii) solar PV power generation to be procured through competitive bidding. The Bank is also supporting sector reforms through PACE, see paragraph 7.

44. **After the 18th Amendment to the Constitution, provinces are beginning to play an increased role in development of power generation projects**. However, their experience of preparing and developing energy sector projects is limited. Sindh Solar Project (P159712), was approved in 2018, to develop RE resources in Sindh. The KHRE will help extend this relationship to Khyber Pakhtunkhwa for the development of sustainable electricity generation in alignment with economic growth and poverty reduction objectives of the Country Partnership Strategy (CPS). The Bank will also bring in its experience of HPPs in Pakistan and elsewhere to help establish technical, fiduciary, and safeguards standards that could be replicated for other public and private sector energy projects in KP. Asian Development Bank (ADB) and International Finance Corporation (IFC) are also engaged with PEDO for specific projects.

45. **KHRE builds on the policy reforms of Prior Actions 5 in the Resilient Institutions for Sustainable Economy (RISE, P171850) Development Policy Loan** related to 'reducing the dependency of imported fuels and lowering electricity generation cost'. This investment in renewable energy in KP is a logical next step to support the Least-Cost Generation Plan which was developed consistent with the Renewable Energy Policy described above. The planned PACE DPF series will also support the implementation of the Renewable Energy Policy.

F. Lessons Learned and Reflected in the Project Design

46. **The key lessons learned from the Bank's hydropower and other energy sector projects** reflected in the KHRE's design are described below:

47. **Leveraging of IDA/IBRD funds to minimize financing cost and maximize financing for development**. The financing for KHRE is to be raised in phases matching the phased approach to implementation. The first project (GKH), which is ready for bidding, will be largely financed through the World Bank financing. World Bank financing will also help start implementation and the award of contracts for the second hydropower project. In parallel, the project will support measures to increase PEDO's capacity to raise commercial financing. This initial phase, focused on preparing for construction and increasing PEDO's capacity, will result in higher probability of availability of commercial financing and lower interest cost. Disbursements from commercial sources would follow the project's financial progress, thus minimizing financing cost. The project financing is structured to provide initial investments for the early stages of the project from the World Bank in order to bring down the cost of commercial financing at the later stages of construction. Therefore, rather than truncating the financing over multiple projects or with additional financing, the project is structured over a time period of seven years to provide confidence and visibility for potential commercial financiers. This will address some of the risks faced by potential investors as outlined in paragraphs 9 through 12 above.

48. **Project benefit sharing and buy-in from local communities.** Hydropower projects are located in remote and usually underdeveloped hilly terrains. The resettlement design for these projects presents a

good development opportunity to improve the quality of living of the affected population. The land acquisition and resettlement for GKH has been designed as a development opportunity by integrating a Social Development Plan (SDP). The project is run-of -river and has a limited footprint; it will require about 64 hectares of land on a permanent basis and 17 hectares of land on temporary basis during construction. The GKH will affect 89 households of which 8 will be displaced. The SDP builds on the experience from Dasu Hydropower Project (DHP, P121507) and will not only enable sharing the project benefits, but also help in getting a strong buy-in from local communities to support the smooth implementation of land acquisition and project execution. In addition, the design of the project will be aimed at enhancing tourism and other commercial activities in the project area to provide long-term benefits to local communities.

49. **Avoiding implementation delays.** Learning from the experience of the DHP, KHRE has a separate PC-I (government approval process)[19] for land acquisition which is being funded by GoKP/PEDO from its own resources. A Project Steering Committee (PSC) is proposed which will be headed by Additional Chief Secretary for better coordination between Deputy Commissioner (DC) office and PMO staff to take advance actions, for example: (i) hiring of experienced surveyors and others for revenue survey of the project area; (ii) close coordination and engagement by PEDO to ensure that the field level work is completed on time for compensation once the rates are agreed with and approved by appropriate authority without affecting project construction schedule; and (iii) PEDO to prepare a Land Acquisition Plan with time-bound schedule and a step-by-step roadmap for acquisition to ensure timely completion of the work. In addition, a high-level committee will be formed with representatives from PEDO and District Administration, which would be formally authorized through official notification to negotiate with the affected households on land rates for compensation purposes.

50. **Prioritizing Staff and Community Safety.** While the construction sites in the Swat valley are not as remote or geographically challenging as Dasu, KHRE incorporates lessons learned from OHS issues faced in the DHP. Therefore, the KHRE project will place considerable emphasis on enhancing PEDO's capacity on OHS aspects. Accredited OHS professionals will be hired in PEDO and it would be mandatory for supervision consultants and contractors to have adequate as well as accredited OHS staff for construction works oversight. Similarly, the bidding documents will clearly state OHS requirements including management and specification standards. In addition, to improve construction governance, permission-based systems for hazardous works and matrix of consequences to enforce contractual obligations will be implemented. It will be mandatory for contractors to have an internal OHS audit system in place. A special program will be initiated for raising awareness among local communities and school children.

51. **Ensuring Project Readiness.** An Energy Sector Management Assistance Program (ESMAP) grant was mobilized for capacity building of PEDO and to inform the project design. The GoKP/PEDO also availed of the Project Preparation Facility (PPF) advance of US$ 4 million. The PPF helped advance government's approval processes, hiring of consultants and panel of experts.

[19] Planning Commission Form I (PC-I) required to seek Government's approval for infrastructure projects.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

52. **PEDO, project executing entity, would be responsible for the implementation of the KHRE on behalf of the GoKP.** PEDO is a statutory organization that was formed in 1993 through an enactment by the Provincial Assembly of KP.[20] GoKP owns 100 percent of the shares and provides strategic oversight through E&P Department. PEDO is autonomous and operationally independent and governed by a Board of Directors that has representation of relevant provincial ministries (energy, finance and planning), Peshawar Electric Supply Company (PESCO), Chamber of Commerce, and six members, appointed by the government from the private sector. The Chief Executive Officer (CEO) is also a member of the Board and is responsible for day-to-day management. PEDO has already developed seven HPPs (Malakand 81 MW, Pehur 18 MW, Shishi 2 MW, Reshun 4 MW, Ranolia 17 MW, Machai 3 MW and Daral Khwar 37 MW) and five (Koto 41 MW, Matiltan 84 MW, Jabori 10 MW, Karora 12 MW and Lawi 69 MW) are under construction. The KHRE will be the Bank's first engagement in hydropower sector directly with the GoKP, however PEDO has experience of working with development partners particularly ADB who has funded two small hydropower schemes (Ranolia 17 MW and Machai 3 MW) and is now financing a 300MW HPP at Balakot. The KHRE will further build PEDO's capacity to plan, prepare and implement RE projects in KP.

53. **The PEDO Act allows it to plan, construct, own, operate, maintain and dispose of generation, transmission and distribution assets.** It can also raise financing through commercial banks, issuance of bonds, and foreign loans but so far, all public sector projects have been financed through Hydro Development Fund and/or government budget allocation through Annual Development Plans. Construction of Gabral-Kalam Hydropower Project (GKH), the first hydropower project (HPP) to be funded under Component A, will be largely financed through the World Bank financing. Commercial financing will be mobilized to the extent feasible and is expected to be higher for subsequent investments. The GoKP/PEDO share will depend upon the level of commercial financing mobilized. The efforts to raise commercial financing will be supported through activities planned under Components B and D. The sequenced approach to financing will help establish PEDO's creditworthiness and track record to arrange commercial bank borrowing at competitive terms in future.

54. **The KHRE will be implemented through a dedicated Project Management Organization (PMO)** with full-time dedicated staff for key technical/engineering, environmental, social, procurement and financial management positions. The PMO is to be headed by a Chief Engineer level officer of PEDO and will be reporting to CEO PEDO. A PC-I to establish PMO along with financing of land cost has been approved by Provincial Development Working Party and key positions have been advertised. PMO will be supported by consultants, advisors and technical experts. Implementation arrangements are further described in **Annex 1**.

[20] PEDO started as Small Hydel Development Organization in 1986 and in 1993 was converted to an autonomous body called Sarhad Hydel Development Organization. Its name was changed to PEDO in 2014 reflecting the change of the name of the province from North West Frontier Province (NWFP) to Khyber Pakhtunkhwa (KP) and broader mandate to develop power resources from hydro and other resources for GoKP.

55. **Role of Consultants and Experts to Support KHRE Implementation.** There will be three main consultancy contracts. Project Implementation Consultants (PIC) will help design and supervise Component A and Component C including technical, procurement, FM, environment, social management and all other aspects of the investments. For Component B, Planning Consultants will help with the preparation of the plan, feasibilities, design and carrying out of geotechnical investigations. Management Support Consultants will help PEDO and PMO carryout the role of the employer. They will support PEDO and PMO in their day-to-day activities and with overall monitoring and evaluation. In addition, an IPOE will be engaged to oversee the project and advise PEDO and GoKP on the project issues that may arise during design, construction and/or project implementation period. The panel would meet as often as needed, but at least every six months. The panel would comprise of experts covering technical, safeguards, financing and contract management issues and would be a mix of international and Pakistani experts. Other members can be coopted depending upon the requirements and implementation issues.

56. **A PSC as described previously will be established to provide high level oversight, guidance and facilitate inter-departmental coordination.** The PSC would be chaired by Additional Chief Secretary (ACS) GoKP with Secretary Energy, Planning, Finance, Forest, Communication and Works Department (C&W), Tourism, Agriculture, Senior Member Board of Revenue, Commissioner Malakand, Deputy Commissioner Swat, Deputy Commissioner and Deputy Police Officers of districts where projects would be undertaken, Ministry of Energy Power Division representative and CEO PEDO as its members. The PSC composition is fit for purpose and other members can be coopted on the need basis. The Head PMO will be secretary to the PSC. A multi-tier Grievance Redressal Mechanism (GRM) will also be established to address any grievances and implementation issues.

B. Results Monitoring and Evaluation Arrangements

57. The PMO will be responsible for submitting annual and quarterly progress reports (QPRs) in an appropriate format to the CEO of PEDO, the Secretary E&P, the GoKP and the Bank no later than 30 days after the end of each quarter. The PMO will be supported by an IPOE, Project Implementation Consultants (PIC) and Management Support Consultants (MSC) for Monitoring and Evaluation (M&E) of the implementation progress including implementation of ESMP and RAP. The PMO and consultants will be responsible for: (a) monitoring physical progress; (b) carrying out M&E of delivered outcomes; (c) reviewing and supervising the environmental and social issues identified and any mitigation measures; and (d) providing guidance to identify and resolve any issues. PIC's scope of work will include: (a) establishing Management Information Systems (MIS), a Geographic Information System, and ICT-based monitoring and verification systems; (b) monitoring the implementation and physical progress of contracts, including environmental and social safeguards; (c) collecting and analyzing data on project impacts, including data on direct and indirect stakeholders; and (d) identifying and assessing problems during implementation and developing potential solutions. A non-technical summary report conducted by an IPOE that will be published periodically on PEDO's website.

C. Sustainability

58. **The E&P Department, GoKP is fully supportive of hydropower and RE development in KP supported through proposed KHRE.** Their current hydropower project portfolio is about 162 MW and

another 216 MW is under construction. In addition, PEDO is implementing social uplift initiatives of GoKP through micro hydel and off-grid solarization program.

59. **RE projects are environmentally, commercially and technically sustainable due to their climate benefits, low O&M cost compared to thermal alternatives and proven technology.** There is also a strong emphasis to ensure long-term sustainability of the proposed projects through involvement of PIC, who will be responsible for reviewing and approving designs and supervising construction to ensure quality assurance, and MSC. In addition, IPOEs will have experts for tunnels and dam construction, hydrology and hydraulic structures, electro-mechanical, construction planning and contract management, environmental and social management. The program will also enhance the capacity of PEDO and E&P Department, GoKP to ensure that overall program and its components are implemented in an efficient and effective manner to achieve the desired objectives.

IV. APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis of GKH

Technical Analysis

60. **The PDO and design of the project are sound given the comparison with the alternatives and needs of the client**. The KHRE will contribute to maximizing financing for development by leveraging development financing to attract commercial financing. In addition, KHRE will build long-term capacity to design and manage RE investments as well as establishing platforms for robust community engagement. The KHRE incorporates a sequenced approach to financing and contracting and is at an advanced stage of readiness. The tender level designs for GKH are ready and have been reviewed by IPOE. The pre-qualification is expected to be launched and the contracting completed by April 2021. The second planned investment, Madyan HPP, will be prepared in parallel and is expected to be contracted by April 2022.

61. **PEDO has experience in preparing and implementing hydropower and RE projects.** A project similar to GKH is under construction on the Ushu River the other tributary of Swat River, Matiltan HPP with similar capacity. The works for GKH are being designed by competent consultants and would be reviewed by an IPOE. The turbines, generators and other related equipment would be designed and supplied by leading global manufacturers. All major components, weir structure, sluices, spillway, sand-trap, power tunnel and powerhouse have been optimized considering alternatives. A critical challenge is to execute the construction works according to the planned schedule. The works would be implemented by contractors selected through international procurement procedures, and they would be supervised by international consultants. The IPOE would continue to work during project implementation and provide guidance during construction phase of GKH.

62. **In designing the structure of GKH, all the underlying analyses and final designs are prepared according to international standards.** This includes hydrologic analysis, hydraulic analysis, seismic analysis, sedimentation studies, material tests and strengths of material to be used for construction. Mathematical models were developed for the project, spillway structure and low-level outlets. The designs will be reviewed by the IPOE. The fine-tuning of the design would continue until the bidding

documents are issued; however, no major changes are expected. The IPOE would continue to deal with the technical, design and construction as well as social and environmental aspects during the construction period.

Economic Analysis

63. **Economic analysis has been done for GKH and confirms the value of low-cost hydropower and renewable energy sources in country's generation mix.** Detailed project justification and cost-benefit analysis is given in Annex 2. A high Economic Rate of Return (ERR) of 20 percent and Net Present Value (NPV) of US$ 86 million, when evaluated against CCGT-RLNG[21] as the next best alternative demonstrates that GKH is an economically viable project; the ERR increases to 25 percent when cost of emissions are also added to estimate climate benefits. Avoided emissions from CCGT-RLNG over 50 years of GKH life are about 7.4 million tons of carbon dioxide equivalent (MTCO2e). Net reduction in emission is estimated to be about 7.3 MTCO2e.

64. **Generation capacity of run-of-river hydropower plants can be enhanced by 5 to 10 percent with the induction of solar.** The estimated economic return from a 5 MW of Solar PV at GKH, assuming cost at US$1,000 per kW of installed capacity and a plant factor of around 17 percent, is around 19 percent. In addition, hydro-solar hybrid will provide operational flexibility to manage peaks, generation stability, early generation to support construction activities and an opportunity to scale-up.

Financial Analysis

65. **GKH will be largely funded through the World Bank financing and therefore will have a low weighted average cost of capital (WACC).** Levelized financial cost, assuming a WACC of five percent and project life of 50 years, is estimated to be about US¢ 4.22 /kWh. Reducing project life to 30 years will increase the levelized cost to US¢ 4.94/kWh but the project would still rank among some of the least cost hydropower resources of the country planned for development. Even for a WACC of nine percent, closer to market rates, the financial cost will increase to US¢ 6.74/kWh or US¢ 7.16/kWh if cost is to be recovered over 30 years but will remain significantly below the average cost of thermal generation estimated around US¢ 8 – 10 per kWh.

66. **The assets, liabilities, costs and revenue for public sector projects are consolidated under PEDO's joint ownership in its financial statements.** PEDO would obtain a generation license and tariff approval from the regulator for each of the HPP. Other project structure options will be evaluated during implementation so that an appropriate structure can be adopted for the future projects. As per tariff guidelines the project will provide PEDO/GoKP with 15-17 percent Return on Equity (ROE) but the regulations also allow to sell the electricity from these projects directly to bulk consumers in which case potential financial returns could be even higher. For Solar PV on hydropower assets, net metering option can also be considered. In addition to financial benefits to PEDO/GoKP, Government of Pakistan will save about US$77 million per annum in fuel imports costs from a total estimated generation of 1,100 GWh

[21] CCGT-RLNG: Combined Cycle Gas Turbine running on Re-gasified Liquefied Natural Gas

under KHRE. This results in savings of more than US$900 million over the life of the RE projects in present value terms discounted at eight percent (assumed as government's borrowing cost).

B. Fiduciary

Financial Management (FM)

67. **FM risk is assessed as Moderate**. The World Bank performed the FM assessment of a dedicated PMO within PEDO who will undertake the FM functions of KHRE in accordance with the Financial Management Manual for World Bank Investment Project Financing Operations (OPCS 5.05 Dir.01 issued February 10, 2017). The assessment concluded that PEDO has the capacity to establish an adequate FM system for the project, which can provide with reasonable assurance, accurate and timely information on the status of the funds, as required by the World Bank.

68. **A dedicated Director of Finance will be engaged/hired for the duration of the KHRE in accordance with the Terms of References (ToR) acceptable to the Bank**. Government budgeting processes will apply, and the KHRE's budget will be a part of the GoKP's Annual Development Plan. PMO will maintain separate books of accounts on cash basis of accounting to record KHRE related receipts and payments. Project transactions will be subject to compliance with PEDO's internal control environment. The KHRE activities will also be subject to periodic internal audit by E&P Department's Internal Audit Cell. Bi-annual Interim Unaudited Financial Reports (IUFRs) will be submitted to the Bank within 45 days of the close of each semester. The KHRE's financial statements will be prepared in accordance with the Cash Basis International Public Sector Accounting Standards (IPSAS) and audited by the Auditor General of Pakistan (AGP) and/or Independent Audit Firms. The audited financial statements will be submitted to the Bank within six months of the close of the financial year. Two segregated Designated Accounts (DAs) will be used for related receipts and payments. As detailed in Annex 1. Disbursements will be report-based where advance equivalent to six months forecast will be provided to DAs and subsequent bi-annual IUFRs will be the basis of documentation of the expenditures.

69. **PPF will be refinanced from KHRE. The unspent funds in PPF's DA at the time of refinancing date or IDA's effectiveness date, whichever comes earlier, will be refunded to the Bank by way of an adjustment entry**. Upon IDA's effectiveness, (i) such unspent funds will be registered for refund under the PPF, and the same amount will be registered as 'Advance' under IDA Credit simultaneously by way of adjustment entries (without moving/transferring funds), and (ii) the PPF's DA will become IDA's DA, and a separate DA will be opened for IBRD.

70. **The WB financing will be on-lent to the provincial government on the same terms and conditions at which these have been borrowed and the exchange risk will be borne by the provincial government.** A Subsidiary Agreement (SA) will be signed between E&P Department, GoKP and PEDO which will be implementing the KHRE on behalf of the GoKP under the same terms and conditions and accordingly exchange risk will be transferred to PEDO, i.e., the principal amount of the credit made available under the Subsidiary Agreement shall be denominated and repayable in Pakistani rupees.

71. **Retroactive Financing.** Retroactive financing of up to US$50 million for payments made against eligible expenditures incurred from January 1, 2020 to the Credit signing date shall be allowed provided that the procurement procedures are acceptable to the Bank.

Procurement

72. **Procurement for KHRE will be carried out in accordance with the World Bank's Procurement Regulations for IPF Borrowers for Goods, Works, Non-Consulting and Consulting Services dated July 1, 2016 (revised November 2017 and August 2018).** The KHRE will be subject to the World Bank's Anti-Corruption Guidelines, dated October 15, 2006, and revised in January 2011 and July 2016. The engagement of consultants and procurement activities initiated through PPF will continue under the KHRE.

73. **Tender stage designs for GKH are ready. GKH will be implemented through two large International Competitive Bidding (ICB) contracts.** Both contracts will follow pre-qualification and Request for Bids (RFB) approach, as slice and package. The reasons for this packaging and approach are given in Annex 1. Other HHPs shall be finalized and designed during implementation. Three large consultancies are identified for Project Implementation Support, Planning, and Management Support, which shall be selected as QCBS after international REOI. Procurement of works contracts and goods will be facilitated and supported by PIC and MSC. The PMO will have adequate contract management and procurement capacity. A Project Procurement Strategy for Development (PPSD) has been prepared to inform the overall procurement strategy and contract packages. The World Bank's planning and tracking system, Systematic Tracking of Exchanges in Procurement (STEP), will be used. Currently the procurement risk rating is kept as Substantial. Details of procurement outlays, risk assessment and mitigation measures are provided in Annex 1.

74. **At this stage Pakistan is among the top countries in hydropower development,** as over 8,000 MW capacity is under construction and many international and national contractors and suppliers of hydropower equipment are active in the country working on various projects. Therefore, KHRE is expected to attract competent contractors and equipment suppliers based on World Bank Standard Supply and Install Documents.

C. Safeguards

75. **The safeguards category of the Project is "Category A". Key safeguard issues and impacts are described here and detailed assessment is given in the Project Information Document and Integrated Safeguards Data Sheet (PID-ISDS) available on Bank's external website.** Safeguard instruments, ESIA and RAP for GKH and Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for other projects have also been prepared by independent environment and social consultants of PEDO to assess and mitigate safeguard issues and impacts. These documents were

reviewed and cleared by the Bank and were disclosed on PEDO and the World Bank external websites in December 2019.[22]

76. **GKH and other HPPs that would be constructed under Component A are also expected to have significant OHS issues due to instream construction activities, underground tunnel construction activities as well as working on hillslopes and heights.** PIC will have OHS experts to build-in OHS related conditions in the bidding documents as well as ensure their compliance during construction.

Environmental Safeguards

77. **The project activities involve construction of hydropower projects which may adversely impact the environment. Impacts during construction and operation would be addressed through robust environment management and biodiversity plans.** The following environmental policies have been triggered: OP 4.01 on Environmental Assessment, OP 4.04 on Natural Habitats, OP 4.11 on Physical Cultural Resources, OP 4.36 on Forests and OP 4.37 on Safety of Dams.

78. **Environmental Assessment (OP 4.01)**: Construction related impacts could include dust and noise generation, all types of wastes (construction, MSW, hazardous waste), release of effluents and wastewater from construction camps as well as batching plants, impacts on physical cultural resources, vehicular traffic and crop damage. Construction related impacts also include safety hazards for surrounding communities and project workers including working in confined spaces and tunnels as well as working at heights and slopes. Potential impacts during O&M activities include changes in river flows, ecology in the reservoir area and its impact on fish habitat, waste generation from repair and maintenance of power plant, offices and residential facilities, safety hazards caused by power generation facility as well as transmission lines, and electromagnetic radiation from transmission lines. Furthermore, the projects may trigger induced developments such as urbanization, communication, business, tourism, industrialization, etc. These induced developments are expected to have both positive and negative impacts.

79. **Natural Habitats (OP 4.04):** The main impacts of the KHRE are related to river ecology in the reservoir area. The river connectivity will be impacted and downstream flows will be altered. Furthermore, the weirs of the HPPs are expected to change fish habitat from present high velocity to slow velocity of a lake. It will also have an impact on fish migration and indigenous snow carps may have difficulty in migrating upstream and downstream during the breeding periods. During the low flow season, there may be a dewatered section between weir and tailrace which can affect aquatic ecology. GKH is designed to ensure that environmental flows are maintained. Further mitigation measures are proposed to reduce the impact on the natural habitat such as control measures to avoid release of wastewater/sediments into river, relocation of trapped fish, compensation to replant trees, management plans to manage biodiversity, etc.

[22] http://pedo.pk/Main/downloads
https://projects.worldbank.org/en/projects-operations/document-detail/P163461

80. **The alpine and subalpine habitats of the Bhan Valley Community Reserve are located about 10 to 20 kilometers (km) from the project facilities of GKH.** According to surveys carried out by the wildlife department in 2005, the mammals in the game reserve include markhors, ibex, black bear, musk deer and snow leopard. The mammalian species usually exists in the upper alpine regions during summer and in the lower alpine regions during winter. The impact on the Bhan Reserve from GKH is not expected to be significant during the construction phase. During the operational phase, PEDO will support the Wildlife Department in its efforts to promote wildlife conservation measures in the project area including conservation measures in the Bhan Game Reserve and afforestation. PEDO will also be undertaking detailed biodiversity studies for developing baseline, monitoring impacts on the ecological receptors and proposing additional mitigation measures, if necessary.

81. **Physical Cultural Resources (OP 4.11)**: While Swat Valley has a significant number of PCRs (Buddhist sites) spread all over the valley, GKH is not expected to affect any of PCRs.

82. **Safety of Dams (OP 4.37):** An IPOE consisting of experts in the field of dam construction, hydraulics, geology, environmental and social will be engaged to review project design and construction activities. In addition, Dam Safety Reports will be prepared, and warning systems would be put in place.

83. **Forests (OP 4.36):** The project footprints are not expected to result in large scale loss of natural habitats and forest cover. However, chopping/cutting of forest trees will take place in the reservoir area. GKH will only impact two small patches of forest. The designs for the other HPP(s) are not final so it is difficult to assess their impact at this stage.

84. **International Waterways (OP 7.50).** The policy has been triggered because the hydropower projects for preparation of detailed design and construction are going to be located on the Swat River and its tributaries that flow into the Kabul River which is a tributary of the Indus River, an international waterway. The policy also applies because the project may entail preparation of feasibility and design studies of hydropower projects on other rivers/international waterways in Khyber Pakhtunkhwa (KP). However, riparian notification is not required as explained below.

85. **Paragraph 7 of the Policy sets forth three exceptions to the Bank's requirement that the other riparian states be notified**. The exceptions according to paragraph 7 (b) and 7 (c) apply to: "(b) Water resource surveys and feasibility studies on or involving international waterways. However, the state proposing such activities includes in the terms of reference for the activities an examination of any potential riparian issues; and (c) Any project that relates to a tributary of an international waterway where the tributary runs exclusively in one state and the state is the lowest downstream riparian, unless there is concern that the project could cause appreciable harm to other states." As the activities under Component A and C will be carried out on a tributary to the Indus River that is entirely located within the territory of Pakistan and Pakistan is the lowest downstream riparian, therefore, the activities fall within the exception to the notification requirements of OP7.50 Paragraph 7(c). For planning and feasibility studies of the selected priority projects under Component B if they are on a river other than Swat River, or on a tributary that is not located entirely within Pakistan, requirements of the Policy will be met before proceeding with the design studies, and thus this component falls within the exception to the notification requirement of OP 7.50 Paragraph 7(b).

Social Safeguards

86. **The Operational Policy on Involuntary Resettlement (OP 4.12)** is also triggered since land acquisition and economic displacement is expected by projects under Component A. For GKH, a RAP and a Social Impact Assessment (SIA) as a part of an overall ESIA have been prepared by PEDO which have been reviewed and cleared by the Bank and disclosed on PEDO's and World Bank external websites. Being a run of the river project, land and resettlement impacts for GKH are not significant. These impacts were further minimized by a thorough analyses of location and design alternatives. GKH will need about 200 acres of land out of which 157.5 acres will be needed permanently and the remaining land will be required on temporary basis. About 78 percent of the permanently and 83 percent of temporarily needed land is rocky and barren. GKH will affect a total of 171 households out of which 89 households will be affected due to the land needed for permanent use and remaining will be affected temporarily. Only 8 affected households will experience physical displacement due to loss of structures built on the agriculture fields. In addition, a total of 19 privately owned fruit trees owned by 4 affected households will be affected along with a total of 636 wood/timber trees owned by the Forest Department.

87. **A RAP for the GKH has been prepared to mitigate these impacts.** PEDO has agreed to adopt a negotiated approach for the land acquisition and use based on the demands of affected households. An initial round of discussions and negotiations have taken place with the affected communities during the resettlement planning process based on rates negotiated by PEDO for another hydropower project currently under construction nearby. Based on these negotiations, rates have been proposed and agreed. The RAP explains the process and records the agreed rates and other agreements from these negotiations. All affected structures will also be compensated at replacement cost and losses of crops and trees will be compensated at market value for the two seasons required for construction. In addition to land compensation and resettlement assistance, a Livelihood Restoration and Improvement Plan (LRIP) has been developed (as part of GKH RAP) to promote community well-being with a focus on vulnerable groups with an allocation of about US$1 million. The total budget for RAP is estimated at US$25.17 million. The costs of land and compensation for land under towers, affected crops, trees, structures and other allowances to be paid to affected households under RAP will be borne by GoKP/PEDO. The Bank financing will help implement, monitor and evaluate the SDP (including the Gender Action Plan) and the ESMP.

88. **The SDP has been designed by PEDO (as part of GKH RAP) to share the benefits of the project with affected communities**. The SDP is aimed to promote the local development with a focus on improving the well-being of community members, particularly vulnerable and disadvantaged individuals. The SDP will mainly focus on interventions prioritized by the communities which mainly include provision of: (i) water supply schemes, (ii) education facilities, (iii) access roads, (iv) health facilities, and (iv) assistance in sports and culture clubs. The RAP budget of GKH has allocated an amount of US$5 million for the SDP and its implementation will be advanced with the finalization of local area development schemes within six months from effectiveness.

89. As designs of other projects under Component A have not been started and the scope and scale of impacts cannot yet be determined, a framework approach has been adopted. PEDO has prepared an ESMF and RPF to guide preparation of detailed ESIAs and Abbreviated/Resettlement Action Plan (A/RAP) once the designs details are available. The ESIA and A/RAP to be prepared for future projects will also be

consulted upon, reviewed and cleared by World Bank and disclosed on the PEDO and World Bank websites.

Labor Influx and Other Impacts

90. **The impacts due to labor influx are not significant for GKH**. The other proposed hydropower projects are not located in very populated areas. Therefore, interaction between the construction labor force and the communities is also expected to be limited, particularly with women due to the conservative culture in the region. The KHRE is unlikely to have any significant labor influx. Only a small number of high-skilled workers are expected to travel to the Project construction sites. The likelihood of Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH) is thus assessed as low.

91. **Though these risks are low, the project will undertake proactive measures to prevent and address potential labor-influx related risks, including SEA/SH risk.** Key measures which will be implemented by PEDO to minimize the risks related to labor influx include development and implementation of Code of Conduct (CoC) by the Contractors which will be reviewed by PEDO and Bank, prohibition of child labor as per the Bank policy, training and awareness raising programs, using unskilled/skilled labor from local population, setting penalties on breach of CoC and engaging a third-party monitoring firm. The project has designed a Grievance Redress Mechanism (GRM) which includes provisions for dealing with labor issues and any cases on SEA/SH.

92. **The Contractors will also prepare and submit a labor-management plan during the pre-construction stage which will be reviewed and cleared by PEDO and the WB.** The clauses on labor and working conditions will be included in the Contractors' contract covering the freedom of association and collective bargaining and requirement of social specialists in Contractors' staff to deal with the labor-related issues.

93. **PEDO will be strengthened with the needed expertise to keep track of local and migrant workers and for regular independent monitoring and inspection of sites of works undertaken by Contractors.** Internal monitoring will be carried out by PEDO and PIC and external monitoring will be carried out by a third-party monitoring agency. All reports will be shared with the Bank for review. The hiring of experts who will monitor labor and working conditions is underway. The Bank will also undertake frequent monitoring of the projects as part of its obligations.

D. Climate Co-Benefits

94. **Reduction in green-house-gas (GHG) emissions is based on the emissions associated with CCGT burning RLNG.** This is the most conservative assumption, because if fuel oil or coal based thermal generation were displaced by GKH, emissions would be significantly higher – by virtue both of the carbon content of the fuel as well as the higher efficiencies achievable by CCGT.

95. **GKH will not create any reservoir emissions, and hence reservoir emissions are assumed to be zero**. The GHG emissions from the GKH are given in Table A2.3 in the Annex 2. The emission from land clearing under the project footprints (a one-time emission of CO_2 based on the available dry mass) is estimated in accordance with Intergovernmental Panel on Climate Change (IPCC) guidelines. The

embodied (life cycle) emissions for material to be used in the project are estimated using a default factor of 2.9 g CO_2e/kWh.

96. **In the absence of GKH the same amount of electricity will be generated through CCGT-RLNG (Baseline).** An emission factor of 436 gCO_2/kWh for CCGT-RLNG was derived from default emission factor of 64.2 TCO_2 per Tera Joule for liquid natural gas given in IPCC Guidelines 2006 and assuming CCGT efficiency of 53 percent. The total generation emissions for CCGT over 50 years is estimated around 7.4 $MTCO_2e$, and the construction emissions are only 0.03 $MTCO_2e$. The net GHG emissions (Project Emissions minus Baseline Emissions from CCGT) of GKH are minus 7.34 $MTCO_2e$. Other RE projects are expected to have similar reduction in net emissions. Assuming same factors, total estimated generation of 1,100 GWh per annum from Component A of KHRE are expected to reduce net emissions by 24 $MTCO_2e$ over 50 years.

E. Gender

97. To foster women's voice and agency, a Gender Action Plan (GAP) has been prepared as a part of project preparation to guide the mainstreaming of gender into the project to help promote equal opportunities for women in the project area. Additional gender indicators determined in the GAP will be monitored. GAP is part of ESIA which is available on the PEDO and World Bank website.

98. Analysis on gender aspects and actions for gender mainstreaming is presented in various sections of the PAD. Actions for increasing women's representation in the energy sector are included in the project's institutional strengthening sub-component (B1.2), and are described in paragraphs 39 and 40. Indicators on gender have been included in the Results Framework covering percentage of total female staff in PEDO and number of schemes directly benefiting women particularly to create business opportunities for female enterprises in project area.

F. Citizen Engagement (CE)

99. **KHRE has a strong element of citizen engagement built in the frameworks as well as in the ESIA and RAP of GKH.** The citizen engagement will take place through the consultation process during preparation and implementation of ESIAs and RAPs and through establishment of the Grievance Redress Mechanism (GRM). Preparation of safeguard instruments (ESIA, RAP, ESMF and RPF) followed a thorough consultative approach including interviews with relevant Project stakeholder groups, in particular local communities, potential affected persons, including vulnerable groups such as women, local Non-government organizations (NGOs), and other interested parties. In total, the consultation activities included 46 Focus Group Discussions (FGDs) with 249 men and 36 women in seven (7) villages and five (5) information disclosure workshops. Seven (7) consultative meetings were also done with different institutions.

100. **Stakeholder consultations will continue to take place throughout the project implementation to obtain feedback to minimize the adverse impacts of the Project.** The ESMF includes a Stakeholder Engagement Framework (SEF) to guide consultations during preparation of ESIAs and RAPs of other projects. ESIA of GKH also includes Stakeholder Engagement Plan (SEP) to guide consultations during implementation stage of the ESIA and RAP.

101. **CE under KHRE will also be ensured through a multi-tier GRM**. A three-tier GRM has been designed and will be established to provide a time-bound, early, transparent and fair resolution of any grievances of affected persons. This will provide a forum for resolving grievances and disputes quickly, facilitate effective communication between the project and affected persons, mitigate adverse impacts of the project on communities, and facilitate appropriate corrective or preventive action. The outcome and performance of CE will be monitored through 2 indicators in the Results Framework – (i) Percentage of affected persons participating in consultations who consider their suggestion have been taken into account; and (ii) Grievances redressed and resolved.

V. Grievance Redress Mechanisms

102. **Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS).** The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service.
For information on how to submit complaints to the World Bank Inspection Panel, please visit *www.inspectionpanel.org*.

VI. Key Risks

103. **Overall Risk – Substantial.** The overall risk associated with the KHRE is assessed as Substantial. This is primarily because of environment and social risks generally associated with HPPs and constraints on mobilizing commercial financing because of the macro-fiscal uncertainty induced by the COVID-19 pandemic. Institutional risk is also rated as Substantial due to the limited experience of PEDO in dealing with procurement, financing, environment and social aspects of HPPs. Key Substantial risks are briefly discussed in paragraphs below, all others are rated Moderate.

104. **Macroeconomic Risk – Substantial.** The KHRE will be relying on commercial financing through local banks to cover a significant portion of the cost and generally US$ 200-250 million (equivalent in local currency) is not considered a huge amount for the banks in Pakistan. However, macroeconomic risk is Substantial as the impacts of COVID-19 may weaken ongoing stabilization efforts and medium-term structural reforms and add additional economic shocks. To mitigate this risk commercial financing will be raised through a consortium of banks in tranches spread over two to three years. The KHRE has been structured to leverage public financing from the World Bank to reduce the risks for commercial financiers, as described previously, associated with long-preparation time and low capacity. Moreover, there is interest for asset-backed Sukuks (Islamic investment financing), as demonstrated from the DHP experience, and under the low interest rate environment banks will be attracted to viable projects.

Furthermore, the Government of Pakistan has committed to staying the course on structural reforms and will be supported by the WBG, IMF and Asian Development Bank to ensure this.

105. **Institutional Capacity for Implementation and Sustainability Risk – Substantial.** With only seven completed projects adding 157 MW in total since 1986, PEDO experience to effectively deal with complex HPPs is limited. This risk will be mitigated through measures to strengthen capacity and through robust oversight and governance. The KHRE will support PEDO's capacity to plan, develop and manage the hydropower infrastructure. In addition, a proper system of procurement planning, tracking of various procurement actions, and monitoring of complaints will be implemented. Project implementation, procurement and contract management will be supervised by the PIC. The Bank Team will also visit the project sites on a regular basis, once COVID-19 restrictions allow, to monitor project planning and implementation of construction activities, communication strategy, and environmental and social safeguards activities. IPOE will also have members for environment, social and contract management. See Implementation Arrangement Section of **Annex 1** for further details.

106. **Fiduciary Risk – Substantial.** Fiduciary risk is rated as substantial primarily because of procurement of large value contracts. A comprehensive PPSD has been prepared, which determined various risk factors and recommended a way forward to maximize competition and value for money. There will be multiple layers of project supervision and robust oversight. The PIC will be supervising construction and will help PEDO to procure the various packages for construction of RE projects and contract management. The IPOE will have technical, procurement and contract management expertise and will be meeting regularly throughout the design and construction phase.

107. **Environment and Social Risk – Substantial.** The hydropower projects are likely to have potential environmental and social impacts and OHS risks which are considered Substantial. Social and environmental considerations were a key determining factors in the design and location of GKH to minimize environment and social impacts. Lack of land records in the area contribute to the social risks related to land acquisition, resettlement and finalization of rates with communities. Detailed environmental and social assessments, in compliance with the government and World Bank requirements, were carried out for GKH. For other projects that will be identified, or their designs will be prepared during implementation, the ESMF and RPF will guide the preparation of detailed ESIAs and A/RAPs. These documents were prepared following a thorough consultation with key stakeholders. KHRE also has a strong element of community engagement that goes beyond the compensation against land expropriation, and the rehabilitation and resettlement assistance (also see Stakeholders Risk). The bidding documents/construction contracts will include OHS conditionalities and consultants will be required to provide qualified OHS staff for preparation of bidding documents and for construction supervision to address OHS risks.

108. **Stakeholders Risk – Substantial.** There is a substantial risk from key stakeholder groups, particularly affected communities who may perceive a lack of benefits sharing, and lack of community engagement. A RAP for the GKH has been prepared to mitigate the direct social impacts. RAP also includes an SDP to have a strong buy-in from local communities through local area development that meets the needs and expectation of local communities. Local households and businesses will also benefit through increased economic activities during construction and operation phase. PEDO and PMO will be in regular

contact with the local communities via consultations and discussions with the Jirgas and other stakeholders, and a three-tier GRM will be put in place to ensure voices are heard and communications are open and transparent.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Pakistan

Khyber Pakhtunkhwa Hydropower and Renewable Energy Development

Project Development Objectives(s)

The Project Development Objectives are to increase renewable energy generation and strengthen the capacity of associated institutions in Khyber Pakhtunkhwa.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Increase renewable energy generation							
Increase in renewable energy generation (Gigawatt-hour (GWh))		0.00	0.00	10.00	350.00	350.00	1,100.00
Strengthen the capacity of associated institutions in KP							
Mobilization of commercial financing (Amount(USD))		0.00	30,000,000.00	40,000,000.00	165,000,000.00	185,000,000.00	185,000,000.00
RE projects prepared for investments (Number)		0.00	1.00	2.00	4.00	4.00	4.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Development of Hydropower and Renewable Energy Investments - Component A							
Generation capacity of energy constructed or rehabilitated (CRI, Megawatt)		0.00	0.00	5.00	93.00	98.00	255.00
Hydropower generation capacity constructed under the project (CRI, Megawatt)		0.00	0.00	0.00	88.00	88.00	245.00
Renewable energy generation capacity (other than hydropower) constructed under the project (CRI, Megawatt)		0.00	0.00	5.00	5.00	10.00	10.00
Institutional Strengthening and Energy Sector Development - Component B							
Engagement of Planning Consultants (Text)		EOIs Received	Development of plans and preparation of projects started.	50 percent of studies completed.	75 percent of studies completed.	100 percent of studies completed.	100 percent of studies completed.
Engagement of Management Support Consultants (Text)		EOIs Received	Constant support				Constant support
Percentage of total female staff in PEDO (Percentage)		2.60	9.00	15.00	15.00	15.00	15.00
Environment and Social Management - Component C							
Implementation of Resettlement Action Plan (Percentage)		0.00	20.00	40.00	60.00	80.00	100.00
Implementation of Environmental and Social Management Plan (Percentage)		0.00	20.00	40.00	60.00	80.00	100.00
Schemes directly benefiting women (Number)		0.00	1.00	3.00	4.00	5.00	5.00

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Affected persons participating in consultations who consider their suggestions have been taken into account. (Percentage)		0.00	40.00	40.00	40.00	40.00	40.00
Grievances redressed/resolved (Percentage)		0.00	70.00	70.00	70.00	70.00	70.00
Project Implementation Support and Technical Assistance - Component D							
Engagement of Project Implementation Consultant (Text)		EOIs received	Constant support and supervision				Effective execution of projects
Develop and implement training program (Text)		No formal training program exist.	Training program designed & implementation started				Training program fully implemented.

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Increase in renewable energy generation	Sum of (i) GKH: 339 GWh; (ii) Madyan HPP: 742 GWh; and (iii) Solar PV: 19 GWh	Annual	QPRs	Total generation over a 12 month period	PIC and PMO/PEDO
Mobilization of commercial financing	All sources: ECAs, loans, sukuks, bonds, PPP etc.	Annual	QPRs/agreements	Equivalent US$ mobilized for investment in Component A projects	PIC and PMO/PEDO

RE projects prepared for investments	Number of RE projects prepared by the Planning Consultants	Annual	QPRs/Planning Consultant Reports	Completion of designs, safeguard instruments and bidding documents.	Planning Consultants and PMO/PEDO

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Generation capacity of energy constructed or rehabilitated		Annual	QPRs	Generation License	PIC and PMO/PEDO
Hydropower generation capacity constructed under the project		Annual	QPRs	Generation License	PIC and PMO/PEDO
Renewable energy generation capacity (other than hydropower) constructed under the project		Annual	QPRs	Generation License	PIC and PMO/PEDO
Engagement of Planning Consultants					
Engagement of Management Support Consultants					
Percentage of total female staff in PEDO	Target ratio for total female staff in PEDO and project offices.	Quarterly	QPRs	Female staff divided by total staff	PMO/PEDO
Implementation of Resettlement Action Plan	(i) payment of compensation & allowances to AHs; (ii) implementation of SDP including GAP; and (iii) a functional GRM.	Quarterly	QPRs	Weights to be assigned based on MWs equally divided into three categories as described.	PIC and PMO/PEDO
Implementation of Environmental and Social Management Plan	As described in ESMP	Quarterly	QPRs	Independent Evaluation	PIC and PMO/PEDO

Schemes directly benefiting women	No. of schemes on cumulative basis. Particularly to create business opportunities for female enterprises in the project area	Quarterly	QPRs	Community engagement/surveys	PIC and PMO/PEDO
Affected persons participating in consultations who consider their suggestions have been taken into account.	Minimum percentage to be maintained throughout for all investments under KHRE.	Quarterly	QPRs	Questionnaires	PIC and PMO/PEDO
Grievances redressed/resolved	Minimum percentage to be maintained throughout for all investments under KHRE.	Quarterly	QPRs	Record maintained through GRM.	PIC and PMO/PEDO
Engagement of Project Implementation Consultant					
Develop and implement training program	MSC will support PEDO in developing and implementing the training program including workshops, seminars, certificates, study tours, apprenticeships and degree programs.	Annual	Annual monitoring/completion reports	PMO will maintain record of types of training, curriculum and participant details.	PMO/PEDO

ANNEX 1: Project Description, Implementation Arrangements and Support Plan

The Gabral – Kalam Hydropower Project (GKH)

1. **GKH is the first project that would be undertaken under Component A.** It is located on the Gabral River which is a right-side tributary of the Swat River, located about 2 km upstream from Kalam town[23]. The catchment of the Gabral River lies in the upper region of the SRB and can be classified as a "high mountain catchment" in which there are several glaciers up to the weir site. The length of Gabral River up to the weir is about 35.4 km. The average riverbed slope ranges from 20 meters (m)/km to 30 m/km, and the catchment area up to the proposed weir site is 957 km^2. Mean monthly minimum temperature ranges from -6^o Celsius (C) (Dec, Jan) to 14.6^o C (July), and mean monthly maximum temperature ranges between 8.2^o C (Dec, Jan) to 26^{o}C (in July). Rainfall in the catchment area is around 1,200 millimeter (mm). At the weir site minimum mean ten-daily flow is 7.32 cubic meters per second (cumecs) in February and maximum is 116.99 cumecs in July. 50 percent probability flow is 18.5 cumecs and 80 percent probability flow is estimated at 7.9 cumecs. 100-year, 500-year and 1,000-year floods are estimated at 1,068 cumecs, 1,745 cumecs, and 2,458 cumecs, respectively. The estimated sediment load at the weir site is 159,000 tons, which includes 25 percent bed load of sand, gravel, cobble, boulder, etc.

2. The proposed GKH will include the following works:

a) A concrete, gravity weir approximately 21 meters high on the Gabral River, upstream from Batinder Village. The total length of the weir structure from intake on right side to non-overflow section on the left bank is 145.5 m. Due to the presence of talus material on left bank of River Gabral, a gravity wall is proposed to abut the left flank of weir. The length of the non-overflow section is 15 m. The structure is expected to have four 5x5 meters sluices with the capacity of 1,293 cumecs at (100-year flood) normal reservoir level of 2,161 meters above sea level (masl). An overflow spillway with five bays each of 12 meters with a crest level at 2,161 m will have the capacity of 1,143 cumecs (50-year flood) with the top level of the weir at 2,168 masl. The two combined can safely pass 1,000 years flood. The reservoir would cover an area of about 50 acres and capacity of 1.08 million cubic meter (mcm) at 2,161 masl. Energy dissipation will be done in a combined stilling basin of 105 m width and 30m long for under-sluices and spillway;

b) A fish pass will be provided in the weir structure;

c) A water conveyance system of about 5.5 km for power generation, comprising of a sand trap with two chambers on the right side of the river (with capacity of 65 cumecs plus 20 percent more for flushing), 4.7 km head race tunnel (5.8 m concrete lined horse shoe shaped), surge shaft, 140 m pressure shaft, and 300 m pressure tunnel;

d) An open surface powerhouse located opposite to the Ashuran Village consisting of three Francis turbines with total capacity of 88 MW that can produce about 340 GWh of energy. Design discharge of the power channel at weir is estimated to be 65 cumecs with a rated net head of 153 meters. The two large turbines will have discharge capacity of 27.7 cumecs (37.5 MW), and 9.6 cumecs (13 MW) is discharge capacity for the small turbine.

[23] Kalam is a about 330 km from Islamabad and 280 km from Peshawar (capital of KP) and accessible via good metaled road up to Bahrain and 35 km road from Bahrain to Kalam is under construction. Due to relatively cooler weather in summer it attracts 0.4 million tourists annually.

e) Offices and facilities for employees required during operation of the project; A construction camp covering an area of about 12.5 acres along left bank of the river downstream of Anakar Khawar, and a muck disposal area of about 15 acres along the existing road; and

f) Rerouting of the existing Kalam – Gabral road (approximately 600 m in length) at the weir site, access road from weir to tunnel inlet (400 m), access road to the power house (400 m), access road to the surge shaft and headrace tunnel (4.3 km) temporary access roads/bridges for construction (400 m road and bridge of about 40 m).

Analysis of Design Alternatives

3. **All elements of the project are optimized considering various alternatives.** For the location of the weir, three locations were considered with varying heights, and two locations were studied for the powerhouse. Among the eight options, a ranking was done considering power potential, geological conditions, socio-environmental conditions, and planning and design. Selected combination ranks the best considering the composite ranking criteria. Then generation cost and NPV was estimated for all eight combinations and the selected option gives the maximum NPV. The proposed location of the weir upstream from Batinder Village also helps avoid major social and resettlement issues. The height of the weir is selected among other things to avoid impact on the two upstream villages of Utror and Kanai. Considering all types of structures (earth-fill, rockfill, concrete gravity, and composite), a concrete gravity dam was determined most suitable; this was primarily because the valley is narrow, and therefore best suited for the spillway and under sluices in the design/body of the dam. This would also provide protection against overflow under very extreme conditions.

4. **River diversion during construction would be done in two stages.** Initially a channel of 20 m width and 6 m depth with 1.5 m freeboard will be constructed on the left bank from upstream cofferdam to the downstream cofferdam. The construction will start on the right side, and once completed, the river will be diverted to the right for construction on the left side. This method has been implemented successfully in Matiltan HPP, which is similar in size and characteristics. This option is half the price of the diversion through tunnels with shorter construction period.

5. **Environmental and Tourism Flows.** The project is planned with environment flows of at least 2 cumecs during winter months from December to February that are increased to 3.5 cumecs in the remaining months. Considering tourism and the environment, minimum flows are estimated to be 4 cumecs during November and December; 6 cumecs from January to March and October; 8 cumecs April and September; and 12 cumecs from May to August.

6. **Solar PV at GKH.** Solar PV plants would be installed along the periphery of the reservoir where water depth is shallow, in the powerhouse area and on other land available under the project. It is estimated that about 5 to 10 MW solar plant can be installed in the project area. The plants would be installed at the start of the construction and would meet part of the electricity requirements of the construction.

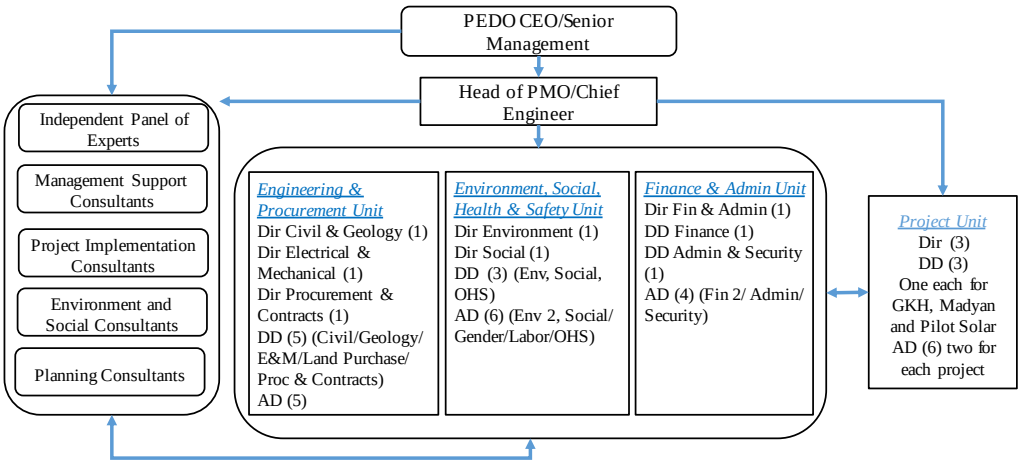
7. **Power Evacuation.** Evacuation of power from GKH will be done through a 220 kilo Volt (kV) transmission line that would also evacuate power from the Matiltan HPP. The line is expected to be completed by 2022 and thus it would be available for evacuation of power by the time GKH is completed. A substation at the GKH will be connected to the same line.

8. Detailed description of other RE projects to be constructed under KHRE would be prepared following design studies during the implementation.

Project Implementation Arrangements

9. **PEDO would be the project executing entity of the KHRE on behalf of the GoKP.** KHRE will be managed through the PMO with full-time dedicated staff for key technical/engineering, environment, social, OHS, procurement and financial management positions. The PMO is to be headed by a Chief Engineer level person with full powers of Grade-20 equivalent officer and will be reporting to CEO of PEDO. The PMO will be supported by a set of consultants and an IPOE. Strategic guidance, inter-departmental coordination and high-level oversight will be provided by the Project Steering Committee (PSC), to be chaired by the Additional Chief Secretary and represented by all relevant government officials/departments. See Figure A1.1 for the PMO organogram and implementation arrangements.

Figure A1.1: PMO Organogram



Head PMO is Chief Engineer level person with full powers in 20 grade. Directors (Dir) are 19 grade, Deputy Director (DD) are 18 grade and Assistant Directors (AD) are 17 grade. In addition there are technical specialists/experts in each unit.
Only grade 17 and above staff are shown here.

Procurement

10. **PEDO has gained experience in carrying out procurement according to the World Bank Guidelines under the PPF.** It also has been engaged with ADB for a longer period and implemented several projects. All KHRE activities shall follow the World Bank Procurement Regulations for IPF Borrowers (July 2016, Revised August 2018).

11. **The project procurement outlays comprise of large works for civil construction, and Electro-Mechanical (E&M) equipment procurement and installation for GKH, on slice and package, and three large consultancies for Implementation Support, Planning, and Management Support**. The procurement approach for the main work contracts (civil and E&M) will follow open international, single-stage, one-envelope method (ICBs), following pre-qualification. The project timelines are such that pre-qualification can be done without causing delay in bidding process, and it will encourage serious bidders to participate. PPSD provides the background for packaging and procurement approach. Other hydel and solar projects are to be selected during implementation and the PPSD will be updated to indicate the procurement approaches.

12. **Market-based selection of a Contract Management and Procurement Specialist will be done in the PMO.** A strong coordination and reporting regime is proposed under the PMO, with delegation of powers to the Head of the PMO and

the roles and responsibilities documented in an SOP. Contract management plans for all large contracts will be prepared and monitored to ensure timely decisions. PIC and MSC will support the PMO in contract management and overall project management. Procurement Risk for the project is assessed as **Substantial**, with the following mitigation plan in the Table A1.1. Procurement Plan Summary is given in Table A1.2.

Table A1.1: Procurement Risk Mitigation Plan

No.	Risk Area	Mitigation measure	Responsibility	Timeline
1	Procurement processes and decision making	i. Additional Procurement & contract management staff hired at PMO. ii. PMO staff trained in Bank procurement procedures iii. Head PMO delegated with authority for approvals of project related decision making. SOP prepared for such delegations and working of PMO.	i. PMO ii. World Bank iii. PEDO	i. Dec 2020 ii. June 2020/ongoing iii. Dec 2020
2	Market response	Packages are made aligned with market readiness.	PMO	Done
3	Design adequacy and cost estimation	i. Consulting firm is being hired for design review and preparation of adequate bid docs; ii. market rates to be used for estimation. iii. IPOE to review design aspects	PMO PMO IPOE	EOI received, firms to be on board by Dec 2020 IPOE in place
4	Contract management	i. Contract management plans for all three contracts prepared and regularly monitored. This will include monitoring of staff deployment and contractor's presence on site. ii. Contract Manager to monitor implementation of consultancy firm(s) contracts on the above lines. iii. Management support firm will support PMO for overall project management	PMO/ Consulting firm PMO PMO	After contract award By Dec 2020 EOIs received, firms on board by March 2021
5.	Law and order perception in the province	Bidding Documents will indicate the provision of site security and specific arrangements will be discussed at pre-bid meetings	PMO	When bidding docs are prepared

Table A1.2: Summary of the Procurement Plan – Key Contracts for Year 1

No.	Name	Estimated Cost (US$ million)	Bank Oversight	Procurement Approach/ Competition	Selection Method	Evaluation Method
CONSULTANCIES/SERVICES						
1	PIC - Project Implementation Consultants	10	Prior	International firm selection /open	QCBS	Highest ranked firm
2	MSC -Management Support Consultants	6	Prior	International firm selection/open	QCBS	Highest ranked firm
3	Planning Consultants	20	Prior	International firm selection/open	QCBS	Highest ranked firm

No.	Name	Estimated Cost (US$ million)	Bank Oversight	Procurement Approach/ Competition	Selection Method	Evaluation Method
MAJOR WORKS CONTRACTS						
1	GKH: Package 1: Civil Works -	136	Prior	ICB	Pre-Qualification RFB	Lowest evaluated qualified bidder
2	Package 2: Powerhouse (Supply & Install) - civil structure; turbines, generators, power evacuation	46	Prior	ICB	Pre-Qualification RFB	Lowest evaluated qualified bidder

Financial Management

13. **FM Staffing.** For the project FM arrangements, a full-time Director of Finance (to be mapped to PMO) will be engaged/deputed by PEDO in accordance with the ToRs acceptable to the Bank. Director Finance will report to Head PMO and will be supported by Deputy Directors, Assistant Directors, Accountants to be engaged in accordance with the ToRs acceptable to the Bank.

14. **Budgeting and Planning.** KHRE will be reflected in GoKP's Annual Development Plan (ADP) of each year of its implementation. Operational/technical teams will provide estimates to PMO's Finance function for preparing annual work plan (AWP) that will provide quarterly break up of planned activities and associated costs. AWP will also form basis of providing estimates to GoKP's Planning and Development Department for inclusion in each year of ADP. On quarterly basis, variance analysis will be conducted of the planned activities and their associated costs.

15. **Accounting and Reporting.** Separate books of accounts will be prepared in accordance with the PEDO's Accounting Manual. Biannual Interim Unaudited Financial Reports (IUFRs) will be prepared to report uses of funds according to the defined expenditure under the KHRE components and will be submitted to the World Bank within 45 days of the close of each semester. Annual Financial Statements will be prepared in accordance with Cash Basis International Public Sector Accounting Standards and will be submitted to auditors.

16. **Internal Controls.** The Project will be housed in PEDO's internal control environment and would benefit from its existing processes and procedures. Each invoice is validated by a budget availability check by the Accountant, and a pre-audit check by Assistant Director to confirm that invoice is supported by adequate and appropriate documentation. Thereafter, the invoice, with a request to approve payment, is forwarded to General Manager (Hydel), who has the sanctioning powers. This practice confirms to a comprehensive set of preventive, detective and corrective controls, along-with segregation of duties. The similar practice will be employed by PMO whereby transactions' financial aspects will be reviewed and approved by Director Finance, and administrative/technical sanctions will be provided by the PMO's Chief Engineer.

17. **Internal Audit.** The Provincial Internal Audit Cell (PIAC) housed in Finance Department has established a node (Internal Audit Cell) in E&P Department which also conducts internal audit of GoKP financed projects implemented by PEDO. This Internal Audit Cell will also conduct internal audit of KHRE.

18. **External Audit**. The Auditor General of Pakistan (AGP) will conduct annual audit of the annual financial statements. For each financial year closing on June 30, acceptable audited financial statements for the overall Project (combined for IDA and IBRD) will be submitted to the Bank by December 31.

19. **Disbursements**. Two segregated Designated Accounts (DAs) will be used for the project related receipts and payments. One DA, which has been opened for the PPF, will continue to be used for the follow-on financing from IDA credit; and the other DA will be opened for receipt and utilization of IBRD loan. Funds disbursed under the PPF will be refinanced in KHRE. The DAs will be operated by the PMO in accordance with the provisions of the "Revised Accounting Procedure for Revolving Fund Account (Foreign Aid Assignment Account)" dated August 2, 2013 and issued by the Finance Division. Disbursements will be report-based where advance equivalent to six months forecast will be provided to DAs and subsequent bi-annual interim unaudited financial reports (IUFRs) will be the basis of documentation of the expenditures. Subsequent IUFRs will also provide six-month expenditure forecasts by which disbursements will be determined. Further details on disbursements will be provided in the Disbursement Letter.

20. **Allocation of Loan Proceeds.** The allocation of the Bank financing proceeds is provided in the Financing Agreement. IDA and IBRD financing percentage for the various expenditure types will be at 100 percent up to the allocated amount in accordance with AWP and Budget approved by the Association and reported in the IUFRs.

21. **Subsidiary Lending Arrangements.** The Bank financing would be on-lent by the Government of Pakistan (GoP) to GoKP, which will then on-lend to PEDO on the same terms through a Subsidiary Agreement (SA). This SA would authorize PEDO to withdraw proceeds of the Credit and proceeds withdrawn by PEDO will be considered withdrawn by GoP. Signing of SA will be a condition of effectiveness.

Strategy and Approach for Implementation Support[24]

22. The strategy for implementation support (IS) has been developed based on the nature of the proposed Project. It will aim at making the support to the client for implementation more flexible and efficient and focus on the implementation of the risk mitigation measures.

a) **Procurement**: There will be large International Competitive Bidding (ICB) contracts, which include the powerhouse and the power plant, and one medium size contract for transformers and other electrical equipment and line outside the powerhouse. The Bank Team has been providing and would continue to provide implementation support through: (a) technical, management and procurement expertise; (b) training to members of the procurement committee and related staff in the regional project offices, as well as the Construction Supervision Consultants; (b) reviewing procurement documents and providing timely feedback to the procurement committee; (c) providing detailed guidance on the Bank's procurement guidelines to the procurement committee; and (d) monitoring procurement progress against the detailed procurement plan developed by the PEDO.

b) **Financial management**: The project's FM system would be reviewed during supervision, including but not limited to accounting, reporting and internal controls. The supervision would also cover contracts on a random sample basis. The Bank Team would also work with the PIC and MSC to assist PEDO and the PMO in improving

[24] This is an indicative and flexible instrument which will be revised during implementation as part of the ISR and adjusted based on what is happening on the ground. The implementation plan should be consistent with the design and riskiness of the operation, and should be adequately resourced.

coordination among different departments and units for financial management and reporting.

c) **Environmental and social safeguards**: The Bank Team will supervise and provide support to PEDO for the implementation of the agreed ESMP and RAP.

d) **Technical Aspects/Independent Panel of Experts**: The Bank credit/loan will support an Independent Panel of Experts (IPOE) consisting of internationally renowned experts in the fields of dams, hydraulic structures, rivers and structural engineering, geotechnical and foundations expertise, electrical and mechanical equipment, sediment management, procurement and contracts management, etc.

Implementation Support Plan

23. The Bank Team will be comprised of members primarily based in the Pakistan Country Office, as well in Washington D.C. and regional country offices to ensure timely, efficient and effective implementation support to the client. Timely monitoring and support to PEDO will be mainly provided by the team members in the country offices of the region, especially for the first 18 months. Formal supervision and field trips will be carried out semi-annually or as often as needed for smooth implementation of the Project.

24. Detailed inputs from the Bank Team are outlined below:

e) **Technical inputs**. Weir, hydraulic structure engineering and electro-mechanical equipment expertise is required to review bidding documents to ensure fair competition through proper technical specifications in the bidding documents and fair assessment of the technical aspects of the bids. The Bank Team will contract individual consultants for these skills. Specialist and high-level procurement skills are required for review of the major works contracts as well as the two consulting services, PIC and MSC. During construction and commissioning, technical supervision is required to ensure contractual obligations are met on technical grounds. Field visits by the team's dam, hydraulic and electro-mechanical engineers would be conducted on a semi-annual basis throughout Project implementation.

f) **Fiduciary requirements and inputs**. Training will be provided by the Bank's FM and procurement specialists. The team would also help PEDO identify capacity building needs to strengthen its FM capacity and to improve procurement management efficiency. Both FM and procurement specialists would be based in the Country Office to provide timely support. Formal supervision of FM would be carried out semi-annually, while procurement supervision will be carried out on a timely basis as required by the client. The PEDO would be provided with consulting services in this area and assistance by the PIC and MSC. In addition, under KHRE, funds are available to PEDO for the recruitment of specialized skills as needed. The Bank can help identify consultants with requisite skills.

g) **Safeguards**. Inputs from an environmental, OHS and a social specialist are required, in parallel to the additional capacity that will be available through Component B. Training is required on environmental and OHS monitoring and reporting and implementation focus would be on ESMP. On the social side, supervision would focus on the implementation of the agreed RAP(s). Field visits are required on a semi-annual basis. Both social and environmental safeguard specialists are based in the Country Office, and an OHS specialist will be from the Head Office or the region. The MSC will help in independent monitoring of the safeguard issues and highlight to the Bank Team any issues, as well as possible alternative solutions in a timely manner.

h) **Operations**. An Operations Officer based in the Country Office will provide day-to-day supervision for all operational aspects and coordination with the client and among Bank Team members.

25. The implementation support plan and staff skills mix are summarized in Table A1.3 and Table A1.4, respectively.

Table A1.3: Implementation Support Plan

Time	Focus	Resource Estimate	Staff Weeks
First Two Years of the Project	Technical review, procurement review, site review, bidding documents	Dam, weir, hydraulic structures (with procurement expertise) Electro-mechanical Engineer (with procurement expertise) OHS expert Procurement Specialist	4 3 3 6-7
	Procurement training, FM training	Procurement and FM Specialists	5
	SAP/RAP implementation	Social Specialist/ RAP Specialist	3
	Environmental supervision	Environmental Specialist	3
	Institutional and capacity building Financial strategy, Financing	Institutional Specialist Financial Specialist	4 4
	Hydro-power generation system	Hydropower specialist	3
	Project Management and Task Leadership	Task Team Leader	8
Year 3 till completion	Project construction	Dam, hydraulic structures Engineer Electro-mechanical Engineer Procurement and Contract management OHS Expert	4 3 4 4
	Environmental and social monitoring	Environmental Specialist Social/RAP Specialist	2 2
	FM, disbursement and reporting	FM Specialist, Disbursement Specialist	4
	Institutional arrangements, capacity building & financial strategy for PEDO	Institutional Specialist	3
	Project Management and Task Leadership	Task Team Leader	8

Table A1.4: Requisite Staff Skills

Skills Needed	Number of Staff Weeks (SW)	Number of Trips	Comments
Dam, Hydraulic structure Engineer	4 SWs annually	Fields trips as required	International
Electro-mechanical Engineer	3 SWs annually	Field trips as required	International
OHS expert	3/4 SWs annually	Field trips as required	International
Procurement Specialist	5/8 SWs annually	Fields trips as required	Country office based
Procurement Specialist	4 SWs annually	Fields trips as required	International
Social Specialist	2 SWs annually	Field trips as required	Country office based
Social Specialists	3 SWS annually	Field trips as required	International/ Regional
Environmental Specialist	2 SWs annually	Field trips as required	Country office based
Environmental Specialist	3 SWs annually	Field trips as required	International
Financial Management Specialist	3 SWs annually	Field trips as required	Country office based
Financial Management Specialist	2 SWs Annually	Field trips as required	International
Institutional Specialist	4 SWs annually	Field trips as required	International
Task Team Leader	8 SWs annually	Field trips as required	International/Country based

ANNEX 2: Economic Analysis

1. **Introduction**. Hydropower generation is one of the least cost solutions to meet Pakistan's growing energy requirements. This is because of several reasons – peak generation from hydro in Pakistan coincides with the peak demand in summer months; it is a clean and an underdeveloped domestic resource; large portion of investment cost is in the local currency; it employs local labor that has gained experience of constructing hydropower projects; and tariff are low, less volatile and predictable. The economic analysis is for GKH only because key project features have been finalized to estimate cost and benefits whereas other projects are yet to be designed and will be evaluated using a similar approach and will be selected for investment based on their overall viability.

2. **Project Optimization.** Environment and social considerations were key determining factors to select the location and height of the weir and the size of the powerhouse. Among the technically, environmentally and socially feasible options, the option that gave maximum NPV was selected for further analysis and detailed modeling was done to fine tune project parameters and to estimate costs and benefits (See **Annex 1** for further details). Based on current market prices the estimated cost of GKH including the transmission line is around US$213 million (excluding IDC). The project will add 88 MW of capacity and 339 GWh of electricity per annum. Based on standard inputs assumed for hydropower projects in the NTDC's Indicative Generation Capacity Expansion Plan (February 2019, 50 years life and 10 percent discount rate) the per unit annualized cost of GKH is estimated to be US¢6.7/kWh which makes it cheaper then all thermal options (coal, RLNG, fuel oil and nuclear) and places it among the top 20 least cost HPPs of various sizes in the country.

3. **Economic Rate of Return.** The economic benefits of GKH are assessed as the avoided cost of CCGT-RLNG as the next best alternative. Based on the assumptions given in **Table A2.1** and described in paragraph 6 of this Annex, the economic rate of return (ERR) for the project is estimated to be around 20.2 percent and 25.1 percent with environmental benefits. When evaluated against steam turbine (ST) running on domestic coal ERR increases to 22.1 percent and to 30.4 percent with environmental benefits. The differential with climate benefits is more because of higher emission factors for coal. It is also quite plausible that when GKH is commissioned it will be displacing thermal generation which is the most expensive. Therefore, for a peaking scenario ERR is estimated to be 29.8 percent (and 34.9 percent with environment benefits) assuming equal displacement of CCGT-RLNG and the combustion turbine (CT) running on High Speed Diesel (HSD). The results of the three scenarios are presented in **Table A2.2**.

4. **Other Benefits not Quantified.** GKH promises other positive externalities e.g. proximity to the Kalam tourist resort will have a positive impact on tourism in the area and benefits emerging from environment/social mitigation measures are expected to exceed its mitigation cost. These externalities, however, have not been quantified and will further increase the ERR. Therefore, GKH is an economically viable project and other hydro power projects are expected to have similar economic returns and will be prioritized for investment based on their technical, economic and financial viability accordingly.

5. **Risk Assessment.** Though Pakistan has good examples of constructing hydro projects on time and below cost, two key risks for hydro after start of construction are: (i) time delays; and (ii) cost over-runs. The NPV of GKH at 10 percent discount rate is about US$ 86 million and US$ 138 million with climate benefits. GKH's NPV will remain positive even if capital cost increases by 94 percent. Project cost already includes physical and price contingencies and a further 94 percent increase in cost is unlikely. In addition, design will be reviewed by PIC and will also be scrutinized by the IPOE. The risk of delay in operations could be due to social/resettlement issues but this usually

happens in the first phase of the project delaying cost and benefits in tandem and therefore such delays are expected to have negligible impact on NPV. Even if for some reason generation is delayed after project has been completed there will be about six years to resolve the issue before NPV becomes negative.

6. **Key Assumptions:**

Crude oil price: US$ 64/bbl (average for 2019) and projected to remain around the same level.

Indexation: Price of RLNG and HSD is linked to crude oil price at 0.95 and 1.2 in energy equivalent terms.

Social Cost of Carbon is according to the World Bank guidelines (2014), with base case starting at US$35 per metric tonne in 2020 and increasing to US$86 per metric tonne in real terms by 2054.

Project schedule: GKH is expected to start generation from FY25.

Table A2.1: *Estimating Cost of Alternate Generation*

Technology		**ST**	**CCGT**	**CT**
Fuel Source		*Coal*	*RLNG*	*HSD*
Plant's Economic Cost	US$/kW	1,556	694	534
Project Life	years	30	25	20
Efficiency		39%	53%	34%
Discount rate		10%	10%	10%
Fixed Capacity charge	$/kW/Year	165	76	63
Fixed O&M	"	173	17	19
Total Fixed Charges	"	338	94	82
Auxiliary Power/Transformer Loss		7%	5%	5%
Adj Fixed Charges	$/kW/Year	364	99	86
Plant Factor		80%	80%	20%
Fixed cost per unit	$/MWh	52	14	49
Fixed cost per unit	US¢/kWh	5.19	1.41	4.92
Variable O&M	"	0.75	0.40	0.20
Fuel Cost	"	3.32	6.66	7.84
Total Cost of Generation	"	**9.27**	**8.46**	**12.96**
Emission Factor	TCO_2/Bbtu	101	68	78
Emission Factor - CO_2	g/kWh	886	436	776

Table A2.2: *Economic and Environmental Benefits Against Various Alternatives*

		Base Case CCGT-RLNG	Alt Scenario ST-Coal	Peaking Scenario RLNG: 50% CT-HSD: 50%
ERR	%	20%	22%	30%
ERR with climate benefits	%	25%	30%	35%
Avoided Emissions (Gross)				
Over 30 years	MTCO2e	4.4	9.0	6.2
Over 50 years	"	7.4	15.0	10.3

Table A2.3: *Net GHG Emissions (tCO_2) from GKH*

	Emission Type	**GKH**	**Baseline (CCGT)**	**Net**
1	Reservoir	0		0
2	Generation		7,395,315	-7,395,315
3	Land clearing	34,467	-	34,467
4	Embodied emissions	49,183	-	49,183
5	Energy emissions in Construction	0	26,413	-26,413
	Total Emissions	**83,650**	**7,421,728**	**-7,338,078**