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Report No: PAD4172

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT  
ON A  
PROPOSED LOAN

IN THE AMOUNT OF US\$195 MILLION

TO

THE ISLAMIC REPUBLIC OF PAKISTAN

FOR AN

ELECTRICITY DISTRIBUTION EFFICIENCY IMPROVEMENT PROJECT

NOVEMBER 22, 2021

Energy & Extractives Global Practice  
South Asia Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective November 16, 2021)

Currency Unit =	Pakistan Rupee (PKR)
PKR 173.55=	US\$1

FISCAL YEAR  
July 1 – June 30

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## ABBREVIATIONS AND ACRONYMS

ABC	Aerial Bundled Cables
ADB	Asian Development Bank
AGP	Auditor General of Pakistan
AMI	Automated Metering Infrastructure
APL	Adaptable Program Loan
AWPB	Annual Work Plan and Budget
BAU	Business as Usual
CCGT	Combined Cycle Gas Turbine
CCI	Council of Common Interests
CD	Circular Debt
CDMP	Circular Debt Management Plan
CEO	Chief Executive Officer
CG	Corporate Governance
CMS	Customer Management System
CPPA-G	Central Power Purchasing Agency-Guarantee
CPS	Country Partnership Strategy
CTBCM	Competitive Trading Bilateral Contract Market
DA	Designated Account
DISCO	Distribution Company
DPF	Development Policy Financing
EDEIP	Electricity Distribution Efficiency Improvement Project
EDTIP	Electricity Distribution Transmission Improvement Project
E&S	Environmental and Social
ELR	Energy Loss Reduction
ERP	Enterprise Resource Planning
ERR	Economic Rate of Return
ESCP	Environmental and Social Commitment Plan
ESF	Environment and Social Framework
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESRS	Environment and Social Review Summary
ESS	Environment and Social Standards
FATA	Federally Administered Tribal Areas
FESCO	Faisalabad Electric Supply Company
FM	Financial Management
FY	Fiscal Year
GDP	Gross Domestic Product
GENCO	Generation Company
GIS	Geographic Information System
GRM	Grievance Redressal Mechanism
GRS	Grievance Redress Service
GS	Grid Station
GWh	Giga-watt hours
HESCO	Hyderabad Electric Supply Company

HR	Human Resources
HT	High Tension
HTLS	High-Temperature Low Sag
IAA	Independent Auction Administrator
ICT	Information Communication and Technology
IFRS	International Financial Reporting Standards
IMS	Incident Management System
INT	Integrity Vice Presidency
ISMO	Independent System and Market Operator
IT	Information Technology
IUFR	Interim Un-audited Financial Reports
KE	Karachi Electric
kWh	Kilo-watt hours
LMP	Labor Management Procedures
LNG	Liquefied Natural Gas
LT	Low Tension
MEPCO	Multan Electric Power Company
MVA	Mega Volt Amperes
MW	Mega-Watt
NEP	National Electricity Policy
NEPRA	National Electric Power Regulatory Authority
NPV	Net Present Value
NTDC	National Transmission and Despatch Company
OHS	Occupational Health and Safety
OP	Operational Policy
PACE	Program for Affordable and Clean Energy
PAD	Project Appraisal Document
PDO	Project Development Objective
PEPCO	Pakistan Electric Power Company
PESCO	Peshawar Electric Supply Company
PHPL	Power Holding Private Limited
PIE	Project Implementing Entity
PIMSC	Project Implementation and Management Support Consultants
PIU	Project Implementation Unit
PKR	Pakistan Rupee
PMU	Project Management Unit
PPMC	Power Planning and Monitoring Company
PPSD	Project Procurement Strategy for Development
PSC	Project Steering Committee
QC	Quality Control
QPR	Quarterly Progress Reports
RE	Renewable Energy
RF	Resettlement Framework
RISE	Resilient Institutions for Sustainable Economy
RoW	Right of Way
SAIDI	System Average Interruption Duration Index

SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SECP	Security and Exchange Commission of Pakistan
SEP	Stakeholder Engagement Plan
SHIFT	Securing Human Investment to Foster Transformation
STEM	Science Technology Engineering and Mathematics
STEP	Systematic Tracking of Exchanges in Procurement
STG	Secondary Transmission and Grid
T&D	Transmission and Distribution
T/F	Transformer
TA	Technical Assistance
TMS	Transformer Monitoring System
TWh	Tera-watt hours
VRE	Variable Renewable Energy
WAPDA	Water and Power Development Authority

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## DATASHEET

### BASIC INFORMATION

Country(ies)	Project Name	
Pakistan	Electricity Distribution Efficiency Improvement Project	
Project ID	Financing Instrument	Environmental and Social Risk Classification
P170230	Investment Project Financing	Moderate

### Financing & Implementation Modalities

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

Expected Approval Date	Expected Closing Date
17-Dec-2021	31-Dec-2027

Bank/IFC Collaboration

No

### Proposed Development Objective(s)

The project development objectives are to improve operational efficiency in targeted areas of selected distribution companies and achieve progress on the power sector reform agenda.

### Components

Component Name	Cost (US\$, millions)
Improving Grid Reliability	89.58



Modernizing Operations and Management	44.50
Capacity Building and Technical Assistance	37.68
Reform Support	20.43
Financing Cost	8.45
Admin and Other Costs	8.44

**Organizations**

Borrower:	The Islamic Republic of Pakistan
Implementing Agency:	Peshawar Electric Supply Company Limited Multan Electric Power Company Limited Hyderabad Electric Supply Company Limited Ministry of Energy (Power Division)

**PROJECT FINANCING DATA (US\$, Millions)****SUMMARY**

Total Project Cost	209.08
Total Financing	209.08
of which IBRD/IDA	195.00
Financing Gap	0.00

**DETAILS****World Bank Group Financing**

International Bank for Reconstruction and Development (IBRD)	195.00
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**Non-World Bank Group Financing**

Counterpart Funding	14.08
Sub-borrower(s)	14.08

**Expected Disbursements (in US\$, Millions)**

WB Fiscal Year	2022	2023	2024	2025	2026	2027	2028
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Annual	3.00	22.00	40.00	50.00	50.00	20.00	10.00
Cumulative	3.00	25.00	65.00	115.00	165.00	185.00	195.00

**INSTITUTIONAL DATA****Practice Area (Lead)**

Energy &amp; 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	● Substantial
2. Macroeconomic	● Moderate
3. Sector Strategies and Policies	● Substantial
4. Technical Design of Project or Program	● Moderate
5. Institutional Capacity for Implementation and Sustainability	● Substantial
6. Fiduciary	● Substantial
7. Environment and Social	● Moderate
8. Stakeholders	● Moderate
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

### Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Not Currently Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

**NOTE:** For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

### Legal Covenants

#### Sections and Description

-The Borrower shall vest the responsibility for the overall oversight and coordination of the Project in MoE. The Borrower shall: (a) take all actions, including ensuring the provision of funds, facilities, services and other resources, necessary or appropriate for the carrying out of the Project by the Project Implementing Entities and MoE; and (b) ensure that the Project is completed in a manner consistent with the requirements of this Agreement, irrespective of the sources of the financing.

(Sections I.A.1 and 2 of Schedule 2 to the Loan Agreement)



#### Sections and Description

-The Borrower, through MoE, shall maintain, throughout the Project implementation period, a Project Steering Committee with attributions and composition acceptable to the Bank, which shall be chaired, composed and responsible for functions specified in the Loan Agreement.  
(Section I.A.3 of Schedule 2 to the Loan Agreement)

#### Sections and Description

-To facilitate the carrying out of the MoE's Respective Parts of the Project, the Borrower, through MoE, shall maintain, throughout the implementation period of the MoE's Respective Parts of the Project, a Project Implementation Unit, with composition and responsibilities specified in the Loan Agreement.  
(Section I.A.4(a) of Schedule 2 to the Loan Agreement)

#### Sections and Description

-To facilitate the carrying out of the MoE's Respective Parts of the Project, the Borrower, through MoE, shall establish, by not later than one month after the Effective Date, and thereafter maintain, throughout the implementation period of the MoE's Respective Parts of the Project, a Procurement Committee, with composition and responsibilities specified in the Loan Agreement.  
(Section I.A.4(b) of Schedule 2 to the Loan Agreement)

#### Sections and Description

-To facilitate the carrying out of the MoE's Respective Parts of the Project, the Borrower, through MoE, shall ensure that the Project Implementation Unit collaborates with PPMC on the implementation of activities under Part 4(a) of the Project, and collaborates with PPIB, AEDB, CPPA and NTDC on the implementation of activities under Part 4(b) of the Project.  
(Section I.A.4(c) of Schedule 2 to the Loan Agreement)

#### Sections and Description

-For purposes of carrying out the Project Implementing Entity's Respective Parts of the Project, the Project Implementing Entity shall maintain, throughout the implementation period of its Respective Parts of the Project, a Project Management Unit, with composition and responsibilities specified in the Project Agreements.  
(Section I.A.1(a) of the Schedule to the Project Agreements with HESCO, MEPCO and PESCO)

#### Sections and Description

-For purposes of carrying out the Project Implementing Entity's Respective Parts of the Project, the Project Implementing Entity shall select and engage, by not later than three months after the Effective Date, and thereafter maintain, throughout the implementation period of its Respective Parts of the Project, the services of a Project implementation and management support consultant, with qualifications and experience and under terms of reference acceptable to the Bank.  
(Section I.A.1(b) of the Schedule to the Project Agreements with HESCO, MEPCO and PESCO)

#### Sections and Description

-For purposes of carrying out the Project Implementing Entity's Respective Parts of the Project, the Project Implementing Entity shall establish, by not later than one month after the Effective Date, and thereafter maintain, throughout the implementation period of its Respective Parts of the Project, a Procurement Committee, with composition and responsibilities specified in the Project Agreements.



(Section I.A.1(c) of the Schedule to the Project Agreements with HESCO, MEPCO and PESCO)

**Sections and Description**

-To facilitate the carrying out of the Project Implementing Entities' Respective Parts of the Project, the Borrower shall make the proceeds of the Loan allocated from time to time to Categories ((1)(b), (1)(c) and (1)(d)) of the table set forth in Section III.1 of Schedule 2 to the Loan Agreement available to the respective Project Implementing Entities under individual Subsidiary Agreements, under terms and conditions acceptable to the Bank.

(Section I.B of Schedule 2 to the Loan Agreement)

**Sections and Description**

-The Borrower shall, not later than thirty months after the Effective Date, or such other date as may be agreed with the Bank, carry out jointly with the Bank and the Project Implementing Entities, a Midterm Review of the Project, and the Project Implementing Entity shall participate in the Midterm Review to assess the status of its Respective Parts of the Project implementation.

(Section II.2 of Schedule 2 to the Loan Agreement and Section II.2 of the Schedule to the Project Agreements with HESCO, MEPCO and PESCO)

**Sections and Description**

-Except for the Borrower's Fiscal Year during which the Loan Agreement shall become effective (for which the deadlines below shall be one month and 2 months after the Effective Date, respectively), the Borrower, through MoE, shall: (a) prepare and furnish to the Bank by not later than March 31 of each year, a draft Annual Work Plan and Budget for the MoE's Respective Parts of the Project for review and comment; (b) taking into account the Bank's comments, finalize and furnish to the Bank no later than April 30 in each year, the Annual Work Plan and Budget, acceptable to the Bank; and (c) thereafter ensure the implementation of the MoE's Respective Parts of the Project during the following Fiscal Year in accordance with the Annual Work Plan and Budget agreed with the Bank and in a manner acceptable to the Bank.

(Section I.D of Schedule 2 to the Loan Agreement)

**Sections and Description**

-Except for the Borrower's Fiscal Year during which the Loan Agreement shall become effective (for which the deadlines below shall be one month and 2 months after the Effective Date, respectively), the Project Implementing Entity shall: (a) prepare and furnish to the Bank by not later than March 31 of each year, a draft Annual Work Plan and Budget for its Respective Parts of the Project for review and comment; (b) taking into account the Bank's comments, finalize and furnish to the Bank no later than April 30 in each year, the Annual Work Plan and Budget, acceptable to the Bank; and (c) thereafter ensure the implementation of its Respective Parts of the Project during the following Fiscal Year in accordance with the Annual Work Plan and Budget agreed with the Bank and in a manner acceptable to the Bank.

(Section I.C of the Schedule to the Project Agreements with HESCO, MEPCO and PESCO)

**Sections and Description**

-Without limitation to the generality of Section 5.03 of the General Conditions, the Borrower shall cause the Project Implementing Entities to provide counterpart funds in an aggregate amount equivalent to not less than fourteen million eighty thousand Dollars (\$14,080,000), for the financing of the Project, including Land Expenditures.

(Section IV.1 of Schedule 2 to the Loan Agreement)



#### Sections and Description

-The Borrower shall ensure, at all times throughout the Project implementation period, that PPMC's mandate and functions shall not enable PPMC to be involved in the governance and management, including human resource functions, of the power distribution companies in the Borrower's territory.  
(Section IV.2 of Schedule 2 to the Loan Agreement)

#### Sections and Description

-The Borrower, through MoE, shall ensure, throughout the implementation period of the MoE's Respective Parts of the Project, that: (a) the monthly update of CDMP, approved by the Cabinet, is published on MoE's website by not later than the last day of each subsequent month; and (b) quarterly update of CDMP, approved by the Cabinet, is published on MoE's website by not later than January 31, April 30, July 31 and October 31 of each year.  
(Section IV.3 of Schedule 2 to the Loan Agreement)

#### Conditions

Type	Financing source	Description
Disbursement	IBRD/IDA	No withdrawal shall be made for payments made prior to the Signature Date, except that withdrawals up to an aggregate amount not to exceed \$15,000,000 may be made for payments made prior to this date but on or after October 1, 2021, for Eligible Expenditures under Categories (1)(a) through (1)(d). (Section III.B.1 of Schedule 2 to the Loan Agreement)



## I. STRATEGIC CONTEXT

### A. Country Context

1. **As the country starts to recover from the initial impacts of the COVID-19 pandemic, the Government of Pakistan (GoP) has made good progress in completing its second year of foundational reforms.** These reforms, supported by the World Bank Group (WBG), include efforts to restore financial viability of the power sector and lock in the transition to a low carbon footprint (supported by the Program for Affordable and Clean Energy, PACE, Development Policy Financing (DPF) series), improve fiscal management and competitiveness (supported by the Resilient Institutions for Sustainable Economy, RISE DPF series), and accelerate human capital accumulation (supported by the Securing Human Investment to Foster Transformation, SHIFT DPF series). The PACE DPF series supports the GoP to reduce circular debt (CD)<sup>1</sup> by reducing power generation costs, decarbonizing the energy mix, improving efficiency in distribution, and retargeting electricity subsidies. RISE supports measures to enhance the country's fiscal position and promote competitiveness and growth through harmonization of the General Sales Tax (GST), increased use of digital financial services, and enhanced integrity in the financial sector. SHIFT focuses on reforms to accelerate human capital accumulation, increase the contribution of women to economic activity, and improve federal safety nets to respond to shocks like COVID-19. Collectively, the PACE, RISE, and SHIFT reforms are expected to help Pakistan break out of boom-and-bust macroeconomic cycles and get on a sustainable growth path, which will in turn facilitate sustainable investment and generate welfare gains. The proposed investment project is designed to complement the power sector reforms and help with their implementation, particularly in terms of improved distribution efficiency, reduced losses and increased collection.

2. **Economic activity recovered in FY21, but challenges remain.** Due to low-base effects and recovering domestic demand, real gross domestic product (GDP) growth (at factor cost) is estimated to have rebounded to 3.5 percent in FY21 from a contraction of 0.5 percent in FY20.<sup>2</sup> However, fiscal and monetary tightening are expected to resume in FY22, as the government refocuses on mitigating emerging external pressures and managing long-standing fiscal challenges. Output growth is therefore projected to ease to 3.4 percent in FY22 but strengthen thereafter to 4.0 percent in FY23 with the implementation of key structural reforms, particularly those aimed at sustaining macroeconomic stability, increasing competitiveness, and improving financial viability of the energy sector. Inflation is projected to edge up in FY22 with domestic electricity tariff hikes and higher oil and commodity prices before moderating in FY23. The current account deficit is projected to widen to 2.5 percent of GDP in FY23 as imports expand with higher economic growth and oil prices. Exports are also expected to grow strongly after initially tapering in FY22, as tariff reform measures gain traction, supporting export competitiveness. Despite fiscal consolidation efforts, the deficit (excluding grants) is projected to remain high at 7.1 percent of GDP in FY22 and widen to 7.2 percent in FY23 due to pre-election spending. Implementation of critical revenue-enhancing reforms, particularly the harmonization of the GST, will support a narrowing of the fiscal deficit over time. Public debt will remain elevated in the medium-term, as will Pakistan's exposure to debt-related shocks. This outlook assumes that the International Monetary Fund Extended Fund Facility program will remain on track.

<sup>1</sup> The reference to circularity is because the arrears cascade from the distribution companies, single-buyer, and power producers to fuel suppliers.

<sup>2</sup> World Bank estimate. The government's preliminary growth estimate for FY21 is 3.9 percent.



**3. Power sector reforms supported by PACE and complemented by the proposed Electricity Distribution Efficiency Improvement Project (EDEIP) are critical to resolving Pakistan's fiscal challenges.**

The power sector has long been a hindrance on the economy, providing insufficient services and building up large sector deficits. Poor planning, implementation bottlenecks, and limited access to financing have created long periods of load shedding<sup>3</sup> for electricity consumers. Inadequate choice of power generation technology and inefficiencies in distribution have resulted in high costs of electricity, damaging Pakistan's competitiveness. Financial deficits with power sector state-owned enterprises (SOEs) have been building up as governments have not passed on the full cost of power to consumers. Sector deficits<sup>4</sup> have averaged 2.2 percent of GDP during the last decade (FY11–20). The power sector deficit that is not covered by subsidies is accumulated as CD, adding to the government liabilities. The CD has risen rapidly over the last three years. The total accumulated debt stock by June 30, 2021, stood at US\$14.5 billion (equivalent to 5.2 percent of GDP)<sup>5</sup> consisting of: (i) US\$8.6 billion of arrears from distribution companies (DISCOs) to Central Power Purchasing Agency-Guarantee (CPPA-G), which has corresponding payables to power generation companies; and (ii) US\$5.9 billion debt stock held in the Power Holding Private Limited (PHPL).<sup>6</sup>

**B. Sectoral and Institutional Context**

**4. Pakistan's energy reforms were initiated in the 1990s but remain unfinished.** The first stages of reform aimed to attract private investment into power generation to address growing supply deficits.<sup>7</sup> In 1997, the GoP unbundled the Power Wing of the Water and Power Development Authority (WAPDA)<sup>8</sup> into four thermal generation companies (GENCOs), one National Transmission & Despatch Company (NTDC), and 10 DISCOs, for subsequent privatization of the unbundled GENCOs and DISCOs. Hydropower assets remained with WAPDA. The National Electric Power Regulatory Authority (NEPRA) was also set up in 1997 with the responsibility for licensing, determining tariffs, creating standards, and monitoring sector performance. Electricity distribution licenses were issued to the DISCOs by NEPRA in 2002 for a 20-year period and first DISCO-wise tariffs were notified in 2007. In 2015, the single buyer function was separated from NTDC and is now the responsibility of the CPPA-G. CPPA-G's core functions include billing and settlement, power procurement on behalf of DISCOs, and market development. The institutional architecture for a modern power sector is in place, but challenges remain that prevent Pakistan from benefitting from these institutional reforms.

**5. Power supply deficit started in 2006<sup>9</sup> and in 2015 these power outages caused an estimated economic loss of US\$18 billion or 6.5 percent of GDP.<sup>10</sup>** The problem of supply deficit was largely addressed by 2018 through rapid development of thermal power plants and FY20 was the first year

<sup>3</sup> Forced blackouts due to power supply deficits.

<sup>4</sup> Defined as difference between the cost of delivering electricity and the revenues generated from its distribution.

<sup>5</sup> PKR 2,280 billion as of June 30, 2021; currency exchange PKR:US\$1=156.45 Rs; GDP 46,530 billion for FY21.

<sup>6</sup> The PHPL is used for raising local bank loans and Islamic Sukuks to cover parts of the sector deficit.

<sup>7</sup> Hubco was the first Independent Power Producer (IPP) that was commissioned in 1997 and presently about 60 percent of installed capacity is owned by the private sector.

<sup>8</sup> Historically, there were two vertically integrated electric utilities operating in Pakistan that were responsible for generation, transmission and distribution in their exclusive territories – Karachi Electric Supply Company (KESC, now referred to as K-Electric or KE) served the city of Karachi and its surrounding areas and WAPDA for the rest of Pakistan.

<sup>9</sup> Load shedding in the early 2010s was as high as 8–10 hours per day during the high demand summer season.

<sup>10</sup> Zhang, Fan. 2019. *In the Dark: How Much Do Power Sector Distortions Cost South Asia?* South Asia Development Forum. Washington, DC: World Bank. <https://www.doi.org/10.1596/978-1-4648-1154-8>.





without a power supply deficit.<sup>11</sup> Financial deficit, on the other hand, started to grow at an accelerated rate. While the electricity supply was increasing, performance of the DISCOs to reduce transmission and distribution (T&D) losses and improve collection improved only marginally. As a result, the number of units lost increased further. Moreover, the average cost of generation was also going up and therefore each lost unit was of a higher value. The two main reasons for increase in per unit cost of generation between 2018 and 2020 are: (i) demand did not grow as anticipated and capacity at a fixed cost remained underutilized; and (ii) the Rupee depreciated resulting in higher fuel costs as well as US dollar indexed returns allowed in the Power Purchase Agreements (PPAs). The financial deficit also grew because the high cost of generation was neither fully passed on to the consumers nor were the subsidies adequately budgeted and paid. These deficits added to the CD and were further compounded by the late payment penalties to generators and interest on debt raised to finance these deficits.

6. **The solutions to CD are known but Pakistan has so far failed to implement them.** The 2013–18 government had a program to reduce CD. However, pressure to implement difficult structural reforms eased because of windfall gains from a stable Rupee and decreasing oil prices in 2015–16. Importantly, the focus on rapidly increasing generation to solve load shedding led to rapidly increased fixed costs of power generation when the committed new coal and liquefied natural gas (LNG) plants started to come online in 2018. The COVID-19 pandemic further accentuated the problem as: (i) the GoP interrupted its plans of increasing consumer tariffs and decided to freeze tariffs while generation costs continued to rise; (ii) consumer willingness to pay decreased and thus collection of bills declined; (iii) anti-theft programs were interrupted due to restrictions to field work and distribution losses increased; and (iv) liquidity needs to finance COVID-19 measures reduced the fiscal space to provide subsidies to compensate lower tariff revenues and to reduce CD stock. There was thus a record accumulation of CD (US\$3.4 billion) in FY20.

7. **The GoP has now taken a more holistic and comprehensive approach to reducing CD, which has replaced load shedding as the priority challenge in the energy sector.** The record CD flow in FY20 showed that the focus on short-term measures were not sufficient. Exogenous factors showed that addressing the underlying structural issues of the sector (high power costs, DISCO inefficiency, untargeted subsidies, and lack of competition) is inevitable to solve the CD issue in a sustainable way. Also, the problem cannot be solved without all stakeholders (producers, suppliers, consumers, government) collectively and equitably sharing the burden of reforms. The GoP has recognized this and initiated a comprehensive power sector reform package, which is supported by PACE. For the first time, the reform program covers all aspects of the sector, focusing strongly on reducing current and future power costs, reducing reliance on imported fossil fuel, adding renewable energy (RE), addressing inefficiencies in distribution, increasing private participation, and lowering subsidies in the sector by better targeting them to those most in need.

8. **Decarbonizing the energy mix by reducing dependence on imported fossil fuels is essential to lower the average power generation cost and to meet the Nationally Determined Contributions target.** Currently about two-thirds of power generation in Pakistan is from imported oil, gas, and coal, which creates exposure to foreign exchange vulnerability. High cost of electricity supply has exacerbated cost recovery challenges for the distribution companies and is a major cause of CD. The GoP supported by PACE has taken key steps to decarbonize the generation mix; the RE Policy notified in FY20 and the Indicative Generation Capacity Expansion Plan (IGCEP) approved in September 2021 stipulate increased

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<sup>11</sup> Power cuts still occur due to poor performing distribution networks or due to forced load shedding to curb non-payments of bills; however, the volume of load shedding is significantly reduced compared to previous years.





RE share in the energy mix. This will bring the share of solar, wind, hydro, and bagasse to about 63 percent by 2030, reversing the large dependence on imported fossil fuel. Also, an important part of the RE Policy and the new National Electricity Policy approved in June 2021 is the introduction of competitive bidding for all new generation projects, which will disrupt the three-decades old practice of direct contracting and cost-plus tariffs that led to high power costs.

9. **Long-term financial viability of the power sector is dependent on efficiency improvement.** Key parameters to measure electricity distribution sector performance over the last five years are given in Table 1. In FY21, total receivables reached PKR 1,266 billion, more than half of which (PKR 683 billion) were private receivables.<sup>12</sup> Between FY17 and FY21 receivable turnover has increased from 236 days to about 248 days. Consequently, CPPA-G dues from DISCOs (or DISCOs' payables to CPPA-G) have more than doubled from PKR 1,063 billion in FY17 to PKR 2,472 billion in FY21. T&D losses (sum of technical and non-technical/pilferage losses) show minor improvement and remained high compared to NEPRA targets. Non-existent incentive structures and lack of transparency in data collection and reporting are major barriers to improving governance and performance of the DISCOs. Therefore, to make the power sector financially viable the DISCOs would need to become more efficient by investing in new technologies.

**Table 1: Distribution Sector Five Year Efficiency Performance**

	FY17	FY18	FY19	FY20	FY21	AAPC
Electricity Units Received, GWh	99,391	112,509	114,086	112,911	120,192	4.9
Electricity Units Sold, GWh	81,558	91,902	93,887	92,792	99,370	5.1
T&D Losses, %	17.9	18.3	17.7	17.8	17.3	-0.9
Average Sale Price, PKR/kWh	12.41	13.06	15.58	17.49	18.29	10.2
Receivable Turnover, days	236	226	233	253	248	1.2
DISCO Receivables, PKR billion	670	818	1,050	1,202	1,266	17.2
(i) Private Consumers	347	411	542	624	683	18.4
(ii) FATA Residential Consumers	22	27	33	38	39	15.5
(iii) Balochistan Agriculture Consumers	185	232	283	306	354	17.6
(iv) Government (as a consumer)	115	147	193	234	189	13.2
CPPA-G dues from DISCOs, PKR billion	1,063	1,529	1,882	2,375	2,472	23.5

Note: Average Annual Percentage Change (AAPC)

10. **The performance varies across DISCOs.** The key contributing factors for financial losses are higher T&D losses and low collections compared to NEPRA targets, market size and cost of service determined by the regulator. In FY20, only FESCO and GEPCO met T&D loss targets set by the regulator and the variance is quite small for IESCO. The T&D losses of these three DISCOs are also less than 10 percent. In FY20, PESCO incurred maximum financial loss due to variance in T&D loss from NEPRA target. Though T&D losses for MEPCO and HESCO are high their contribution to circular debt is less because the NEPRA target for them are also high and gap is less. In FY20, PKR 54 billion is estimated to be the financial loss due to variance in T&D losses from NEPRA target that accumulated as CD. In terms of bill collection, some of the DISCOs have been able to maintain collection rate close to 94 percent but since underlying assumption is 100 percent recovery the entire non-collection (except for some small write-offs) accrues as CD. In FY20 non-collection added about PKR 200 billion to CD. DISCO-wise performance and breakup of losses is given in Table 2. Table 2 also indicates a strong correlation between losses and overloaded transformers and trippings.

<sup>12</sup> Excluding Federally Administered Tribal Areas (FATA) residential consumers and Balochistan agriculture consumers that are generally picked up by the government.



**Table 2: DISCOs Operational Performance During FY20<sup>13</sup>**

DISCO	T&D Losses - Reported, %	T&D Losses Allowed, %	Loss due to breach of T&D Loss target, PKR billion	Collection Rate, %	Loss due to non-collection, PKR billion	Combined AT&C Losses, PKR billion	Overloaded 11kV feeders	Overloaded power transformers	No. of trippings of 132kV	Consumers, million	Units Sold, TWh
<b>In Red</b>	>10%			<90%			> avg	> avg			
IESCO	8.69%	8.60%	0.2	90.3%	19.6	19.7	6%	3%	204	3.1	10.4
LESCO	12.40%	10.88%	5.9	94.5%	20.9	26.8	24%	16%	3,442	5.2	20.6
GEPCO	9.51%	10.03%	Nil	94.4%	9.5	9.5	7%	9%	91	3.7	9.9
FESCO	9.62%	10.10%	Nil	94.2%	13.3	13.3	5%	11%	314	4.4	13.1
<b>MEPCO</b>	<b>15.23%</b>	<b>15.00%</b>	<b>0.7</b>	<b>92.9%</b>	13.9	14.6	<b>15%</b>	<b>12%</b>	<b>1,889</b>	<b>6.9</b>	<b>16.4</b>
<b>HESCO</b>	<b>28.82%</b>	<b>22.59%</b>	<b>7.9</b>	<b>73.2%</b>	19.5	27.5	<b>12%</b>	<b>21%</b>	<b>418</b>	<b>1.1</b>	<b>3.9</b>
SEPCO	36.27%	29.75%	6.0	56.5%	20.8	26.8	19%	12%	828	0.8	2.7
QESCO	26.68%	17.50%	10.9	49.3%	55.6	66.6	100%	29%	436	0.6	4.8
<b>PESCO</b>	<b>38.69%</b>	<b>31.95%</b>	<b>22.5</b>	<b>87.7%</b>	19.8	42.3	<b>31%</b>	<b>36%</b>	<b>614</b>	<b>3.7</b>	<b>9.0</b>
TESCO	16.19%	12.47%	0.0	68.2%	9.0	9.0	79%	29%	80	0.4	1.8
<b>Total</b>	<b>17.82%</b>	<b>15.53%</b>	<b>54.0</b>	<b>88.8%</b>	<b>202.0</b>	<b>256.0</b>	<b>23%</b>	<b>17%</b>	<b>8316</b>	<b>30.0</b>	<b>92.8</b>

Source: State of Industry Report, DISCO Performance Evaluation Report, DISCO Performance Statistics

Note: IESCO: Islamabad Electric Supply Company; LESCO: Lahore Electric Supply Company; GEPCO: Gujranwala Electric Power Company; MEPCO: Multan Electric Power Company; HESCO: Hyderabad Electric Supply Company; SEPCO: Sukkur Electric Power Company; QESCO: Quetta Electric Supply Company; PESCO: Peshawar Electric Supply Company; TESCO: Tribal Areas Electric Supply Company

11. **Selection of DISCOs.** The proposed project is part of the Bank's overall engagement in the sector to improve distribution efficiencies, enhance private participation, and reduce CD. The better performing DISCOs have been excluded as these are good candidates to be considered for private participation (as per the GoP's approved roadmap for private sector participation, also one of the PACE-I prior actions). The key underlying issues for high losses in QESCO and TESCO are unbudgeted subsidies given to agriculture consumers in QESCO and private/residential consumers in TESCO. Addressing this issue is critical before addressing investment needs to improve efficiencies and is being addressed through better targeting of subsidies and policy actions to resolve CD supported through PACE DPF. With high losses and low collections, the selected DISCOs (HESCO, MEPCO, and PESCO) are some of the major contributors to CD and lack investments and modern management.

12. **Strengthening the poor performing DISCOs is essential to bring in private participation in the distribution sector.** KE was privatized in 2005 but privatization of the unbundled GENCOs and DISCOs could not proceed as envisaged. This was because of weak political commitment and lack of consensus, mixed experience with KE privatization, and unaddressed apprehensions of DISCO employees. Pakistan Electric Power Company (PEPCO) which was created in 1998 to steer the privatization program of the unbundled DISCOs and GENCOs failed to do so and practically held complete control over the DISCOs rendering boards and management of the DISCOs largely ineffective. Pakistan tried to privatize the DISCOs in 2015 starting with FESCO<sup>14</sup> but could not proceed due to stakeholders' concerns and opposition from workers' unions. The current government has again expressed the intention to bring in private participation in the distribution sector to reduce government liabilities. As part of the power sector reforms supported through PACE, Cabinet has approved steps for increasing private participation in the

<sup>13</sup> There have been some minor improvements in FY21. For FY21 MEPCO is at par with the NEPRA target in terms of T&D losses.

<sup>14</sup> The FESCO transaction, which was ahead of the other transactions, reached past the road show stage and interested private parties deposited their initial expressions of interest in the FESCO privatization.



management of the government-owned DISCOs. It has further supported the reconstitution of the boards of all 10 DISCOs to bring in competence from the private sector and improve the governance by increasing the number of independent directors. The boards have been given full authority and autonomy to establish the senior management without interference from PEPCO, and to make DISCOs fully accountable to regulatory requirements. An assessment of the potential mode of private sector participation was conducted, which recommended to bring in private participation either through management contracts or concessions, while the company and assets remain in ownership of the GoP. While private participation through concessions is possible to implement in a timely manner for the well-performing DISCOs, the process will take longer for the poor performing DISCOs. Investments and capacity building of the latter are crucial to stem technical and financial losses during the transition period and to make them attractive for private sector investment. Since management contracts are envisaged for the poor performing DISCOs, government will remain responsible for investments in these companies.

**13. Cost reflective tariffs are pre-requisites to ensure financial viability and enhance private participation.** In the short term, the GoP has plans to reach cost recovery by increasing electricity tariffs and retargeting electricity subsidies. Since coming into power, the current government undertook several tariff increases, which had been frozen up till then. In 2018–19, the GoP implemented a total of 17 percent increase in the electricity tariffs but halted this process due to COVID-19. As part of the updated Circular Debt Management Plan (CDMP), tariff increases were reintroduced in January 2021 with a 16-percentage increase in base tariffs. Further planned increases in base tariffs and quarterly adjustments in 2021 aim to take consumer tariffs closer to cost recovery (defined as power generation cost plus NEPRA allowed transmission and distribution losses). To ensure that non-poor and vested interests do not benefit from poorly targeted subsidies, the GoP has adopted comprehensive subsidy reforms that allow for better targeting of the poor. The reforms will be implemented in three phases. The first phase, which was part of PACE-I, introduced new categorization of the customers by dividing them into protected (bottom 40 percent) and non-protected. It further introduced new slabs among non-protected customers that would allow for a more progressive tariff increase. The second phase of the subsidy reforms (part of PACE-II) is expected to introduce a gradual reduction of the subsidies to the non-protected customers, as well as large agricultural consumers. In the third phase, DISCO meters and Computerized National Identity Card data are expected to be integrated with National Socio-Economic Registry in order to better identify poor households and deliver subsidies through the Ehsaas program (direct cash transfers).

**14. The development of the wholesale competitive electricity market is equally important and will require further strengthening of DISCOs.** Following NEPRA's 2018 amendment, CPPA-G developed a wholesale electricity market conceptual design, which has been approved by NEPRA. The target date for the commencement of the commercial operation of the wholesale market is April 2022. For effective functioning of the wholesale markets DISCOs are in the process of setting up Market Implementation and Regulatory Affairs Department, which will be responsible for overall implementation of DISCO actions under Competitive Trading Bilateral Contract Market (CTBCM). It will ensure compliance of the regulatory directions for power market, oversee the transmission planning and forecasting activities within DISCOs, facilitate tariff petitions for supply and network businesses, management of credit cover/guarantees, lead the contract negotiations with generators and administration of bilateral contracts and participation in all regulatory hearings, workshops, and meetings to represent views of the respective DISCOs with regard to the implementation and operations of the competitive electricity market.



15. **Investment in climate-resilient electricity distribution infrastructure is important to ensure reliable supply of electricity.** Based on ND-Gain Country Index,<sup>15</sup> Pakistan is ranked 39th most vulnerable country and 27th least ready to manage the impacts of climate change. The frequency and intensity of extreme climate events are expected to rise, increasing disaster risk, particularly for vulnerable poor. The country could face up to US\$3.8 billion in economic loss due to climate change. In the past, high precipitation, floods, landslides, and dense fog have damaged transmission and distribution lines interrupting power supply and leading to long hours of power outages. Given this context, it is important for all the DISCOs to consider climate risks in system expansion and modernization, such as through shifting to climate resilient equipment (e.g. composite/polymer insulators as oppose to porcelain) and smart technologies/solutions (e.g. switch shunt capacitors and Internet of things) that can withstand the impact of climate events or quickly recognize and address disruption.

### C. Relevance to Higher Level Objectives

16. **The EDEIP is aligned with the WBG's Country Partnership Strategy (CPS) for Pakistan FY15–20<sup>16</sup>.** The proposed project supports Results Area I (Energy) of the CPS (Report No. 84645-PK) and the Performance and Learning Review (Report No. 113574). EDEIP also responds to Pillar 4 (Strengthening Policies, Institutions and Investments for Rebuilding Better) of the WBG COVID-19 Crisis Response Approach Paper. Moreover, as Pakistan moves towards achieving the RE targets set out in the RE Policy, the EDEIP will help strengthen the transmission and distribution network of the DISCOs to supply this power to the end-consumers. The rollout of CTBCM supported under the project is also expected to have a positive impact on investments in low-cost solar and wind energy projects.

17. **The EDEIP is consistent with the GoP's National Electricity Policy (NEP) 2021.** NEP lists three key objectives—access to affordable electricity, energy security, and sustainability. The project will help achieve these objectives following key principles also laid down in the NEP—improve efficiency of the distribution companies through improved governance, increase transparency and availability of reliable data through automation and digitization of processes, build competition through development of the wholesale market, and improve performance of DISCOs to ensure financial viability of the power sector.

18. **The project forms part of the Bank's broader program to address climate change in the power sector.** The Bank's approach is focused around: decarbonization of the energy sector through renewable energy, improvement of both demand and supply side efficiency, industrial decarbonization and building resilience in the energy sector. It is also consistent with WBG's Climate Change Action Plan (CCAP) 2021–2025 and Green, Resilient, and Inclusive Development approach as it has the objective of “Building Back Better,” as reliable supply of electricity is imperative for effective response to the COVID-19 crisis across different sectors including health and education. The project will also contribute towards achieving Pakistan's Updated Nationally Determined Contributions<sup>17</sup>, particularly high priority actions related to Mitigation, as the reduction of T&D losses and theft control measures will require lesser generation from fossil fuel to meet demand that will reduce emissions by about 16.97 million tonnes of carbon dioxide equivalent (MTCO<sub>2e</sub>) over 30 years.

<sup>15</sup> ND-GAIN Country Index summarizes a country's vulnerability to climate change and its readiness to improve resilience. The details can be found at <https://gain-new.crc.nd.edu/country/pakistan>.

<sup>16</sup> The Pakistan Country Partnership Strategy (Report No. 84645-PK) was extended to FY20 in the Performance and Learning Review 2017 (Report No. 113574), and through FY21 by WBG Management as part of the pandemic response.

<sup>17</sup> <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pakistan%20Updated%20NDC%202021.pdf>



19. **The project will contribute to both the GoP's climate adaptation and mitigation efforts as part of Pakistan's Nationally Determined Contributions.** The key climate change risks to project activities include extreme temperature, heavy precipitation, flash floods, and landslides in the areas served by the selected DISCOs. The climate disaster risk screening is moderate but if not managed adequately, the climate change events can impact the capacity of DISCOs to provide electricity. Project investments will be designed to adapt to and address present and future climate change-related risks and impacts – particularly extreme temperature, heavy rainfall, and risk of landslides in some areas – by introducing measures in the infrastructure investments. Mitigation efforts will include hardening of electricity distribution network to build climate resilience. Use of aerial bundled cables, composite insulators and smart grid technologies are expected to result in additional climate resilience benefits.

## **II. PROJECT DESCRIPTION**

### **A. Project Development Objective**

#### **PDO Statement**

The project development objectives are to improve operational efficiency in targeted areas of selected distribution companies and achieve progress on the power sector reform agenda.

#### **PDO Level Indicators**

20. There are six PDO level indicators for each selected DISCO.<sup>18</sup> These indicators are: (i) System Average Interruption Duration Index (SAIDI); (ii) System Average Interruption Frequency Index (SAIFI); (iii) Transformer Damage Rate; (iv) Transmission and Distribution (T&D) losses; (v) Current Collection Rate; and (vi) Multi-year Tariff (MYT). SAIDI and SAIFI are the two indicators to measure reliability of electricity supply and will be supplemented by transformer damage rate. T&D losses and collection rate will help capture the commercial performance and provide good insights into financial performance also. MYT will improve transparency and predictability of tariff and is a key triggering factor to improve bankability and enhance private participation. The four PDO level indicators, SAIDI, SAIFI, T&D Losses and collection rate are also evaluated and reported by NEPRA in its annual distribution performance evaluation reports that are disclosed publicly. T&D losses and collection rate are also the two main indicators being monitored under CDMP. A seventh PDO level indicator is on implementation of electricity market reforms leading to retail competition as a key reform action. These outcome indicators will be supplemented by intermediate indicators to measure implementation progress. In addition, there are specific indicators related to gender, citizen engagement and climate change. These indicators are described in Section VII.

21. The proposed investment project components and the PDO is directly designed to support the government's power sector reforms and the PACE series. The CDMP, which is one of the prior actions of PACE, has specific goals set for improving operational efficiency of DISCOs, which are guiding the indicator goals of the operation. These improvements in efficiency will reduce the CD through reduced technical and commercial losses of the DISCOs.

### **B. Project Components**

22. **The project will help the selected DISCOs to modernize and improve their service delivery.** This

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<sup>18</sup> Selected DISCOs are HESCO, MEPCO and PESCO. The targeted areas are the geographical areas serviced by them.



will be achieved through strengthening of the grid to improve quality of electricity supply to the consumers while reducing technical losses under Component 1 of EDEIP and modernizing operations and management of the selected DISCOs through effective use of technology and information systems to improve commercial performance and service delivery under Component 2 of EDEIP. Component 3 of EDEIP will help build capacity of the DISCOs to better perform various functions and to support project implementation. In addition, Component 4 will support the Ministry of Energy (MoE) to implement power sector reforms and improve sector governance. Further details of the activities to be carried out by each of the selected DISCOs under each component/subcomponent are described in Annex 1. The broad scope of each of the components is summarized in the paragraphs below.

**Component 1: Improving Grid Reliability (US\$89.58 million)**

23. This component will support carrying out of selected DISCOs' investment programs<sup>19</sup> aiming to improve reliability of electricity supply and reduce technical losses through:

- a. New grid stations:
  - i. in respect of HESCO, the construction of new grid stations and the associated transmission lines; and
  - ii. in respect of MEPCO, the construction of new grid stations and the associated transmission lines.
- b. Existing grid stations:
  - i. in respect of HESCO, the conversion, augmentation and/or extension of existing grid stations; and
  - ii. in respect of PESCO, the upgradation of busbars at, and/or the augmentation and/or extension of, existing grid stations.
- c. Transmission lines:
  - i. in respect of HESCO, the construction, rehabilitation and/or reconductoring of transmission lines to higher capacity conductor; and
  - ii. in respect of PESCO, the construction, rehabilitation and/or reconductoring of transmission lines to higher capacity conductor.
- d. Energy loss reduction:
  - i. in respect of MEPCO, the expansion and/or rehabilitation of feeders; and
  - ii. in respect of PESCO, the installation of switch shunt capacitors.

**Component 2: Modernizing Operations and Management (US\$44.50 million)**

24. This component will support the modernization of selected DISCOs' operations and management functions through:

- a. Automation and information systems:
  - i. in respect of HESCO, the preparation of feasibility study and rollout plan for the implementation of the supervisory control and data acquisition system;
  - ii. in respect of MEPCO, the installation of the transformer monitoring and protection system;

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<sup>19</sup> Comprising of Secondary Transmission and Grid (STG) and Energy Loss Reduction (ELR) subprojects.





and

- iii. in respect of PESCO, the upgrade of its billing, geographic information system and information technology infrastructure.

b. Revenue and equipment protection program:

- i. in respect of HESCO, the deployment of automated metering infrastructure; and
- ii. in respect of PESCO, the deployment of automated metering infrastructure, and the installation of aerial bundled cables and transformer monitoring and protection systems in feeders.

**Component 3: Capacity Building and Technical Assistance (US\$37.68 million)**

25. This component will help strengthen the institutional capacity of the selected DISCOs through:

- a. Improving operations and maintenance: in respect of each of the Selected Distribution Companies, the improvement of its operations and maintenance practices, including, *inter alia*, the enhancement and/or upgradation of safety and testing equipment; the development and/or improvement of asset and inventory management systems; provision of goods and equipment necessary for its operations and maintenance functions; the establishment and/or upgradation of transformer repair workshops; and the improvement of training centers.
- b. Training, capacity building, studies and improving gender diversity: in respect of each of the Selected Distribution Companies, the preparation and/or updates of its manuals, procedures and systems in relation to the conduct of various functions, including, *inter alia*, internal audit, human resource management, inventory management, procurement, financial management, customer services, safety, testing and maintenance of transformers, and environmental and social management; the carrying out of studies, options assessments, feasibility studies, and the preparation and implementation of pilot initiatives identified and agreed by the relevant Selected Distribution Company and the Bank and reflected in the Annual Work Plans and Budget, in relation to new technologies and/or the implementation of government policies aimed to increase the use of renewable energy and promote energy efficient measures; the carrying out of training programs, workshop and seminars to improve staff's skills; and the carrying out of activities to promote workforce participation of women.
- c. Project implementation support: in respect of each of the Selected Distribution Companies, the provision of technical and operational assistance for Project management and implementation, including, *inter alia*, the hiring of the Project implementation and management support consultant; the conduct of financial, operational and technical audits; the preparation and review of feasibility studies, design and bidding documents; and the provision of support on the implementation of environmental and social management instruments.

**Component 4: Reform Support (US\$20.43 million)**

26. This Component will support the MoE on the implementation of power sector governance and institutional reforms and electricity market reforms through:

- a. Supporting governance and institutional reforms: the provision of technical assistance and related



equipment, including the carrying out of training and capacity building activities, to support MoE in fulfilling its policy mandate under the National Electricity Policy 2021, including, *inter alia*: (i) the development of national electricity plan; information technology based monitoring system; and research and development framework; (ii) the carrying out of integrated planning, economic and policy analysis; tariff and subsidy analysis; environmental analysis and risk assessment and mitigation; and analysis to improve the existing distribution standards and systems; and (iii) the development of frameworks, tools and applications for power distribution companies.

- b. Supporting the implementation of CTBCM: the provision of technical assistance and related equipment, including the carrying out of training and capacity building activities, to support MoE on the transition to wholesale electricity market, including, *inter alia*, the setting up of an independent system operator, market operator and independent auction administrator under the CTBCM, and the strengthening of their capacities.

27. **Project cost and financing plan.** Overall cost is provided in Table 3. The total Bank financing proposed for the estimated project size of US\$209 million is US\$195 million. Cost estimates are inclusive of land acquisition and all entitlements/compensations expected in accordance with the resettlement framework and to be included in Resettlement Plans (where applicable), which will be financed by counterpart funding. Project will be financed through IBRD Loan and front-end-fee (FEF), interest during construction (IDC), and commitment fee will be charged to the loan. Unutilized funds can be reprogrammed through project restructuring for other subprojects not identified under the current scope of the project/DISCOs to maximize project benefits and fund utilization.





**Table 3: Project Cost Estimates and Financing**

Components	HESCO	MEPCO	PESCO	MoE	TOTAL
<b>1 Improving Grid Reliability</b>					
(a) New Grid Stations	12.56	19.69	-	-	32.26
(b) Existing Grid Stations	14.31	-	15.19	-	29.50
(c) Transmission Lines	2.65	-	4.25	-	6.90
(d) Energy Loss Reduction	-	15.90	5.02	-	20.92
Sub-total Component 1	<b>29.52</b>	<b>35.59</b>	<b>24.46</b>	-	<b>89.58</b>
<b>2 Modernizing Operations and Management</b>					
(a) Automation and Information Systems	-	11.93	6.93	-	18.86
(b) Revenue and Equipment Protection Program	2.98	-	22.66	-	25.64
Sub-total Component 2	<b>2.98</b>	<b>11.93</b>	<b>29.60</b>	-	<b>44.50</b>
<b>3 Capacity Building and Technical Assistance</b>					
(a) Improving Operations and Maintenance	10.58	8.48	10.10	-	29.16
(b) Training, Capacity Building, Studies and Gender Diversity	0.65	1.06	0.48	-	2.19
(c) Project Implementation Support	2.62	1.59	2.12	-	6.33
Sub-total Component 3	<b>13.85</b>	<b>11.13</b>	<b>12.70</b>	-	<b>37.68</b>
<b>4 Reform Support</b>					
(a) Supporting Governance and Institutional Reforms	-	-	-	8.00	8.00
(b) Supporting the Implementation of CTBCM	-	-	-	12.43	12.43
Sub-total Component 4	-	-	-	<b>20.43</b>	<b>20.43</b>
Total Components	<b>46.35</b>	<b>58.65</b>	<b>66.76</b>	<b>20.43</b>	<b>192.19</b>
Admin & other costs	2.32	2.78	3.34	-	8.44
<b>Total Cost</b>	<b>48.67</b>	<b>61.43</b>	<b>70.10</b>	<b>20.43</b>	<b>200.63</b>
DISCOs Share/Counterpart Funds (including land expenditure)	4.91	5.83	3.34	-	14.08
Remaining	43.76	55.60	66.76	20.43	186.55
Financing Cost: FEF + Commitment Fee + IDC	1.98	2.52	3.02	0.93	8.45
<b>Total IBRD Loan Amount (including financing cost)</b>	<b>45.74</b>	<b>58.12</b>	<b>69.78</b>	<b>21.36</b>	<b>195.00</b>
Grand Total (Counterpart Funds + IBRD Loan)	50.65	63.95	73.12	21.36	209.08

Note: (a) Financing of SCADA under subcomponent 2(a) for HESCO is subject to completion of feasibility, availability of funds, and project restructuring; (b) DISCOs' share/counterpart funds include cost of land expenditures.

### C. Project Beneficiaries

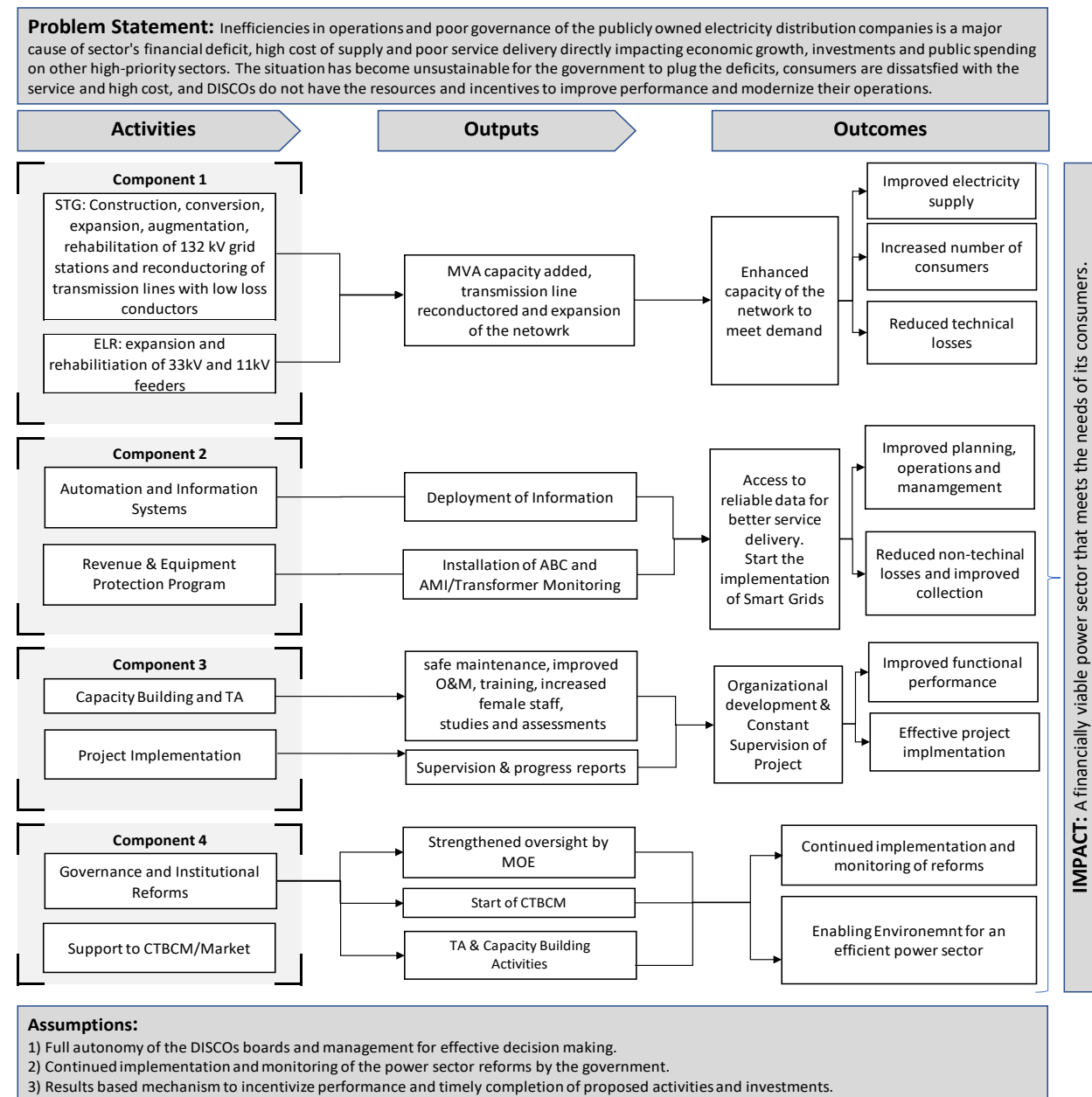
28. Project beneficiaries are all electricity consumers within the targeted areas serviced by selected DISCOs, including residential, agricultural, commercial, and industrial. Increasing the reliable supply of electricity will contribute to economic development and ease of doing business. The project will also help improve selected DISCOs financial health and reduce the reliance on government support to help create the fiscal space for spending on other sectors of the economy. The beneficiaries of Component 4 will be the consumer, who will benefit from lower cost of electricity as part of the power sector reforms and transition to the wholesale electricity market.

### D. Results Chain

29. The interventions under the project specifically aim at improving governance, technical capabilities, safety, and commercial performance of the DISCOs. It will also support MoE to implement power sector reforms, strengthen its oversight function, and support enhancing private participation in the management of the DISCOs.



Figure 1: Results Chain



## E. Rationale for Bank Involvement and Role of Partners

30. **The combination of policy operations and investment project for the distribution sector are expected to give favorable and enduring results.** The last investment project for the electricity distribution sector was approved in 2008 (for the newly created entities after the unbundling of WAPDA) (EDTIP, P115893). It was a first of a series of Adaptable Program Loan (APL). The indicative triggers for APL-2 were: (i) successful progress of APL-1; (ii) corporate autonomy of the DISCOs; and (iii) a fully functional wholesale market. None of these were met and the project closed in 2014 with an unsatisfactory rating. The Bank remained engaged on energy sector reforms through policy operations



(P128258 in 2014 and P152021 in 2015) and more recently PACE (P174553 in 2021) to support these objectives and improving distribution performance was central to all these policy operations. Specifically referring to the triggers for APL-2, the prior actions and triggers under PACE are now paving the way for greater autonomy and accountability of the DISCOs and for transitioning to the wholesale market. While PACE is rightly targeting institutional accountability and financial viability of the power sector, strengthening DISCOs' capacity and skills and improving DISCOs' service delivery and operational efficiency are also crucial to achieve these objectives. The EDEIP is designed to support the DISCOs in all of these areas through investment in physical infrastructure as well as improvement in operational performance.

31. **Investments in distribution are needed on a continuous basis and can be met through public and private funding.** Government has decided to increase private participation in the DISCOs through concession and management contracts and it is expected that by the end of 2023 at least four DISCOs will be operated by private management contracts or concessions. The most efficient DISCOs are expected to be offered for longer duration concessions where private party will be fully responsible for investments and management of the company. The DISCOs likely to be offered for concession under the first round have not been selected for EDEIP. For short duration management contracts, private participants are not expected to make any investments but takes over the management and operations of the company under some profit-sharing mechanism. While none of the DISCOs selected under the project are candidates for concession in the first round, the focus on demand growth and serving the need of consumers<sup>20</sup> will be critical to their sustainability. Therefore, until the investment responsibility is shifted to the concessionaire, public investments would be needed in the DISCOs on a continuous basis to strengthen their network, overcome system bottlenecks, improve efficiencies and also develop the financial, technical and human capacity to become a modern utility.

#### F. Lessons Learned and Reflected in the Project Design

32. Key lessons learned are drawn from the Implementation Completion and Results (ICR) Report of Bank's previous operation (EDTIP, P115893) that closed in 2014. The team also relied on Bank's regional experience of implementing automated metering infrastructure (AMI) and DISCOs own experience of installing smart meters and aerial bundled cables (ABC) cables. The project design is also aligned with the objectives, actions, triggers, and targets of the power sector reforms supported through PACE DPF. Key lessons reflected in the project design are:

- a. Implementation flexibility and competition. Design of the project is kept flexible so that during implementation the subprojects can be added or replaced. Therefore, in addition to subprojects ready for implementation during the first 18 months, the proposed project can be reprogrammed/restructured during implementation to finance additional priority subprojects after fulfilling appraisal and other requirements.
- b. Use of consultants/owner's engineer. DISCOs have weak capacity to implement and tend to perform better with the help of implementation consultant/owner's engineer. Therefore, each DISCO under EDEIP will engage a consulting firm that will support the DISCO throughout the project implementation and in preparation of new subprojects.

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<sup>20</sup> About 1 million consumers are added each year and prior to COVID-19 pandemic electricity sales between FY16 and FY19 grew by about 7 percent per annum. In FY20 electricity sales dropped by about 1 percent and first nine months data of FY21 show a remarkable increase of 6 percent in electricity sales with 9 percent for industry indicating signs of post pandemic economic recovery.



- c. New lending for power projects in Pakistan should include measures aimed at strengthening governance and addressing various market and governance risks experienced in previous World Bank (WB) funded projects in the country. Therefore, to inform the procurement strategy, the DISCOs have conducted an analysis of their past procurements to determine aspects that require improvement and to develop a better understanding of the market sectors that will participate in the project procurement. The procurement strategy developed for the Project has been informed by lessons learned and outcomes from recent INT investigations in the sector as well as by other independent procurement evaluations/reviews.
- d. Provision of capacity building, in addition to implementation TA, strengthens project sustainability. Therefore, Component 3 will not only support the implementation of project components but also enhance DISCOs' day-to-day functions and transfer of knowledge to DISCO staff.
- e. Mix of policy programs and investment projects will achieve more sustained results. This strategy is in line with the lessons learned from the 2014–15 DPF series that budget support in combination with other Bank instruments can help leverage more sustained results.
- f. Adopting smart technologies – AMI as a case study. In EDTIP AMI was part of Energy Efficiency Component that was included during negotiations. Later in 2012 (four years from approval) this component was dropped through restructuring because of slow progress and lack of clarity (e.g. technology to be used) and EDTIP closed in 2014. The key lessons learned and reflected in project design based on prior experiences are: (i) smart meter or technology driven programs require a strong buy-in from DISCOs; (ii) such interventions cannot achieve the desired results on their own and would require training and capacity building of the utility staff to effectively utilize the information; (iii) depending upon the objectives, alternatives have to be considered (e.g. if the objective is to reduce theft alternative could be ABC or ABC in combination with smart meters); (iv) better results can be achieved by phasing implementation (e.g. for smart meters targeting high-end consumers in the initial stage), (v) ensuring project success would require an effective communication strategy, (vi) retraining of redundant staff after adoption of new technology (e.g. meter readers in case of AMI) should be part of the program to address their concerns about lay-offs; (vii) DISCOs would require consultancy support to manage the overall program where they have limited or no experience; and (viii) mature technologies with proven results would be easy to implement in DISCOs with weaker capacity.

### **III. IMPLEMENTATION ARRANGEMENTS**

#### **A. Institutional and Implementation Arrangements**

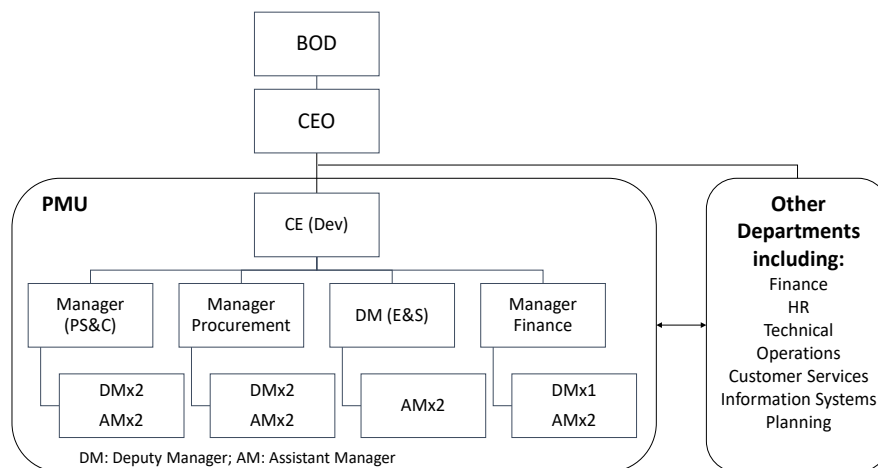
33. Components 1 to 3 of the project will be implemented by the three selected DISCOs (or Project Implementing Entities) – HESCO, MEPCO, and PESCO. Annex 1 sets forth the details of the activities under each subcomponent to be carried out by the relevant selected DISCOs. HESCO and MEPCO were also beneficiaries of EDTIP. The DISCOs already have established Project Management Units (PMUs) for project preparation, deployment of resources, implementation, monitoring, and reporting to the WB and the government. These PMUs were established in all the DISCOs for implementation of projects funded by International Financial Institutions (IFIs) including the Asian Development Bank (ADB) and the Bank and other development partners. These PMUs are fully functional with most of the positions filled. As shown in Figure 2, for each DISCO, the PMU has established four sections under Chief Engineer (Development): Planning, Scheduling & Coordination (PS&C); Procurement; Finance; and Environmental and Social (E&S) Management. EDEIP will also be implemented by these PMUs. PMUs will be supported by the Project Implementation and Management Support Consultants (PIMSC) and other individual advisors and experts



as may be required. The PIMSCs should be hired by the PMU in each of the DISCOs not later than three months after the effective date of the loan agreement.

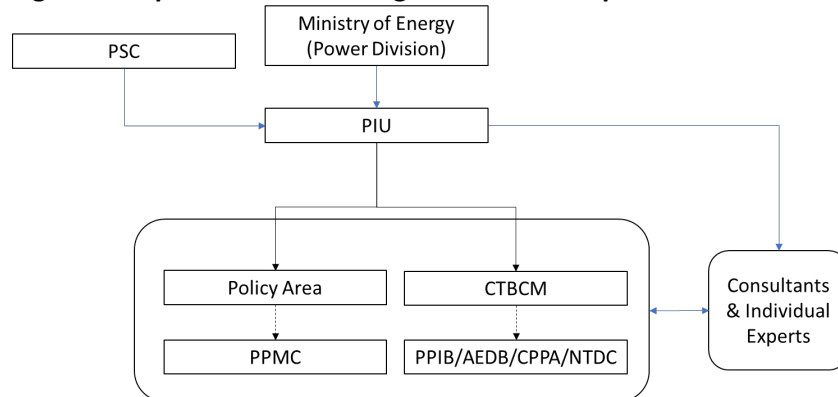
34. MoE (Power Division) will be the implementing agency and principal accounting authority for Component 4 of EDEIP. A joint secretary (or higher level) will serve as a project director of the Project Implementation Unit (PIU) and will be supported by budget officer(s) and procurement officer, to oversee financial management and procurement aspects. MoE will also designate a focal point on E&S to ensure compliance with E&S related aspects as described in the E&S management instruments. It will oversee execution of planned activities and will collaborate with relevant entities as described in Figure 3 below for their effective execution. On the policy aspect, MoE will collaborate with Power Planning and Monitoring Company (PPMC), whereas MoE will collaborate with Private Power Infrastructure Board (PPIB)/Alternative Energy Development Board (AEDB) on the work related to the Independent Auction Administrator (IAA). The setting up of the Independent System Operator (ISO) and Market Operator (MO) will involve collaboration with NTDC (as current SO) and CPPA-G, who is currently serving the role of the market operator. A Project Steering Committee (PSC) is proposed to provide high-level oversight, strategic guidance and facilitate coordination between relevant entities and departments for smooth implementation of Component 4 of EDEIP in particular and overall project implementation in general. The PSC would be chaired by Secretary Power Division of MoE with Member (Energy) of the Planning Commission, the Chief Executive Officers (CEOs) of PITC, PPMC and, if relevant, the DISCOs; representative of Privatization Commission as its members. The PSC composition is fit for purpose and other members can be coopted on a need basis. The Project Director of PIU in MoE (PD) will be secretary to the PSC. Implementation arrangements are further described in Annex 1.

**Figure 2: DISCOs PMU Organogram**





**Figure 3: Implementation arrangements for Component 4**



35. **DISCOs are public sector regulated entities performing the electricity distribution function under the oversight and monitoring by the regulators (NEPRA and Security and Exchange Commission of Pakistan) and the federal government.** DISCOs were established as public limited companies after the unbundling of WAPDA and are incorporated under Companies Ordinance 1984 (now the Companies Act, 2017) and as such are subject to the Public Sector Companies (Corporate Governance) Rules, 2013. The DISCOs are also NEPRA licensees and are subject to license conditions, rules and regulations formulated under the NEPRA Act. In addition to tariff setting, so that the DISCOs can meet its revenue requirements, NEPRA as a power sector regulator also monitors and evaluates the performance of the distribution companies and can impose penalties. These DISCOs are fully owned by the GoP which appoints the Board of Directors (BODs). In early 2021, the Power Division reconstituted the BODs of all the DISCOs. These BODs comprise of 12 members each of which at least two-third are independent directors, including two consumer representatives from civil society, and the remaining represent relevant federal and provincial government departments. The DISCOs' financial accounts are audited by the commercial auditors as well as by the Auditor General of Pakistan (AGP). The government through the MoE keeps an oversight, provides strategic direction, and monitors performance of the DISCOs. Some of this role of the government is performed by PEPCO on behalf of the Power Division, which will be transitioned to PPMC. The GoP should strengthen the oversight function for DISCOs within MoE for which some support is available under Component 4 also.

36. **The Bank will lend the funds to Pakistan through the loan agreement.** For activities under Components 1 to 3, the GoP, will on-lend relevant portions of the loan to each of the selected DISCOs through subsidiary agreements. The Bank will also enter into project agreements with each of the selected DISCOs. These loans will be made available to the selected DISCOs with the same terms and conditions, as per the re-lending policy of the Borrower.

## **B. Results Monitoring and Evaluation Arrangements**

37. The PMUs will be responsible for submitting quarterly progress reports (QPRs or Project Reports) in an appropriate format to the CEO of the DISCO, the Secretary Power Division and the Bank no later than 45 days after the end of each quarter. PMUs will prepare an annual work plan and budget (AWPB) that will provide, among others, a quarterly breakdown of planned activities to be carried out in the following fiscal year and their associated costs, and share the draft with the Bank for comments no later than one month after effectiveness and by not later than March 31 for each subsequent fiscal year. On a quarterly



basis, variance analysis will be conducted of the planned activities and their associated costs. The PMUs will be supported by PIMSC for monitoring and evaluation (M&E) of the implementation progress including implementation of the E&S instruments. The PMUs and consultants will be responsible for: (a) monitoring physical progress; (b) carrying out M&E of delivered outcomes; (c) reviewing and supervising the E&S issues identified and any mitigation measures; and (d) providing guidance to identify and resolve any issues. PIMSC's scope of work will include: (a) establishing management information systems (MIS), a geographic information system (GIS), and ICT-based monitoring and verification systems; (b) monitoring the implementation and physical progress of contracts, including E&S management; (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. The MoE will similarly submit the aforementioned progress report and AWPBs on activities and implementation progress for Component 4.

### **C. Sustainability**

38. The achievement and sustainability of project benefits depends on the continued implementation of reforms and the ability of the DISCOs to utilize, operate, and maintain the assets financed under the project and uphold the efficiency improvements.

39. The implementing agencies have proven ability to utilize, operate, and maintain the types of assets created by the project, which represent their main line of business. The most sensitive element of the sustainability aspect is the ability of the companies to achieve and sustain the expected efficiency improvements, especially to the extent at which these improvements depend on commercial discipline in the system, which the distribution companies are expected to enforce. To strengthen the companies' hands in this area, the project includes TA aimed at improving their capacity in various areas of commercial and technical operation. In addition, measures have been taken to strengthen policy environment through tariff framework, increase in tariffs and subsidies, and efforts to improve financial management of the sector through support to the wholesale market administration, provided by the Bank and other international financing institutions, especially the ADB.

40. There is a strong ownership of the project, both at the level of the implementing agencies and the government. The ownership and commitment have been demonstrated through project preparation and policy measures, some of which have significant fiscal and political costs.

## **IV. PROJECT APPRAISAL SUMMARY**

### **A. Technical, Economic, and Financial Analysis**

41. The project design caters to the needs of the selected DISCOs to better serve their customers. The project will also help improve financial health of the selected DISCOs. Detailed project description is given in Annex 1. Economic returns of the investments in STG, energy loss reduction (ELR), AMI, and ABC subprojects are significant and robust to sensitivity to changes in key input variables, such as delay in project implementation, under-attainment of the anticipated improvements, and cost escalation. As demonstrated in Annex 2, assessed investments are economically viable against the counterfactual where the distribution system continues to serve rising demand but without system upgradation and modernization efforts.





42. The benefits will be achieved primarily through increased sales, reduction in the T&D losses and improving collections. The STG program specifically targets the urban centers with unmet demand, overloaded feeders, and potential for growth. Reduction in losses translates into lower purchases of power by the utility for the same volume of electricity sold. Transformer monitoring systems and AMI would help reduce breakdown and outages thereby reducing operation and maintenance costs. Furthermore, lower power outages would also reduce the economic losses of businesses, and industries reducing electricity costs for consumers as grid electricity will replace diesel generation.

43. Component 1 will improve stability, reliability, and capacity of about 42 grid stations – 941 MVA capacity will be added, about 96 km of transmission lines will be constructed, and about 77 km of transmission line will be replaced with high capacity conductor. These subprojects are estimated to increase sales by about 2,716 GWh per annum, reduce losses by 200 GWh per annum. Component 2 will help with deployment of modern information systems and installation of ABC, AMI, and transformer monitoring system (TMS). This component will benefit all consumers of the selected DISCOs, AMI will be installed for 95,000 consumers, ABC and TMS will be installed in 60 high loss feeders of DISCOs and in MEPCO TMS will be installed on about 9,000 transformers of 200 kVA. Component 3 will help with the improvement of safety, operations, maintenance, project implementation, and various functions of selected DISCOs.

## B. Fiduciary

### Financial Management

44. PMUs have qualified staff to undertake the Bank fiduciary requirements and will be supported by the Finance Directorate of the DISCOs. A complete DISCO financial management (FM) assessment along with the capacity assessment of the Finance and internal audit department is detailed in Governance Assessment Note in the file and key points are summarized in Annex 3. Budget officers within Power Division will be assigned in the MoE to undertake activities identified in Component 4.

45. The project will mainly use the Advance and Direct Payment method of disbursements. The allocation of loan among different categories is given in Table 4. For receipt of funds, each Project Implementing Entity (PIE) (three selected DISCOs and MoE) will open and operate a segregated Designated Account (DA) in US Dollars at the National Bank of Pakistan. The DA will be operated in accordance with the provisions of "Revised Accounting Procedure for Revolving Fund Account (Foreign Aid Assignment Account)" issued by the Finance Division.

46. Disbursements will be report-based and the project will mainly use the advance method of disbursement where the funds will be front-loaded into the DA based on six months cash forecast. Initial advance into the DA will be provided by the Bank on the basis of projections for the first six months. Subsequent advances will be based on forecast for the following semester and the balance available with PIEs/MoE as reported in the Interim Unaudited Financial Reports (IUFR) submitted on a half yearly/semester basis. The project financial statements will be submitted within six months of the close of the financial year by each PIE/MoE.

47. The conclusion of the assessment is that the FM arrangements for the project have an overall **Moderate** residual risk rating. The existing FM staffing at the selected DISCOs can account for the financial transactions and generate financial reports. However, the timeliness of these financial reports is not





ascertained mainly due to infrequent board meetings and manual accounting systems in some of the selected DISCOs (HESCO). The selected DISCOs' governance and FM assessments noted weak control environments, which includes factors such as (i) lack of clarity of the board of directors regarding their roles and responsibility; (ii) weak internal audit department; (iii) poor performance monitoring and HR policies; and (iv) inadequate risk management framework. With the implementation of the action plan through Components 3 and 4 respectively, the FM and governance arrangements will be strengthened. To ensure that the project is effectively implemented, the MoE and the selected DISCOs will ensure that agreed FM arrangements (as outlined in Annex 3 Paragraph 7) are maintained throughout the project life.

**Table 4: Withdrawal Table**

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1)(a) Goods, works, non-consulting services, consulting services, Incremental Operating Costs, Training and Workshops for MoE's Respective Parts of the Project (but excluding Land Expenditures)	20,430,000	100 %
(1)(b) Goods, works, non-consulting services, consulting services, Incremental Operating Costs, Training and Workshops for HESCO's Respective Parts of the Project (but excluding Land Expenditures)	43,760,000	
(1)(c) Goods, works, non-consulting services, consulting services, Incremental Operating Costs, Training and Workshops for MEPCO's Respective Parts of the Project (but excluding Land Expenditures)	55,600,000	
(1)(d) Goods, works, non-consulting services, consulting services, Incremental Operating Costs, Training and Workshops for PESCO's Respective Parts of the Project (but excluding Land Expenditures)	66,760,000	
(2) Front-end Fee	487,500	Amount payable pursuant to Section 2.03 of this Agreement in accordance with Section 2.07 (b) of the General Conditions
(3) Interest Rate Cap or Interest Rate Collar premium	0	Amount due pursuant to Section 4.05 (c) of the General Conditions



(4) Commitment Charge and Interest During Construction	7,962,500	Amount payable pursuant to Sections 2.04 and 2.05 of this Agreement in accordance with Section 2.07 (c) of the General Conditions
TOTAL AMOUNT	195,000,000	

48. **Retroactive Financing.** Retroactive financing of up to US\$15 million for payments made against eligible expenditures under Category 1(a) through 1(d) incurred from October 1, 2021, to the Loan signing date shall be allowed provided that the procurement procedures are acceptable to the Bank.

### Procurement

49. **Procurement Regulations.** Procurement for EDEIP will be carried out in accordance with the WB's Procurement Regulations for IPF Borrowers for Goods, Works, Non-Consulting and Consulting Services (Fourth Edition November 2020). Further, the Project will be subject to the Bank's Anti-Corruption Guidelines, dated October 15, 2006, and revised in January 2011 and July 2016. Unless otherwise agreed with the WB, the WB's Standard Procurement Documents will be used.

50. **Implementation Arrangements for Procurement.** PMUs of the respective DISCOs will undertake the procurement. These PMUs have a procurement manager who reports to the Chief Engineer (Development) and is assisted by two Deputy Managers (DMs) and two Assistant Managers (AMs) (see Implementation Arrangements Section III and Figure 2). Some of the DMs and AMs positions are vacant, which will be filled by the DISCOs. In order to build the capacity of the PMUs they will be supported by PIMSC, who will help review and prepare specifications, tender design and bidding documents, and will also assist with bid evaluation and contract management. The PMUs will also be supported by the relevant departments within the DISCOs (e.g. Planning, Grid Station Construction, Material Management Directorate). Component 4, which is to be implemented by the Power Division of the MoE, primarily comprises of consultancy services to help the GoP with effective implementation of power sector reforms. Some trainings, studies, and procurement of goods, hardware, and software will also be done under Component 4 to strengthen the capacity of MoE to implement reforms and start-up of CTBCM and PPMC. Implementation arrangements for Component 4 are yet to be notified, following which PIU will be set up.

51. **Procurement Strategy and Risk Assessment.** Procurement outlays include supply and install contracts to be awarded by PMU/DISCOs; these contracts are expected to fall within the estimated cost of US\$15–30 million, for grid stations of the three DISCOs, as well as some smaller supply and install contracts (less than US\$10 million), which would be identified by the consultants. There would be some goods contracts (less than US\$5 million) too, as well as consultancy contracts not exceeding US\$5 million each. DISCOs have prepared a Project Procurement Strategy for Development (PPSD) to inform the overall procurement strategy and contract packages. The PPCSD is based on past experience of the DISCOs, independent procurement reviews and evaluation reports for EDTIP, interviews with stakeholders, and market assessments. Where feasible, subprojects are combined to minimize the number of packages and increase their value to optimize on economies of scale, which will help attract international competition and reduce procurement risks. All of the contracts under Component 1 and most under Component 2 are going to be through Supply and Install procurement method to address the issues of project management and implementation delays faced during EDTIP. In view of the expected concurrent biddings by three



DISCOs, the bidding documents will have a cross referral for qualification criteria. The WB's planning and tracking system, Systematic Tracking of Exchanges in Procurement (STEP), will be used to process and monitor procurement packages. The use of consultants to review/prepare tender design and specifications, assist with procurement/bidding, and for supervision will ensure smooth project implementation. Details of procurement outlays, risk assessment and mitigation measures are provided in Annex 1. The procurement risk rating is **Substantial** given sectoral market issues, limited market size of electric equipment manufacturers, diversity of procurement packages, multiple PIEs, and limited capacity of PMUs to manage numerous concurrent procurement packages.

### C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

### D. Environmental and Social

#### Environmental Risks and Impacts

52. The project includes physical interventions under Components 1 and 2 and capacity building related activities under Component 3 to be implemented by the DISCOs. The activities under Component 4 will mostly be focused at policy and plan levels, capacity building, purchase of equipment, and consultancies by PD. The project initiatives by selected DISCOs to improve operational efficiency and reliability of the electricity distribution system of the selected DISCOs will also have some environmental impacts as well as climate change gains associated with possible reduction in fossil fuel consumption and reduced reliance on costlier, inefficient, and more polluting backup power generation alternates. The environmental risks and impacts are typical of an electricity distribution system and include typical construction related issues such as air emissions released by construction machinery and vehicles, generation of blown up dust caused by excavations and running of project vehicles on unpaved roads/tracks, soil and water contamination caused by release of contaminants at the worksites and discharge of domestic sewage and other waste waters from temporary facilities, some limited clearing of natural vegetation and trees, and occupational health and safety (OHS) risks associated with the construction works and site specific risks such work at heights, noise, vibrations, lifting operations, overhead services. Almost all these risks and impacts are localized and temporary in nature and can easily be addressed through sound construction management, good housekeeping, and implementation of easily implementable mitigation measures. During the operation and maintenance (O&M) phase, the potential risks and impacts are mainly associated with low levels of electromagnetic radiation, OHS risks related to working at heights (towers and poles) and on live system and wires as well as related to the use and disposal of hazardous materials such as transformer oils and possibility of PCBs in obsolete transformers and sulfur hexafluoride (SF6). For O&M activities, best industry practices, reliable mechanisms, safety standards, and precautionary measures are expected to be sufficient to manage risks in a predictable manner. No physical interventions are proposed under Component 4 of the project, hence there are no direct environmental and or social impacts of these activities. However, certain activities such as conducting studies, preparing feasibility studies and formulating plans can potentially have downstream environmental impacts. While precise details of many of these activities will be worked out



during the project implementation, an initial assessment has been carried out as a part of the E&S management instruments prepared for the project. These E&S management instruments will guide the screening and the process to ensure that E&S aspects are fully integrated into these activities during the implementation. For these reasons project has been categorized as having **Moderate** risk rating.

### **Social Risks and Impacts**

53. Overall, the project is expected to promote socioeconomic benefits for the country and extend opportunities for further electrification of currently non-electrified areas, improvement of the quality of electricity supply, voltage improvement, and reduction of outages. Under Components 1 and 2 to be implemented by the DISCOs, the project activities will have small-scale land needs for the construction of new substations and temporary impacts for distribution network rehabilitation. Distribution line rehabilitation works will mostly follow the existing right of way (RoW) and construction of new substations will be carried out primarily on government-owned lands. The DISCOs prefer to use government land or purchase the land through willing buyer and willing seller arrangements. However, if this is not possible due to technical limitations, then other modes of acquisition will be used. The small areas needed for construction also offer the flexibility to shift the site in case there are social issues. Therefore, the approach will be very flexible in terms of location and area to be acquired. The social risks and issues for the rehabilitation/upgradation/augmentation works are expected to be insignificant, since only the existing RoW and land of the facilities will be used. Communities will need to be fully brought on board through effective communication and consultation for the use of ABC to increase its acceptability and avoid any risks to the project. The direct potential social impacts are limited, site-specific, largely reversible, and can be readily addressed through mitigation measures. The sexual exploitation and abuse/sexual harassment (SEA/SH) risks are assessed to be low based on the assessment done using the SEA/SH risk assessment tool. The risk assessment is based on the country and legal context, gender norms and beliefs, and national capacity to respond. In addition, several project specific factors, including project location, type of infrastructure, accessibility of women for consultations, poverty levels, accessibility for supervision of project, and others, have been considered for determining the risk levels. Risks associated with labor influx are found to be relatively manageable and with high job demand of most unskilled labor that can be sourced locally. Other social impacts and risks will be related to the limited community health and safety issues and may have some social impacts related to vulnerable groups which will be identified during the implementation phase. Component 3 to be implemented by DISCOs will mainly focus on capacity building activities. Under Component 4 to be implemented by MoE, no physical interventions are proposed, hence there are no direct social impacts of these activities. However, certain activities such as conducting studies, preparing feasibility studies and formulating plans can potentially have downstream social impacts. While precise details of many of these activities will be worked out during the project implementation, an initial assessment has been carried out as a part of the E&S management instruments prepared for the project. Based on the above assessment, the overall Social Risk Rating of the project has been assessed as **Moderate**.

54. **Environmental and Social Standards (ESSs).** Seven ESSs are relevant for the project: ESS1-Assessment and Management of Environmental and Social Risks and Impacts; ESS2-Labor and Working Conditions; ESS3-Resource Efficiency and Pollution Prevention and Management; ESS4-Community Health and Safety; ESS5-Land Acquisition, Restrictions on Land Use and Involuntary Resettlement; ESS 8-Cultural Heritage; and ESS10-Stakeholder Engagement and Information Disclosure.



55. **Environment and Social Instruments.** The implementing agencies (MOE, PESCO, MEPCO, and HESCO) have developed the Environmental and Social Commitment Plan (ESCP), a Stakeholder Engagement Plan (SEP), an Environmental and Social Management Framework (ESMF), Labor Management Procedures (LMP), and a Resettlement Framework (RF). The ESCP, which was agreed during negotiations, includes commitments to implement the ESMF, LMP, SEP, and RF during project implementation. The ESMF includes the process to integrate environmental and social considerations in project E&S instruments. The RF sets out key principles and requirements for compensation concerning any resettlement involved with project investment and provides guidance for the preparation of Resettlement Plans (RPs). Once the locations of subprojects are finalized, site specific Environmental and Social Impact Assessments (ESIAs) and Resettlement Plans (RPs) will be prepared. DISCOs will also conduct Life and Fire Safety risk and high-level security risk assessments as committed in the ESCP.

56. **Environmental and Social Management Capacity.** Each of the selected DISCO has established Environmental and Social Cells (ESCs) with sanctioned positions of one Deputy Manager (Environment) and one Assistant Manager (Social Development). HESCO and PESCO have previously implemented project financed by the Bank and other IFIs and are familiar with the safeguard requirements. However, these DISCOs are relatively new to some of the ESF elements especially related to ESSs 2, 3, and 4. OHS aspects are handled by the Safety Departments of DISCOs and are mandated to ensure regulatory compliance with electrical safety code which includes OHS issues during the construction and operation phases. While DISCOs have also initiated the implementation of the Safety Code prepared by NEPRA, its effective implementation will be assessed during the project implementation and additional measures will be considered as needed. To overcome the shortcomings identified above and to enhance capacity of implementing agencies, extensive environmental and social training will be conducted during project implementation. The MoE is also new to ESF; however, no direct environmental and or social impacts of these activities are envisaged. To augment the E&S related capacity, the MoE (PD) will designate a focal point on E&S and the training and capacity building activities conducted under Component 4 will also include trainings on E&S.

## **E. Gender**

57. **Improving Gender Diversity in DISCOs – HESCO, MEPCO, and PESCO.** The percentage of women employees in the DISCOs ranges from approximately 1–3 percent of total employees.<sup>21</sup> This figure is lower than the country average, where women work in about 3.6 percent of the power sector jobs, women's share of technical/officer level jobs is 4.6 percent, with most women working in non-technical administrative positions.<sup>22</sup> The distribution sector is especially challenging as many of the available jobs are field-based line construction and maintenance positions. An assessment of the Pakistani power sector found that women must overcome various discrimination and bias during their times as students and professionals. Some of the major barriers that contribute to the low number of qualified women in the power sector job pool include (i) negative preconceptions of careers in the power sector (i.e. male-dominated), which discourages women applicants, especially in technical field-based positions; (ii) low

<sup>21</sup> Percentage Female Staff in the DISCOs - HESCO: 2.9 percent (218/7,582), MEPCO: 2.5 percent (379/15,703) and PESCO: 1.1 percent (142/12,985) \* This is estimated/tentative data and will be updated after the planned baseline assessment survey.

<sup>22</sup> Pakistan's numbers fall on the lower end of the spectrum in South Asia, which ranges from 3.6 percent to 22 percent women employees. This trends with national level data and rankings. According to the World Economic Forum Global Gender Gap Report 2021, Pakistan's gender gap has widened as it ranked 153rd among 156 countries assessed. Pakistan is placed at 152nd in economic participation and opportunity for women, which is among the top 10 with the largest gap in this sub-index.



awareness and enrollment of girls in science, technology, engineering, and mathematics (STEM) subjects, especially in disciplines relevant to the power sector such as electrical engineering; (iii) lack of personal and technical training opportunities; and (iv) lack of gender-inclusive policies and facilities (flexi-work options, childcare centers, and transportation).<sup>23</sup> To discuss solutions to these issues, the Bank hosted a virtual WePOWER<sup>24</sup> forum for DISCOs on June 2, 2021. The event was attended by senior management of all 10 DISCOs, including panel discussants from HESCO, IESCO, LESCO, and PESCO. The active participation of the DISCOs demonstrated that they are aware of the challenges and barriers women face in the sector.

**58. The project will fund activities to increase the number and quality of jobs for women in selected DISCOs under subcomponent 3(b).** Towards this, the DISCOs will become WePOWER Partners and complete a rapid gender assessment for each DISCO to survey HR employee data and workforce planning needs. Based on the findings, each DISCO will develop and adopt a gender strategy and action plan with specific interventions to help inform their modernization efforts under the project. The DISCOs will look to (i) host career awareness outreach to female secondary school students and STEM university students to help change gender norms and encourage more women to consider careers in the energy sector; (ii) diversify training and hiring in technical/engineering and ICT related positions; and (iii) implement policies and facilities to recruit and retain women employees. The specific gender activities will be outlined in the action plans/list of activities for each DISCO to be agreed with WePOWER and the Bank, and reflected in AWPBs and can include: hiring more women in the PMU; targeting outreach for internships and in-house training opportunities to identify suitable women candidates for full-time positions; establishing a mentorship program for younger women employees to help their personal and professional growth to leadership positions; adopting a gender, diversity, and inclusion policy; improving HR systems (gender-informed PMS), building lactation rooms, providing safe transportation facilities; hosting sexual harassment awareness sessions to create a more conducive workplace for women; and job advertisements that detail hiring quotas for women and showcase facilities for women.

**59. To measure the outcome of these gender activities, the project will monitor the combined total number of female staff in the selected DISCOs** (baseline: 739 total female staff; Target: 1,814 total female staff). This will entail more than doubling the number of women from the estimated 739 women out of the combined workforce of 36,270 for the three DISCOs. The baseline data will be updated based on the planned gender assessment survey. In addition, the differentiated percentage of female staff for all grade levels, including technical and senior/management positions, percentage of female staff in trainings/capacity-building activities, and progress on WePOWER activities will be monitored by PMU for each DISCO in the quarterly progress reports. Given the challenging sector and country context, more than doubling the number of women in the three DISCOs would be a significant achievement. The 1,814 women will create a pool of much-needed mentors and role models for the next generation of women employed in the power sector.

<sup>23</sup> Please see 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.

<sup>24</sup> To help address this gender employment gap in the South Asia, the World Bank established the South Asia Women in Power Sector Professional Network (WePOWER) in 2019. WePOWER Partners implement incremental gender activities under Five Pillars: (1) STEM Education; (2) Recruitment; (3) Development; (4) Retention; and (5) Policy and Institutional Change. Please see [www.wepowernetwork.org](http://www.wepowernetwork.org).





## F. Climate Change

60. **The investments under the project qualify for climate change benefits as they will reduce T&D losses and generation required to meet the demand.** The additional sales met through the grid will also displace use of diesel for self-generation and other inefficient sources to meet energy needs. The reduction in net emissions will be availed at a very low cost of about US\$11 per ton of CO<sub>2</sub>, implying that targeted subprojects and interventions are also efficient climate mitigation investment (see Annex 2). Other environmental and health co-benefits associated with the project are reduced local pollution (SO<sub>2</sub>, NO<sub>x</sub>, soot) from not generating electricity with inefficient diesel and HFO generators. Indicators related to improving grid reliability/stability, reduction in losses, reconductoring with low-loss/high capacity conductors have been tagged for climate also.

61. **The project has been screened for climate and disaster risks using the WB's Climate and Disaster Risk Screening Tool.** Based on the screening, the project area has moderate rating of being exposed to climate and disaster risks. The project investments aim to rehabilitate and upgrade the distribution system to increase its resilience to climate change induced extreme events. Investments under Components 1 will augment the capacity of the distribution system to provide reliable and good quality electricity supply, and will help reduce technical and commercial losses, and better manage the distribution lines and transformers in the selected DISCOs. Component 2 will include investments in aerial bundled cables, which will help reduce damage to the distribution system in a climate change induced event, while deployment of AMI and improvement of information technology (IT) systems will allow DISCO staff to restore electricity supply in a shorter time as automated and remote operations pre-empt the need for the staff to travel, with equipment, to areas affected by climate change events such as storms, cyclones, or heavy precipitation that usually result in long power outages in the country. Moreover, smart grids can play a vital role in supporting the penetration of variable renewable energy while displacing thermal generation. Component 3 includes capacity building of DISCO staff to better respond to extreme weather events and mitigate and better manage the interruptions and damages.

62. **Climate co-benefits.** Activities under Components 1, 2, and 3 are all well aligned with the multilateral development banks' list of eligible climate mitigation activities under Category 2.1 *"Lower carbon and efficient energy generation – Transmission and Distribution Systems – Retrofit of transmission lines or substations and/or distribution systems to reduce energy use and/or technical losses including improving grid stability/reliability."* Component 4 will support the MoE in implementing the power sector reforms, as part of PACE I and II, to bring more efficiency and increase the share of RE in the generation mix.

## G. Citizen Engagement

63. **The project incorporates various elements to support citizen engagement (CE) to be implemented throughout the project cycle through enhanced public participation.** The project recognizes the need for meaningful and inclusive engagement with all the relevant stakeholders including the project affected parties and customers/electricity users across the selected DISCOs' areas of operations. Stakeholder consultations and citizen engagement were emphasized during project preparation and will continue during implementation. The SEP, developed to ensure meaningful consultations during the project preparation, has identified and analyzed key stakeholders and described the process and modalities for sharing information on the project activities as well as incorporating stakeholder feedback into the project design, reporting, and disclosure of project documents. The SEP



also outlines a Grievance Redress Mechanism (GRM), which will be built on the existing GRM and procedures established and operational in each DISCO to address grievances, comments, and feedback about the project. The GRM will specify the systems and requirements for grievance redress, from uptake, sorting and processing, and acknowledgement and follow-up, to verification and action, and M&E. The project design also includes using the consumer satisfactions surveys as another CE tool to close the feedback loop with beneficiaries. These surveys will assess if project interventions have resulted in improved service delivery.

## GRIEVANCE REDRESS SERVICES

64. Communities and individuals who believe that they are adversely affected by a World Bank 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](http://www.inspectionpanel.org).

## KEY RISKS

65. **Overall Risk – Substantial.** The Substantial risk is driven by the current difficult financial position in the sector, the need for sustained implementation of reforms, and substantial procurement risks associated with few suppliers of electricity transmission and distribution equipment in the local market.

66. **Political and Governance risk is rated Substantial.** The political and governance risk is rated as Substantial because of the links between the EDEIP and the power sector reforms that are aimed at improving the performance of the DISCOs and increasing private participation in the DISCOs. Implementation of NEP, proposed actions under CDMP, and retargeting of subsidies require political ownership as well as participation of DISCOs. Government has given targets and policy direction to the DISCOs and will be monitoring the performance. However, post-pandemic recovery and upcoming elections in 2023 could tend to slow down the pace of these reforms putting their continued implementation at risk. This is particularly relevant for Component 4. Secondly, since the EDEIP is targeting selected areas, overall achievement of results measured through outcome indicators will be subject to continuity of reform actions and parallel investments and other initiative DISCOs will be making to achieve these targets. The continued support of the Bank and other development partners will help keep implementation of reforms and its regular monitoring by the government on track.

67. **Sector Strategies and Policies risk is rated Substantial.** The sector is currently facing financial challenges, primarily because of non-cost reflective tariffs, high losses, and low collections. While the latter are under the control of each DISCOs, tariff levels are outside their control. The decision to notify the NEPRA determined tariffs rest with the government, which historically has delayed the notification of





a tariff, at a lower level, and instead offered subsidies to the DISCOs to cover for the difference. However, a combination of delayed tariff notification and payment of subsidies has put even more pressure on the DISCOs cash flow. If continued, this can make more difficult the implementation and financing of the much-needed investments for improved efficiencies. To mitigate for this risk, the Bank is supporting the government through the PACE DPF series. Part of the reforms, is the gradual increase of the tariffs, combined with improved tariff structure that will help better target subsidies for the poor customers. At the same time, through reforms, the government has taken measures to reduce generation cost across most of the power generators, both public and private. This will help ease the pressure on the future tariff increases. The proposed project will improve data reliability and investment planning to improve the quality of tariff petitions to NEPRA. Component 3 will support the DISCOs to comply with regulatory requirement and move towards MYT regime, which will help streamline tariff setting process and avoid the delays. MYT will improve transparency and predictability for all market players and will support future investments. Furthermore, the new NEPRA Act has introduced the principle of automaticity, which allows for tariff notification after certain number of days from the NEPRA determination.

68. **Institutional Capacity for Implementation and Sustainability is rated as Substantial.** The implementation capacity within the three DISCOs is relatively low. While the design of the project has incorporated lessons learned from previous operations to strengthen the implementation capacity, the risk still remains. The project design includes bringing in consultants that will support implementing entities in preparation and implementation of the project components. However, DISCOs will still need to hire and bring onboard these consultants, so any delay or inefficiencies in this process could still impact the outcome. The Bank team will work closely with the DISCOs to ensure they prioritize the procurement process for the consultants and ensure timely preparation of the subprojects.

69. **Fiduciary risk is rated as Substantial.** The Substantial risk rating is based on the deficiencies highlighted in Section IV above. Procurement related implementation delays could pose serious challenges to achieving the PDO. The risk mitigation measures include: (i) adequate packaging through single-stage supply and installation procurement approach; (ii) establishment of a dedicated project specific procurement committee within the PMU (not later than one month from effectiveness), with adequate protocols for confidentiality and absence of conflict of interest; (iii) engagement of consultants to supervise procurement and contract management throughout the project; and (iv) preparation of contract management plan to identify possible changes and delays. Further details are in Annex 1.

70. **All other risks are rated as Moderate.**



## VII. RESULTS FRAMEWORK AND MONITORING

### Results Framework

COUNTRY: Pakistan

### Electricity Distribution Efficiency Improvement Project

#### Project Development Objectives(s)

The project development objectives are to improve operational efficiency in targeted areas of selected distribution companies and achieve progress on the power sector reform agenda.

#### Project Development Objective Indicators

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Improving Operational Efficiency - Distribution Business							
SAIDI - HESCO (Minutes)		7,853.00	7,068.00	6,361.00	5,725.00	5,152.00	4,637.00
SAIDI - MEPCO (Minutes)		39,735.00	35,761.00	32,185.00	28,966.00	26,069.00	23,462.00
SAIDI - PESCO (Minutes)		16,033.00	14,430.00	12,987.00	11,688.00	10,519.00	9,467.00
SAIFI - HESCO (Number)		137.00	130.00	123.00	117.00	112.00	106.00
SAIFI - MEPCO (Number)		471.00	447.00	425.00	404.00	384.00	365.00
SAIFI - PESCO (Number)		200.00	190.00	181.00	171.00	163.00	155.00
Transformer Damage Rate - HESCO (Percentage)		0.51	0.46	0.41	0.37	0.33	0.30
Transformer Damage Rate - MEPCO (Percentage)		4.27	3.84	3.46	3.11	2.80	2.52
Transformer Damage Rate -		7.52	6.77	6.09	5.48	4.93	4.44



Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
PESCO (Percentage)							
<b>Improving Operational Efficiency - Supply Business</b>							
T&D Losses - HESCO (Percentage)		27.99	27.14	25.97	24.78	23.56	22.26
T&D Losses - MEPCO (Percentage)		14.93	14.75	14.60	14.50	14.40	14.30
T&D Losses - PESCO (Percentage)		38.17	36.83	35.78	34.72	33.64	33.55
Collection Rate - HESCO (Percentage)		76.70	87.00	93.00	94.00	95.00	96.00
Collection Rate - MEPCO (Percentage)		86.41	90.00	94.00	96.00	98.00	100.00
Collection Rate - PESCO (Percentage)		91.60	92.00	93.00	95.00	96.00	97.00
MYT - HESCO (Yes/No)		No	Yes	Yes	Yes	Yes	Yes
MYT - MEPCO (Yes/No)		No	Yes	Yes	Yes	Yes	Yes
MYT - PESCO (Yes/No)		No	Yes	Yes	Yes	Yes	Yes
<b>Implementation of Reforms</b>							
Implementation of electricity market reforms (Text)		Market design approved by the regulator	Creation of IAA and ISMO for start-up of CTBCM	Market based contracts implemented	Proposal prepared for electronic trading platform	Electronic trading platform introduced	Petition to reduce the threshold for bulk power consumers filed with the regulator.



### Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
Improving Grid Reliability							
New or existing grid stations with improved stability, reliability and/or capacity (Number)		0.00	0.00	0.00	13.00	27.00	42.00
HESCO (Number)		0.00	0.00	0.00	1.00	3.00	5.00
MEPCO (Number)		0.00	0.00	0.00	2.00	4.00	6.00
PESCO (Number)		0.00	0.00	0.00	10.00	20.00	31.00
MVA Capacity Added (Number)		0.00	0.00	80.00	427.00	751.00	941.00
HESCO (Number)		0.00	0.00	0.00	147.00	227.00	253.00
MEPCO (Number)		0.00	0.00	0.00	120.00	280.00	332.00
PESCO (Number)		0.00	0.00	80.00	160.00	244.00	356.00
Transmission line constructed or reconducted (Kilometers)		0.00	0.00	6.00	25.00	90.00	173.00
HESCO (Kilometers)		0.00	0.00	0.00	1.00	34.00	90.00
MEPCO (Kilometers)		0.00	0.00	0.00	3.00	7.00	34.00
PESCO (Kilometers)		0.00	0.00	6.00	21.00	49.00	49.00
Feeders with reduced losses (Number)		0.00	0.00	20.00	50.00	70.00	70.00
MEPCO (Number)		0.00	0.00	20.00	50.00	70.00	70.00
Modernizing Operations and Management							
Implementation of information technology and systems (Percentage)		0.00	0.00	14.00	52.00	93.00	100.00



Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
MEPCO (Number)		0.00	0.00	3,000.00	6,000.00	9,000.00	9,000.00
PESCO (Percentage)		0.00	0.00	20.00	40.00	80.00	100.00
Consumers benefiting from the AMI Program (Number)		0.00	0.00	15,000.00	45,000.00	95,000.00	95,000.00
HESCO (Number)		0.00	0.00	5,000.00	15,000.00	30,000.00	30,000.00
PESCO (Number)		0.00	0.00	10,000.00	30,000.00	65,000.00	65,000.00
Feeders with reduced non-technical losses (Number)		0.00	0.00	10.00	30.00	60.00	60.00
PESCO (Number)		0.00	0.00	10.00	30.00	60.00	60.00
Consumer Satisfaction (Percentage)		0.00	70.00	70.00	70.00	70.00	70.00
HESCO (Percentage)		0.00	70.00	70.00	70.00	70.00	70.00
MEPCO (Percentage)		0.00	70.00	70.00	70.00	70.00	70.00
PESCO (Percentage)		0.00	70.00	70.00	70.00	70.00	70.00
<b>Capacity Building and Technical Assistance</b>							
Application of tools, equipment, training in daily work (Text)		Limited to no exposure to international best practices on utility management and use of latest technologies and equipment.	Needs Assessment and commencement of the program	Application of acquired knowledge, tools and equipment by DISCO staff and management in their daily work.	Application of acquired knowledge, tools and equipment by DISCO staff and management in their daily work.	Application of acquired knowledge, tools and equipment by DISCO staff and management in their daily work.	Application of acquired knowledge, tools and equipment by DISCO staff and management in their daily work.
HESCO (Text)		"	"	"	"	"	"
MEPCO (Text)		"	"	"	"	"	"
PESCO (Text)		"	"	"	"	"	"
Improved Management (Text)		No clear plan exist.	Detailed assessments and preparation of implementation plans to	Continued Implementation	Continued Implementation	Continued Implementation	Continued implementation



Indicator Name	PBC	Baseline	Intermediate Targets				End Target
			1	2	3	4	
			improve various functions				
HESCO (Text)		No clear plan exist.	Hiring of PIMSC, Preparation and Approval of the Roadmap/Plan	Completion of studies & start the program implementation	Continued Implementation	Continued Implementation	Completion of planned activities.
MEPCO (Text)		No clear plan exist.	Hiring of PIMSC, Preparation and Approval of the Roadmap/Plan	Completion of studies & start the program implementation	Continued Implementation	Continued Implementation	Completion of planned activities.
PESCO (Text)		No clear plan exist.	Hiring of PIMSC, Preparation and Approval of the Roadmap/Plan	Completion of studies & start the program implementation	Continued Implementation	Continued Implementation	Completion of planned activities.
Female Staff (Number)		739.00	800.00	1,000.00	1,200.00	1,500.00	1,814.00
HESCO (Number)		218.00	250.00	281.00	345.00	472.00	535.00
MEPCO (Number)		379.00	434.00	489.00	599.00	820.00	930.00
PESCO (Number)		142.00	163.00	183.00	225.00	308.00	349.00
Grievances redressed/resolved (Percentage)		0.00	80.00	80.00	80.00	80.00	80.00
HESCO (Percentage)		0.00	80.00	80.00	80.00	80.00	80.00
MEPCO (Percentage)		0.00	80.00	80.00	80.00	80.00	80.00
PESCO (Percentage)		0.00	80.00	80.00	80.00	80.00	80.00
<b>Reform Support</b>							
Engagement of Consultants (Yes/No)		No	Yes	Yes	Yes	Yes	Yes


**Monitoring & Evaluation Plan: PDO Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
SAIDI - HESCO	System Average Interruption Duration Index	Annual	QPR	Calculated on an annual basis as per NEPRA methodology/standards.	PMU
SAIDI - MEPCO	"	"	"	"	"
SAIDI - PESCO	"	"	"	"	"
SAIFI - HESCO	System Average Interruption Frequency Index	Annual	QPR	Calculated on an annual basis as per NEPRA methodology/standards.	PMU
SAIFI - MEPCO	"	"	"	"	"
SAIFI - PESCO	"	"	"	"	"
Transformer Damage Rate - HESCO	Transformers damaged during the year as percentage of total number of transformers.	Annual	QPR	Covering all distribution transformers.	PMU
Transformer Damage Rate - MEPCO	"	"	"	"	"
Transformer Damage Rate - PESCO	"	"	"	"	"



T&D Losses - HESCO	Units lost as a percentage of units purchased.	Annual	QPR	Calculated on an annual or a 12 month period as per NEPRA methodology/standards.	PMU
T&D Losses - MEPCO	"	"	"	"	"
T&D Losses - PESCO	"	"	"	"	"
Collection Rate - HESCO	Percentage of current billed amount collected during the year.	Annual	QPR	Calculated on an annual or a 12 month period as per NEPRA methodology/standards.	PMU
Collection Rate - MEPCO	"	"	"	"	"
Collection Rate - PESCO	"	"	"	"	"
MYT - HESCO	Timely revision/updates/adjustments as may be applicable under MYT	Continuous	Petitions, Determinations and Notifications	.	DISCO
MYT - MEPCO	"	"	"	"	"
MYT - PESCO	"	"	"	"	"
Implementation of electricity market reforms	Competitive power market stages	Annual	QPR		MoE





**Monitoring & Evaluation Plan: Intermediate Results Indicators**

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
New or existing grid stations with improved stability, reliability and/or capacity	Covering new as well as conversions, extensions, augmentation, and upgradation works.	Quarterly	QPR	Grid stations where planned work has been completed.	PMU
HESCO	"	"	"	"	"
MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
MVA Capacity Added	Covering new as well as conversions, extensions, augmentation, and upgradation works.	Quarterly	QPR	New installed capacity energized.	PMU
HESCO	"	"	"	"	"
MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Transmission line constructed or reconducted	Length of the transmission line	Quarterly	QPR	Physical work completed.	PMU
HESCO	"	"	"	"	"



MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Feeders with reduced losses	Feeders selected for HT ELR proposals or other loss reduction measures.	Quarterly	QPR	Physical work completed	PMU
MEPCO	"	"	"	"	"
Implementation of information technology and systems					
MEPCO	TMS installed on 200kVA T/F				
PESCO	Upgradation of billing, GIS and IT systems				
Consumers benefiting from the AMI Program	Consumers with smart meters	Quarterly	QPR	Physical progress	PMU
HESCO	"	"	"	"	"
PESCO	"	"	"	"	"
Feeders with reduced non-technical losses	Selected feeders	Quarterly	QPR	Physical work completed	PMU
PESCO	"	"	"	"	"
Consumer Satisfaction	Percentage of the consumers who consider that project interventions have resulted in improved service delivery.				



HESCO					
MEPCO					
PESCO					
Application of tools, equipment, training in daily work	Effective use of resources and skills acquired	Quarterly	QPR	Surveys and Questionnaires	PMU
HESCO	"	"	"	"	"
MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Improved Management	Compliance with Code of Corporate Governance and regulatory requirements and implementation of plans/actions for institutional strengthening	Continuous	QPRs	Approvals, notifications and compliance statements	DISCOs/PMUs
HESCO	"	"	"	"	"
MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Female Staff	Improving gender diversity	Quarterly	QPR	Total number of female staff.	DISCO/PMU
HESCO	"	"	"	"	"



MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Grievances redressed/resolved	Registered grievances satisfactorily resolved in line with the Grievance Redress System	Quarterly	QPR	Surveys and Grievance Systems	PMU
HESCO	"	"	"	"	"
MEPCO	"	"	"	"	"
PESCO	"	"	"	"	"
Engagement of Consultants	Constant support to MoE	Continuous	QPR		MOE



## ANNEX 1: Sector Analysis, Project Description, and Implementation Arrangements

COUNTRY: Pakistan

### Electricity Distribution Efficiency Improvement Project

#### Sector Analysis

1. **Project Introduction.** The project will help improve operational efficiencies and modernize operations and management of the selected DISCOs. There are 10 state-owned DISCOs in Pakistan and one privately owned K-Electric (KE)<sup>25</sup> responsible for distribution and supply<sup>26</sup> of electricity in their respective areas. In FY20, the 10 DISCOs purchased 113 tera-watt-hours (TWh) of electricity and sold 92.8 TWh to their 30 million connected consumers. About one-fourth is lost in the technical and commercial losses. These high losses add to sector's financial deficit (aka CD), affect investments needed to ensure reliable supply of electricity, and increase cost of electricity for the consumers. Some of these losses are due to technical reasons, which is normal though high for electricity distribution system and can be reduced through improvements and investments in the distribution system while also improving the reliability of supply (i.e. Component 1 of EDEIP). Other non-technical and commercial losses can be reduced through effective use of technology and information systems (i.e. Component 2 of EDEIP). Component 3 of EDEIP will provide implementation support as well as undertake capacity building measures to improve various day-to-day functions of the DISCOs. Component 4 is to support the implementation of power sector reforms.

2. **DISCOs are state owned entities and therefore despite their poor financial performance, eroded equities and huge working capital gap are considered a going concern.** As shown in Table A1.1, DISCOs have billions of rupees in fixed assets built over years of investments and generate substantial revenues that are comparable to large corporations. However, because of chronic financial losses their equity has been depleted and is in negative. Current ratio for most of the DISCOs is less than 1 and they tend to manage their working capital by non-payment to CPPA-G for the power purchased. About one-third of the revenue is generated through subsidies in lieu of the costs allowed by the regulator but not passed on to the consumers and therefore these DISCOs are dependent on government subsidy payments to maintain their cashflows. Their net profit/loss positions are erratic because of the mismatch between the time of cost charged and its recovery through revenue. This distortion is because of the delay in tariff notifications and associated prior year adjustments, for example if costs have gone up but tariffs are not revised upwards this increase in cost will be recouped as positive prior-year adjustment in the following year's tariffs. This anomaly can be addressed by timely notification of tariffs and applying deferral account regulations as discussed in Annex 3 to make financial figures reflective of actual performance.

3. **The focus of the project is on the three of the low performing DISCOs – (i) HESCO; (ii) MEPCO; and (iii) PESCO.** The last five-years trend for these three DISCOs show a consistent increase in T&D losses

<sup>25</sup> KE was privatized in 2005 as a vertically integrated utility that supplies electricity to about 3 million consumers in Karachi and its surrounding areas.

<sup>26</sup> In 2018, NEPRA Act Amendment, distribution and supply became two distinct activities requiring separate licenses. This bifurcation will enable competitive wholesale electricity markets as envisaged under power sector reforms. For an initial period of five years (i.e. till April 2023) DISCOs are deemed to have supply license also.



and non-collection and they contributed one-third to the total CD flow in FY20. As a result of these losses, DISCOs also suffer because they are unable to meet their investment requirements and consequently, a significant number of power transformers are overloaded (HESCO: 21 percent; MEPCO: 12 percent; and PESCO: 36 percent) and tripping of feeders (11 kv and above) is quite common. In MEPCO, during FY20, there were 405,537 forced tripping with an average duration of about 7.7 minutes. In PESCO, the number of forced trippings were 29,136 but with a much higher average duration of 75 minutes and in HESCO the number of forced trippings were 54,192 for an average duration of 10.6 minutes. Therefore, in all the three DISCOs there is a need to invest in the network, implement pilferage control measures, modernize, and improve customer services.

**Table A1.1: Key FY20 Financial Figures, PKR billion**

Particulars	IESCO	LESCO*	GEPCO	FESCO	MEPCO	HESCO*	SEPCO*	QESCO*	PESCO	TESCO	TOTAL
<b>Assets:</b>											
Non-Current Assets	102	93	55	127	118	41	29	90	75	11	741
Current Assets	170	217	110	130	174	160	174	154	256	99	1,644
<b>Total Assets</b>	<b>272</b>	<b>310</b>	<b>165</b>	<b>257</b>	<b>292</b>	<b>201</b>	<b>203</b>	<b>244</b>	<b>331</b>	<b>111</b>	<b>2,385</b>
<b>Liabilities:</b>											
Non-Current Liabilities	84	224	116	144	184	51	47	48	195	24	1,116
Current Liabilities	195	256	57	123	193	272	268	392	418	108	2,281
<b>Total Liabilities</b>	<b>279</b>	<b>480</b>	<b>173</b>	<b>268</b>	<b>377</b>	<b>322</b>	<b>314</b>	<b>440</b>	<b>612</b>	<b>133</b>	<b>3,398</b>
Total Equity	(7)	(170)	(7)	(11)	(85)	(121)	(112)	(196)	(282)	(22)	(1,013)
<b>Total Equity and Liabilities</b>	<b>272</b>	<b>310</b>	<b>165</b>	<b>257</b>	<b>292</b>	<b>201</b>	<b>203</b>	<b>244</b>	<b>331</b>	<b>111</b>	<b>2,385</b>
Working Capital	(25)	(39)	53	7	(19)	(112)	(94)	(237)	(162)	(9)	(637)
<b>Revenue:</b>											
Electricity Sales-net	134	269	125	168	199	50	34	54	128	27	1,186
Subsidy from GoP	23	63	28	59	80	36	21	32	73	4	420
<b>Total Revenue</b>	<b>157</b>	<b>332</b>	<b>153</b>	<b>226</b>	<b>279</b>	<b>86</b>	<b>55</b>	<b>86</b>	<b>201</b>	<b>30</b>	<b>1,607</b>
Gross Profit/ (Loss)	10	33	10	31	31	4	(3)	(3)	1	7	122
Net Profit/ (Loss)	(12)	(2)	(12)	6	0	(11)	(17)	(65)	(20)	3	(130)

Note: \*Un-audited financial statements

4. **The operational and commercial performance of a DISCO is closely linked to the tariff regulatory framework** as applicable performance standards and efficiency targets impact the financial performance of the company. DISCOs file tariff petitions to NEPRA on annual or multi-year basis and NEPRA determination approves the DISCOs revenue requirements to cover their power purchase price (PPP), opex, capex, distribution margin, and allowed losses. The costs which are not in the control of the DISCOs are passed on through periodic adjustments – monthly fuel cost adjustments for variance in fuel cost component of PPP, quarterly adjustments for variance in other components of PPP (capacity, transmission, and variable O&M) and impact of T&D losses on PPP and prior year adjustments in base tariffs to account for under/over recovery (e.g. due to variance in sales, consumer mix, delayed notification). Accordingly, the main risk faced by the DISCO, intended as an incentive, is to perform and manage the efficiency incentive parameters allowed and approved in the tariff determination, which are mainly collection and T&D losses. The financial impact of these two key efficiency parameters is demonstrated in entity financial analysis section of Annex 2. Another cause of financial deficit to the DISCOs is due to inordinate delays in tariff notification process particularly if the costs are going up and



non-payment of committed subsidies by the government. The financial losses caused by the above-mentioned factors adversely impact the DISCOs' investment plans, as also suggested by NEPRA's evaluation, which shows that DISCOs actual investments tend to be less than planned and allowed in the tariff determination, despite high overloads experienced by their transformers and feeders. This highlights the importance on investment being adequately planned and targeted. The three selected DISCOs have filed their MYT petition for the first time and once determined and notified will streamline the tariff setting process and investment planning.

**5. DISCOs are performing two key businesses under one license:**

- (i) Distribution business i.e. responsibility of delivering electricity safely and reliably to the consumers. DISCOs, as providers of distribution network services, has the following responsibilities: distribution system planning; investment, rehabilitation and maintenance of the distribution system; connections to the distribution network; demand forecast in its license area and load profiling of its customers; system losses studies to identify, classify, and quantify losses in the distribution system and to prepare and implement loss reduction programs; and record and monitor operational performance indicators.
- (ii) Supply business i.e. interaction with the customers. The supply business mainly covers the entire revenue cycle (metering, billing, collection and management of unpaid bills, etc.) as well as providing customer services, connection management and complaint resolution.

6. The NEPRA Act Amendment of 2018 stipulate that as the electricity market in Pakistan moves towards a competitive market, DISCOs would require separate licenses for distribution network and supply business and also that each service territory can have more than one supplier. DISCOs are deemed supplier until 2023 and will remain the supplier of last resort as the implementation of CTBCM commences in phases. The separate licenses for distribution and supply implies that technical losses become the responsibility of a distribution licensee, while collection losses become the responsibility of a supply licensee. Component 1 of EDEIP aimed at improving the distribution business and Component 2 of the project is to improve the supply business. While Component 3 is for better management of corporate resources – planning, accounting, HR, procurement, logistics, day-to-day O&M activities.

**Project Description**

*Component 1: Improving Grid Reliability. This component will improve reliability of electricity supply and reduce technical losses by adding transmission and transformation capacity. The scope has two main parts: (I) Secondary Transmission and Grid (STG) works under subcomponents 1(a) for new grid stations, 1(b) for existing Grid Stations and 1(c) for transmission lines; and (II) Energy Loss Reduction (ELR) works under subcomponent 1(d). List of subprojects to be carried out by each DISCO is given in Table A1.2.*

7. **STG Works.** Subcomponent 1(a) and 1(b) will expand the network by constructing new 132 kV grid stations and increase the MVA capacity of the existing 132 kV grids stations through augmentation, extension, conversion and/or upgradation works. The construction of the associated 132 kV transmission lines are also included as part of STG works. Subcomponent 1(c) comprise of reconductoring existing 132 kV transmission lines with higher capacity lines such as high-temperature low sag (HTLS) conductors,



which has higher load carrying capacity with less weight and therefore would not require constructing new lines. Use of HTLS conductors is going to be more economical with little environmental and social impact for congested urban areas where constructing new lines will be a challenge and is expected to increase the capacity by at least 60 percent using the same towers/footprint. Component 1(d) is to reduce energy loss by expanding and/or rehabilitating the 33 kV and 11 kV feeders, deployment of shunt capacitor banks, and other works to improve the quality of supply. These STG and ELR works are the core requirements of the DISCOs distribution business to strengthen the electrical infrastructure resulting in elimination/curtailing the forced load shedding due to overloading.

8. Since 2016, installed capacity (for the CPPA-G system) has increased by more than 50 percent from 23,123 MW to 35,735 MW (as of June 30, 2020), transmission and distribution capacity has also been enhanced but not at the same pace. In 2016, 132 kV distribution system provided 1.68 MVA of transformation capacity for every installed MW, which as of June 30, 2020, is at 1.47 MVA. This declining ratio is the cause of distribution system overloading, breakdowns, and load shedding. Over this period, the percentage of overloaded power transformers has declined from 45 percent to about 16.5 percent, but a significant number of power transformers are still overloaded. The situation is worse in PESCO and HESCO, where percentage of overloaded power transformers is 36 percent and 21 percent respectively; while MEPCO had second highest number of trippings of 132 kV feeders. Therefore, the focus for the STG program is enhancing the power transfer capacity, accommodating load growth, reducing transmission losses, and improving the quality of supply of electricity to the consumers. This will not only improve the stability and reliability of the network but also enhance revenue.

9. The subprojects have been selected based on technical requirements, such as transformer loadings and load flow studies, and have been prioritized to maximize project returns and revenues to the DISCOs. The main benefit of this subcomponent is increase in sales of electricity due to enhanced transformation and transmission capacity to meet the growing demand, increase in revenue, and reduction in technical losses. The subcomponent will improve stability, reliability, and capacity of the distribution network benefiting electricity consumers. These interventions will incorporate state-of-the-art digital technologies (hardware and software) to optimize operation, maintenance, control, and protection of new and rehabilitated 132 kV grid stations with focus on their core equipment, given the critical importance of these assets in reliability and quality of service delivered by DISCOs to their customers. These subprojects are estimated to increase sales by about 2,716 GWh per annum, reduce losses by 200 GWh per annum, and – as shown in Annex 2 – will yield high economic returns.

- (i) HESCO has proposed the construction of two new GS and the associated transmission lines; one conversion of 66kV GS to 132 kV, one augmentation and/or one extension of existing GSs; and reconductoring of one TL to high-capacity conductor.
- (ii) MEPCO has proposed the construction of six new GS and the associated transmission lines.
- (iii) PESCO has proposed upgradation of busbars at 20 GSs; four extensions and/or 12 augmentations of existing GSs; and reconductoring of four TLs to high-capacity conductor.





10. **ELR Works.** Subcomponent 1 (d) is to support ELR subprojects of the DISCOs. ELR is an ongoing process in DISCOs to increase sales, improve voltage profiles, improve HT/LT ratio, reduce technical losses, reduce overloading in HT/LT network and improve electric power supply. For EDEIP:

- (i) MEPCO has proposed 70 HT proposals that involve expansion and/or rehabilitation of 11 kV feeders – 46 feeders have been selected due to overloading and 24 due to high voltage drop because of the feeder length. 30 MWs translated into 160 GWh per annum are expected to be saved.
- (ii) PESCO will be installing 11 kV capacitor banks – 12 MVAR switch shunt capacitors (complete set) at selected locations (27 grid stations have been selected and requirement will be updated during implementation).

**Table A1.2: List of Component 1 Subprojects and Key Attributes**

Sub-component	DISCO	Subproject	New + Existing GS with improved stability, reliability and capacity*	MVA capacity added	Length of Feeding T/L, km	Area Needed for GS, Acres
1(a)	(i) HESCO	Hyderabad Riverbund GIS	1	80	1.0	2.0
		Rashidabad	1	80	5.0	4.0
	(ii) MEPCO	Khanewal	1	80	1.0	8.0
		Layya 2	1	40	2.0	6.0
		DG Khan 3	1	26	3.5	4.0
		Bahawalpur 2	1	80	0.5	5.0
		Kot Samba	1	80	2.0	6.0
		Makhdoom Jahanian	1	26	25.0	4.0
1(b)	(i) HESCO	Conversion: Khipro	1	26	56.0	-
		Ext: 1 GS - 40 MVA T/F and T/B Added - Tando Adam	1	40	-	-
		Aug: 1 GS - 13MVA T/F replaced with 40 MVA T/F	1	27	-	-
	(ii) PESCO	Ext: 4 GS - 40 MVA T/F and T/B Added	4	160	-	-
		GS: 1) Rahman Baba Peshawar, 2) Mardan II, 3) Kohat, 4) Jamrud				
		Aug: 12 GS - 14x26MVA T/F replaced with 40 MVA T/F	12	196	-	-
		GS: Haripur, Jalala, Dargai, Nowshera City, Timergara, Pabbi, Kohat, Jehangira, KDA Kohat, Tangi, Hangu, Warsak				
		Upgradation of bus bars - twin bundle bus bar at 20 GS	20			
1(c)	(i) HESCO	Jamshoro-Qasimabad-Hala		0	28.0	-
	(ii) PESCO	New Wah - Hattar			28.0	-
		Shahibagh old TL			6.0	-
		Abbottabad - Murree			6.0	-
		Jamrud - Peshawar Univ.			9.0	-
1(d)	(i) MEPCO	70 HT Proposals				
	(ii) PESCO	11kV capacitor banks - 12MVAR Switch Shunt capacitors				
			<b>42</b>	<b>941</b>	<b>173.0</b>	<b>39.0</b>

\* total number is adjusted for common grid stations where multiple activities are to be carried out

11. Based on the details with respect to Component 1, HESCO will be responsible for carrying out activities under subcomponents 1(a)(i), 1(b)(i), and 1(c)(i); MEPCO will be responsible for carrying out activities under subcomponents 1(a)(ii) and 1(d)(i); and PESCO will be responsible for carrying out activities under subcomponents 1(b)(ii), 1(c)(ii), and 1(d)(ii).

*Component 2: Modernizing Operations and Management. This component will support modernization of operations and management function. It will support two distinct but linked programs to integrate*



*network planning and management solutions. Automation and Information Systems under subcomponent 2(a) and Revenue and Equipment Protection Program under subcomponent 2(b).*

12. **Automation and Information Systems.** All selected DISCOs are at different stages when it comes to use of latest technology and information system. The Distribution Grid Code requires all DISCOs transmission network to be connected with the supervisory control and data acquisition (SCADA),<sup>27</sup> which is considered a backbone for a modern electric utility, but so far none of the DISCOs have started its implementation. This subcomponent 2(a) will support the following activities:

- (i) HESCO plans to implement SCADA for all grid stations (in a phased manner starting with 30 grid stations). The project will support HESCO to conduct feasibility study and rollout plan for implementation of SCADA. The implementation of SCADA can be carried out under EDEIP subject to availability of funds, approval and project restructuring. Being rich in renewable energy resources and closer to the demand centers the jurisdiction served by HESCO has maximum concentration of variable renewable energy (VRE) projects identified in the WB's locational study. The implementation of SCADA will help integrate these variable renewable energy resources into the grid.
- (ii) MEPCO has the highest number of transformers damaged and therefore has proposed the installation of the transformer monitoring and protection system for its 9,000 transformers of 200 kVA. This will help gather the required data to inform a predictive and preventive maintenance approach.
- (iii) PESCO will be upgrading their billing, GIS, and IT infrastructure.

13. These interventions will help improve planning, grid operations and customer services by providing access to and integrating modern information systems such as Incident Management System (IMS), feeder automation, transformer monitoring and protection systems, GIS, Customer Management System (CMS), and Enterprise Resource Planning (ERP). This will also lead to the deployment of SCADA and Distribution Management Systems (DMS) during project implementation (subject to finalization of feasibility, availability of funds and required approvals, including project restructuring) to integrate these information systems and to start the implementation of smart grids.

14. **Revenue and Equipment Protection Program.** This subcomponent will be a combination of installation of ABC, AMI, and TMS for some of the high loss high revenue areas/consumers of the DISCOs and is built upon the lessons learned from the Bank's regional experience of implementing AMI and DISCOs' own experience of installing smart meters and ABC.

15. The implementation approach varies across DISCOs but are expected to give high economic and financial returns (see Annex 2). In addition to reducing non-technical losses and improving collection this subcomponent will also reduce technical losses as loading will reduce, reduce power supply as more consumers will be metered, reduce loading and technical losses, and will ensure timely access to reliable

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<sup>27</sup> SCADA is a backbone of Smart Grids and a standard for modern utilities. SCADA on 132 kV network is a mandatory regulatory requirement stipulated in the Distribution Code to monitor and control the network.



data for better planning that will reduce outages and reduce operations and maintenance cost due to overloaded system.

- (i) HESCO has selected Hyderabad and Laar Circles (where it has already installed ABC) for deployment of AMI. These are the two urban circles of HESCO comprising of high revenue industrial and commercial consumers. About 30,000, 3 kW and above consumers will benefit from the program.
- (ii) PESCO has already installed AMI for 20 kW and above consumers, which will be expanded under EDEIP to 5 kW and above consumers. About 65,000 consumers of PESCO will benefit from the program. PESCO has also selected 60 high loss feeders in Peshawar and Khyber Circles for installation of ABC and TMS. In FY20, T&D losses of these 60 feeders were about 49 percent.

16. Based on the details with respect to Component 2, HESCO will be responsible for carrying out activities under subcomponents 2(a)(i) and 2(b)(i); MEPCO will be responsible for carrying out activities under subcomponents 2(a)(ii); and PESCO will be responsible for carrying out activities under subcomponents 2(a)(iii) and 2(b)(ii).

*Component 3: Capacity Building and Technical Assistance.*

17. There are three focus areas covered through respective subcomponents: (a) improving operations and maintenance; (b) training, capacity building, studies, and improving gender diversity; and (c) project implementation support. Component 3 is an integral part of the project to help achieve the development objectives. Using transformer as an example, Component 1 will improve grid reliability by adding transformation capacity, Component 2 will tend to reduce transformer damages by enabling preventive maintenance and Component 3 will put a system in place for better maintenance and asset management. Similarly, all three components will be contributing to reduction in T&D losses – Component 1 will reduce technical losses, Component 2 will target non-technical losses, and Component 3 by enhancing the staff skills through training and provision of resources to tackle theft and better system planning. Component 3 will also support in the implementation of subproject and the role of PIMSC is going to be particularly relevant to maximize effectiveness in the use of technology and AMI. The scope of subcomponent 3 activities is the same across all three selected DISCOs.

18. For subcomponent 3(a), the selected DISCOs have shared their detailed proposal which includes the enhancement and/or upgradation of safety equipment (e.g. bucket mounted trucks, gloves), and testing equipment for M&T, GSO, and GSC; upgradation of transformer repair workshops; improvement of training centers; stock of essential running items/goods; development and/or improvement of asset and inventory management systems.

19. Subcomponent 3(b) will be used to improve various functions in the DISCOs. One of the key interventions would be to carry out studies and assessments for mini-grid and standalone system to serve isolated areas in an optimal manner. For example, VRE Locational Study carried out by the Bank shows that there is significant distributed energy potential in MEPCO and HESCO areas. Coincidentally these DISCOs also have a sizeable unelectrified population. This subcomponent will support the DISCOs to conduct feasibility studies for mini grids and standalone systems. Furthermore, it will help the selected



DISCOs to streamline the processes for greater penetration of net metering/grid connected rooftop solar and carry out assessments and feasibility studies, on battery storage and smart grids, for increased system flexibility for integrating renewable energy, peak demand management and improved resilience of the system against climate change events. On the gender side it will support selected DISCOs to carry out activities to promote workforce participation of women.

20. Subcomponent 3(c) is to provide technical and operational assistance for project management and implementation. Hiring of Project Implementation and Management Support Consultants (PIMSC) by each DISCO will be the key activity under this subcomponent. The role of the PIMSC will include: (i) carrying out and reviewing load flow studies, demand/load forecasts, market assessments, and design, preparation of specifications and bidding documents for investments in Secondary Transmission and Grid (STG) and ELR programs of the DISCOs to improve reliability of electricity supply and reduce technical losses; (ii) development of systems and support in modernization of the DISCOs' operations and management functions using latest equipment, technology, and information systems. This includes preparation of a plan to implement automation and information systems and its rollout; (iii) effectively carry out revenue and equipment protection program comprising of ABC, AMI, and TMS; (iv) develop systems and practices to improve compliance with regulatory requirements; and (v) carry out a well-structured training and capacity building program for the DISCOs. In addition, the support under this subcomponent will also include, among others, the conduct of financial, operational and technical audits; the preparation and review of feasibility studies, design and bidding documents; and the provision of support on the implementation of environmental and social management instruments.

#### *Component 4: Reform Support*

21. The purpose of the Component 4 is to support MoE (PD) fulfill its policy mandate under the National Electricity Policy 2021 and implement power sector reforms. This component consists of two main subcomponents: (a) supporting governance and institutional reforms; and (b) supporting transition to wholesale electricity market through commencement of the CTBCM, as described below:

- a. Supporting governance and institutional reforms: The PD is in the process of consolidating all policy related activities that are currently being conducted by different parts of the sector entities, into one centralized location that will be dedicated to supporting PD in development of policies, strategic plans, frameworks, monitoring, and other activities. Towards this end, PD<sup>28</sup> will collaborate with Power Planning and Monitoring Company (PPMC), a newly established entity as a result of PEPCO restructuring. PPMC's role will not involve any management of the DISCOs operation but will be focused primarily on the monitoring of the DISCOs performance, providing policy direction, conduct research and development, carry out strategic studies, sector assessments, analysis, audits, feasibilities for new technologies, etc., all with the aim of improving DISCOs processes and efficiency. With the reconstitution of boards of DISCOs (part of PACE-I), they have been given more autonomy, at both, board, and management level, including HR functions. The GoP's (through the PD) role is now to monitor their performance to improve their efficiency

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<sup>28</sup> According to the National Electricity Policy 2021, Ministry of Energy (Power Division) may designate any entity (or entities) to perform its policy mandate.



regarding technical and commercial losses in line with goals set in the CDMP. This subcomponent will provide TA and related equipment, including the carrying out of training and capacity building activities, to support the MoE in fulfilling its policy mandate under the National Electricity Policy 2021, including, among others: (i) the development of national electricity plan (PACE-II Prior Action); IT based monitoring system; and research and development framework; (ii) the carrying out of integrated planning, economic and policy analysis; tariff and subsidy analysis; environmental analysis and risk assessment and mitigation; and analysis to improve the existing distribution standards and systems; and (iii) the development of frameworks, tools and applications for power distribution companies. Table A1.3 below provides a list of specific activities.

**Table A1.3: List of Key Activities Under Component 4**

Type of work	Financing
Software support	Simulation tools and models Monitoring and Evaluations platforms Power Information Systems ICT Plan Global subscription
Hardware support	Office equipment, supplies, furniture
TA	Initial funds required for R&D fund Establishment of Center of Excellence
Consultancies	Institutional restructuring/transformation Functions development Business processes Legal consultancies
Training and capacity building	

- b. Supporting the implementation of CTBCM: The MoE (PD) is also in the process of the implementation of electricity market reforms to transition from existing single-buyer market to a competitive wholesale market. The initial market design was approved by NEPRA in December 2020 and it is expected to commence operation in April 2022. The progress towards commencement is monitored through a Market Implementation and Monitoring Group, led by Secretary PD and Chairman NEPRA. There are a number of activities already ongoing to accommodate this transition, including new Grid Code and new Commercial Code (both part of PACE-II prior actions). Furthermore, there are some key institutions that are in the process of being established and that will be supported through this subcomponent, such as ISO, MO, and IAA. Towards this end, the PD will collaborate with AEDB/ PPIB,<sup>29</sup> CPPA, and NTDC to implement this subcomponent. The IAA will be a new entity responsible for running the competitive auctions for new capacity procurement / new contracts of DISCOs. It will be established as part of AEDB/PPIB restructuring. The establishment of the ISO and MO will involve organizational restructuring of NTDC and CPPA, whereby MO function of CPPA-G and System Operator (SO) function of NTDC will be restructured into separate legal entities.

<sup>29</sup> The Cabinet has approved the proposal for a merger of AEDB and PPIB. While the amendments to the respective Acts still need to take place, the two companies have started operating under one Managing Director.



The approved design of the wholesales competitive market is based on a gross pool with security constrained economic dispatch, allowing for real time trading with ex-post settlements. The key products are energy and capacity. The resource adequacy is ensured through capacity obligations and centralized auction. The transition from a single buyer to a wholesale market expands the definition of the buyers, whereby eligible buyers include DISCOs supplying retail customers and other bulk consumers consuming above 1 MW. The design allows for the merchant plants to be part of the market from day one, who will sell the electricity on the take-and-pay basis. The market penetration, however, is expected to be gradual.

The key service providers will be, wire business (transmission and distribution), MO, ISO, Special Purpose Trader (SPT), and IAA. This subcomponent will focus on support in setting up of an ISO and IAA. The subcomponent will provide TA and related equipment, including the carrying out of training and capacity building activities, to support MoE on the transition to wholesale electricity market, including, inter alia, the setting up of an ISO, MO, and IAA under the CTBCM, and the strengthening of their capacities. The IAA will be a new entity responsible for running the competitive auctions for new capacity procurement / new contracts of DISCOs. It will be established as part of the AEDB/ PPIB restructuring. The strengthening of the IAA is considered to be an ongoing exercise and is expected to continue even after the IAA registration is completed. Once PPIB assumes the role of IAA, it could highlight some new areas where it may require capacity building and training of existing staff as well as developing new IT infrastructure. The subcomponent will further support PPIB with technical, financial, and legal consultants in developing new market contracts as market evolves. The establishment of the ISO, who will establish marginal prices for trading including settlement of imbalances; and MO, will involve organizational restructuring of NTDC and CPPA, whereby MO function of CPPA-G and SO function of NTDC will be restructured into separate legal entities. The consultancy support will also focus on the implementation of the restructuring plan and assistance in the creation of associated documentation such as organizational structures, core functions, business process maps, including manuals and procedures. While not supported through the proposed project, CPPA will further be restructured to establish SPT.

### **Fiduciary Assessments and Implementation Arrangements**

22. **Procurement Assessments, Strategy and Plan.** Since their formation, the selected DISCOs have gained substantive experience to carry out procurement for the projects financed by IFIs – the ADB's power distribution enhancement investment program (Tranche 2) closed in 2019 and MEPCO and HESCO were two of the recipients of the WB financed EDTIP. Each DISCO has prepared a PPSD that has to be agreed with the Bank. PPSD takes into consideration, among other things, market situation, previous experience, operational context, and associated risks. Procurement Risk for the project is assessed as Substantial, with the mitigation plan given in the Table A1.4.

23. PMUs within selected DISCOs, will be responsible for respective procurements in accordance with the agreed Procurement Plan. Procurement Plan for the first 18 months has been prepared as part of PPSD. Key features of major procurement packages are described below:



- All works and goods contracts will be procured through international competitive bidding because of size and/or market conditions following single-stage, one envelope selection method (with pre-qualification for large value contracts).
- Procurement of services of PIMSCs will be through quality and cost-based selection method.

**Table A1.4: Procurement Risk Mitigation Plan**

No.	Risk Area	Mitigation measure	Responsibility	Timeline
1	Decision making	i. PDs/Chief Engineers delegated with authority for project related decision making ii. Each DISCO will form within the PMU, a dedicated procurement committee headed by Chief Engineer (Development) with members from relevant departments of the DISCOs to conduct bid evaluation iii. Members will sign a COI and confidentiality protocol	DISCOs  DISCOs  DISCOs	One month from effectiveness One month from effectiveness  One month from effectiveness
2	Design adequacy and cost estimation	i. Consulting firm to be hired for design review and preparation of bid documents using internationally accepted specifications ii. Market rates to be used for estimation	PMU  PIMSC	
3	Procurement processes, and contract management	i. Procurement documents will take cognizance of concurrent processes in qualification criteria ii. Contract management specialization to be considered at PMUs during implementation. iii. Contract management plans will be developed for large contracts iv. Training opportunities for key PMU staff for project management, procurement and technical areas	PMU/PIMSC  PMU  PIMSC/PMU  PMU	Continuous  Continuous  After contract award  Continuous
4	Market response	i. Project dissemination workshop for private sector ii. PQ for larger contracts to establish market confidence	PMU	Before procurements commence

### Implementation Support

24. 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 PIEs 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.

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

- Technical.** Technical inputs will be 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. In particular, support will be needed by the PIEs for implementation of Components 2 and 3. Experts will be required to review the implementation of reforms and documents/plans prepared under component 4. The Bank Team will contract individual consultants/experts for these skills. Specialist and high-level skills are required for review of the implementation plans for modernization and implementation of sector reforms supported under Component 4.

- (ii) **Financial Management and Procurement.** Intensive support including field visits, desk reviews and training will be provided by the Bank's FM and procurement specialists. The team would also help PIEs identify capacity building needs to strengthen its FM capacity and to improve procurement management efficiency. The PIEs would be provided with consulting services in this area and assistance by the PIMSC. In addition, funds are available to DISCOs under Component 3 of the project for the recruitment of specialized skills as needed.
- (iii) **Environment and Social.** The support will cover monitoring various activities to ensure full compliance with the WB's ESF and the agreed readiness criteria for subprojects related to environment and social aspects.





## ANNEX 2: Economic and Financial Analysis

COUNTRY: Pakistan

### Electricity Distribution Efficiency Improvement Project

#### Economic Analysis

1. **Project Costs:** For the purposes of this analysis, it is assumed that the subprojects proposed for Bank financing by the DISCOs are standalone projects, since each component has its own benefits and cost streams. Therefore, the analysis was carried out separately for each company's investments included in the EDEIP. For economic analysis, all costs were converted into economic values by using import prices, subtracting taxes and duties and other transfer payments. The economic life of the assets is assumed to be 30 years, as appropriate for transmission and distribution equipment. Project costs include capital and recurrent costs. Recurrent costs include operation and maintenance costs of the assets to be installed under the project, and the cost of additional electricity purchases by the entities.
2. **Project Benefits:** Most benefits come from loss reductions achieved through both technical and commercial improvements. Reducing high technical and commercial losses mitigates rising generation requirements from the grid. This results in lower purchases of power by the utility for the same volume of sales, translating into cost savings, and the potential for lower costs for consumers. The DISCOs will also achieve reductions in breakdowns and outages, and improvements in voltage profile, and in the loading of grid stations and lines. This would reduce the operation and maintenance cost as transformer monitoring system would enable the distribution company to better manage the transformers and lines. Wherever such benefits can be quantified, the economic benefits were adjusted to include the corresponding amounts.
3. **Key Assumptions:** The economic value of electricity can be derived through various methodologies – for example the costs incurred by consumers for alternate sources of power supply, willingness to pay, the cost of expanding supply through the grid. For this analysis, the cost of incremental electricity supply through the grid was taken as a proxy for the economic value of electricity. Specifically:
  - (a) Generation cost (sum of capacity and energy charges), determined by NEPRA, is taken as a proxy for economic cost of generating electricity for the economy.
  - (b) The Use-of-System charge for NTDC – as determined by NEPRA – is taken as a proxy for the economic cost of transmission services for the economy. This is derived from NTDC's revenues by removing the value of power purchases/sales.
  - (c) Similarly, the Distribution Margin reflects NEPRA's assessment of the cost of providing distribution service in each DISCO's service area.
  - (d) Electricity purchases by utilities is valued as sum of generation cost, and use of system charges, adjusted for transmission losses.
  - (e) Electricity sold by the utility to end consumers is valued at sum of generation cost, use of system charges and distribution margin.

**Table A2.1: Assumptions**

Exchange Rate as of July 2021 (PKR/US\$)	160
Standard Conversion Factor	0.96
Life of Assets	30



	years
Discount Rate	10%
O&M Cost as percentage of Capital Cost	4%
Starting load for new MVA capacity added for existing demand	40%
Per annum increase in load for MVA capacity added/sales growth	7%
Maximum load for new MVA capacity added	80%
Percentage reduction in losses for feeders after installation of ABC	25%

4. **Environmental Benefits:** The environmental benefits of additional sales and reduced losses are reduced local and global emissions. Local emissions result from power generation through diesel by the residential, commercial, industrial, and agriculture consumers who are either not connected to the grid or experience unreliable electricity and long outages due to weak distribution system. Additional sales from capacity augmentation will displace diesel generation reducing the emissions. In addition, the project will also lower emissions globally due to reduced need for purchases from energy loss reduction investments. With the reduction in technical losses, need for grid electricity generation will also reduce, bringing down emissions from power generation through coal and gas projects – contributing to around 66 percent of total power generated in the country. The total reduction in emissions expected from the project through the life of the project is estimated as 16.97 MTCO<sub>2e</sub>. The emission factors used for the analysis are given in Table A2.2 and net greenhouse gas (GHG) emissions are presented in Table A2.3.

**Table A2.2: Emission Factors**

		Coal ST	Gas CCGT	Diesel self- generation
IPCC default	Kg/GJ	94.60	56.10	74.10
converted to mmBTU	Kg/mmBTU	89.70	53.20	70.26
efficiency	%	0.34	0.50	0.40
heat rate	BTU/kWh	10,035	7,200	8,530
Emissions	kg/kWh	0.90	0.38	0.60

**Table A2.3: Net GHG Emissions from EDEIP ('000 TCO<sub>2e</sub>)**

No.	Emission Type	Baseline	Project	Net
1	Land Clearing	0	41	41
2	SF <sub>6</sub> Emissions	0	139	139
3	Generation Emissions associated with losses and diesel consumption for self-generation	43,332	0	-43,332
4	Emissions for additional sales due to increased grid capacity	0	26,176	26,176
	Total	43,332	26,356	-16,975

5. **Other Benefits:** Modernization and automation of the distribution system will improve system reliability thereby reducing the frequency and associated costs for system maintenance. Advanced metering infrastructure allows the distribution utility to manage the grid more efficiently, reducing non-



technical losses and improving recoveries. Additionally, AMI will reduce incidents of power outage and emergency incidents by reducing vulnerability of power system to shocks including natural disasters. It will also reduce the cost of replacing meters and transformers as AMI system allows DISCOs to better monitor their distribution infrastructure. The improved capabilities of personnel, through the capacity building program, and systems at the distribution companies will also better prepare them for transition of the power sector to competitive market from the current single-buyer market. The DISCOs will also be better prepared to integrate renewables and distributed generation. Lastly, investments under Component 2 and 3 will help in improving the overall accountability and transparency of the company and its ability for effective management.

6. **Results:** The Base Case results of the economic analysis are presented in tables below. These results confirm that the investments are viable and provide significant benefits to the companies, and to the economy. All components yield high economic rates of return (ERR), have positive net present values (NPVs), and the benefit/cost (B/C) ratio exceeds unity for all companies.

**Table A2.4: Economic Benefits for STG Subprojects – Subcomponents 1(a), 1(b), and 1(c)**

	Without Environmental Benefits			With Environmental Benefits		
	ERR	NPV (PKR Million)	B/C Ratio	ERR	NPV (PKR Million)	Net Emissions (MTCO <sub>2</sub> )
HESCO	37%	8,764	1.15	41%	13,615	(3.45)
MEPCO	28%	5,526	1.03	32%	5,493	(4.53)
PESCO	55%	11,611	1.15	67%	20,901	(5.13)

**Table A2.5: Economic Benefits for ELR Subprojects – Subcomponent 1(d)**

	Without Environmental Benefits			With Environmental Benefits		
	ERR	NPV (PKR Million)	B/C Ratio	ERR	NPV (PKR Million)	Avoided Emissions (MTCO <sub>2</sub> )
MEPCO	129%	15,578	33.91	153%	19,429	(1.73)

7. **Benefits of ABC** include reduction in technical losses and pre-empting theft thereby improving recoveries. Installation of transformer monitoring system will further improve reliability of power for the consumers and at the same time reduce operation and maintenance cost for the utility. The cost benefit analysis includes cost of transformer monitoring system while the benefits only include reduction in technical losses. The EIRR for ABC component in both circles is very high even without adding benefits of transformer monitoring system as shown in the Table A2.6 below.

**Table A2.6: Economic Benefits for ABC Subprojects – Subcomponent 2(b)**

	Without Environmental Benefits			With Environmental Benefits		
	ERR	NPV (Rs. Million)	B/C Ratio	ERR	NPV (Rs. Million)	Avoided Emissions (MTCO <sub>2</sub> )
PESCO						
Peshawar	146%	12,126	39.72	178%	15,578	1.54
Khyber	115%	4,516	31.33	140%	5,830	0.59



8. **Benefits of AMI** far exceed the costs as the Implementation of AMI project significantly contributes towards reduction in non-technical losses thereby decreasing the loss in cash flow because of power theft. Other benefits include reduction in operation cost for utilities and increased reliability of electricity for consumers. The cost benefit analysis for AMI component gives very high returns. The breakeven point for reduction in non-technical losses where net present value is zero is calculated as 0.56 percent showing that even a very marginal reduction in benefits will result in an EIRR equal to discount rate.

9. **Summary:** The ERR of all subprojects is higher than the hurdle rate of 10 percent with positive net present value over a 30 year duration of the project. The STG investments are estimated to increase sales by about 59.4 TWh and reduce utility's purchases by 1.13 TWh over the 30 years project life, reducing the need for expensive generation from coal and RLNG plants. Similarly, investments in ABC and ELR projects are also economically viable with very high ERR, saving 9.6 TWh over the project life. Reduction in carbon emissions is estimated as 16.97 MTCO<sub>2</sub>. The economic analysis is based on conservative estimation of benefits but there are several other benefits which would further increase the economic return.

10. **Sensitivity Analysis:** The project's ERR is robust to changes and uncertainties in key variables. The major cost component is STG investments which can be affected by the delay in project completion or increase in costs. The return of ABC and ELR project investments are not affected by project delays as the benefits accrue without delay upon project completion. STG investments however can be impacted by delays in results delivery, cost escalation, or less than anticipated growth in demand. Sensitivity analysis was done for MEPCO's STG investments. The expected benefits are substantial enough that the project remains viable even with delays up to 13 years, which is highly unlikely. The switching value for cost escalation is 51 percent. The analysis assumes load growth of 7 percent but even with a much lower growth rate of 1 percent, NPV remains positive. Similarly, STG investments for other DISCOs are also expected to robust to these parameters.

### **Project's Financial Analysis**

11. All distribution companies are regulated entities with NEPRA determining tariffs for each DISCO. The revenue requirement consists of PPP and distribution margin. PPP is a pass-through cost whereas distribution margin is for the DISCOs and it includes depreciation charge for return of assets and a rate of return for return on assets. The proposed investments will become part of the DISCOs' investment plans and tariff petitions to NEPRA to recover the cost and an allowance for return through tariff.

12. Nevertheless, the project financial analysis was carried out following a similar framework to the economic analysis, with a few key differences. The source of financial benefits and costs is the same as the source of the economic benefits and costs: the additional sale of electricity caused by the project compared to the business-as-usual scenario without the project and the reduction in purchase of electricity by DISCOs because of efficiency gains. The areas of difference and the methodology are as follows:



- The benefit of additional electricity sales is valued at the NEPRA determined tariff for each DISCO which is assumed to increase over time. Similarly cost of purchasing electricity is also assumed to increase over time at pace with inflation.
- Average collection rate of each DISCO is assumed to improve incrementally over time as projected
- The capital cost considered is inclusive of taxes, duties, and escalation.

13. The analysis shows a positive rate of return for all subprojects under Component 1, much higher than the weighted average cost of capital (estimated to be around 10–12 percent). For Component 2 subprojects, even with a very small improvement in collection efficiency of DISCOs, the net financial returns of the subprojects become positive indicating cost effectiveness of the planned interventions.

**Table A2.6: Project Financial Benefits**

	FIRR	Net Financial Benefits (Rs. Billion)
<b>MEPCO</b>		
Subcomponents 1(a), 1(b), and (c)	22%	158
ELR Component 1 (d)	117%	219
<b>PESCO</b>		
Subcomponents 1(a), 1(b), and (c)	51%	230.2
Component 2(b): ABC-Peshawar	155%	166.9
ABC-Khyber	106%	63.2
<b>HESCO</b>		
Subcomponents 1(a), 1(b), and (c)	30%	97

### Financial Analysis of Entities

14. Presently, the power sector is primarily a single-buyer market with CPPA-G procuring on behalf of all DISCOs and therefore distribution companies have no control over the price they get from CPPA-G. While the NEPRA determination provides for a pass-through for increase in PPP, there are delays in tariff application/determination/notifications, during which the burden of additional cost has to be shouldered by all the DISCOs. Due to these delays, revenues and costs recognized by NEPRA for tariff determination of DISCO for a particular FY pertains to the costs incurred in prior years. In order to ensure financial viability of the DISCOs, it is important that cost reflective tariffs are passed on to the consumers in a timely manner and there are no unbudgeted subsidies. The prior year adjustments in FY20 and FY21, on the account of delayed tariff notification for all DISCOs, were PKR 309 billion and PKR 178 billion respectively and can be seen as amount of deficit caused by delay in tariff notifications. The DISCOs cannot recover this cost until the base tariff is revised, which affects their financial position as well as their ability to invest in capacity augmentation and access. The government is aware that it needs to raise tariffs to make the broader electricity sector financially sustainable. See paragraph 13 of sectoral and institutional context for how government is addressing the deficit through tariff increases as well as paragraph 67 of key risks section.

15. Furthermore, as explained in Annex 1, the primary levers of reducing CD flow in the circular debt management plan (CDMP) are reducing T&D losses and improving collection as these contribute the most to the CD. Efficiency gains expected to be achieved under this project, through reduction in losses and improvements in collections, will contribute to reduction in circular debt flow. In FY21, the contribution of excess losses (difference between NEPRA allowed losses and actual losses) was PKR 56 billion while the



impact of low recoveries was PKR 161 billion adding a total of PKR 217 billion to CD, about one-third of this was contributed due to the three selected DISCOs. Therefore, the project investments will be critical in bringing down the quantum of losses of these three DISCOs and reduce CD flow as envisaged under the CDMP.

16. Figure A2.1 presents cash flow analysis comparing a business-as-usual (BAU) scenario versus efficiency improvements scenario for the three selected DISCOs. Key assumptions are described in Table A2.7. In the BAU scenario, it is assumed that there is no improvement in losses and collections while the efficiency improvement (EI) scenario assumes the loss reduction and increase in recoveries as projected by the DISCOs and expected to be achieved under the project. The key assumption for the analysis is timely determination and notification of tariffs, and adequate budgeting and timely disbursement of subsidies to the DISCOs by the Ministry of Finance. This is being addressed through sector reforms.<sup>30</sup> Compared to the BAU scenario whereby the projected financial deficit is expected to increase, in the efficiency improvement scenario the deficit is expected to reduce over the next 10 years as the projected losses of DISCOs will come down to match the targets. The financial deficit of MEPCO is expected to reduce to zero in FY26 as it reaches 100 percent collections. The other two DISCOs also show a significant reduction in the deficit compared to BAU scenario.

**Table A2.7: Assumptions**

Forecast Period, Years	10
Sales Growth, Percentage	HESCO: 5.2; MEPCO: 3.8; PESCO: 4.1
Increase in Cost, Percentage	PPP: 5; Distribution Margin: 7 Baseline Values as per NEPRA Determination
BAU Scenario	No change in efficiency parameters
Efficiency Improvement Scenario	Matching the target values – consistent with CDMP and DISCO tariff petitions for the available years and projected to improve for the remaining years.

<sup>30</sup> The NEPRA Act 2021 gives NEPRA powers to notify the uniform base tariff and the quarterly adjustments determined by the authority if the federal government fails to notify the tariff within the stipulated time. This will reduce the protracted delays in tariff notification.

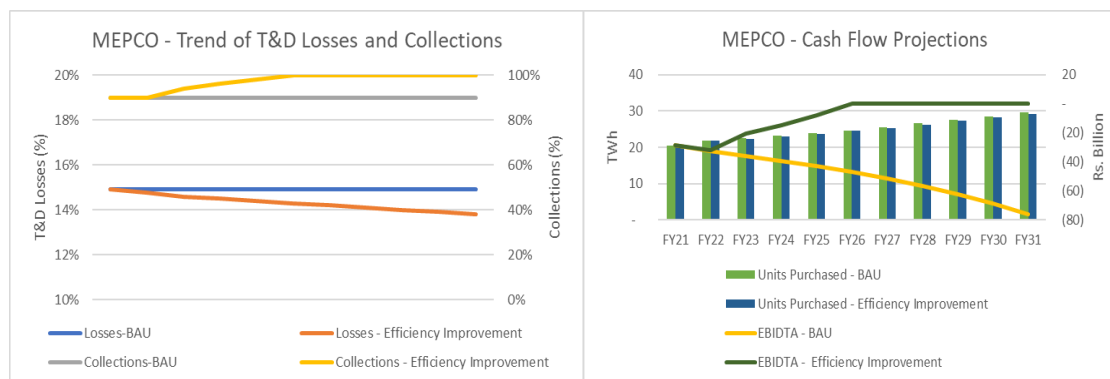


Figure A2.1: Impact of Key Efficiency Parameters on Cashflows

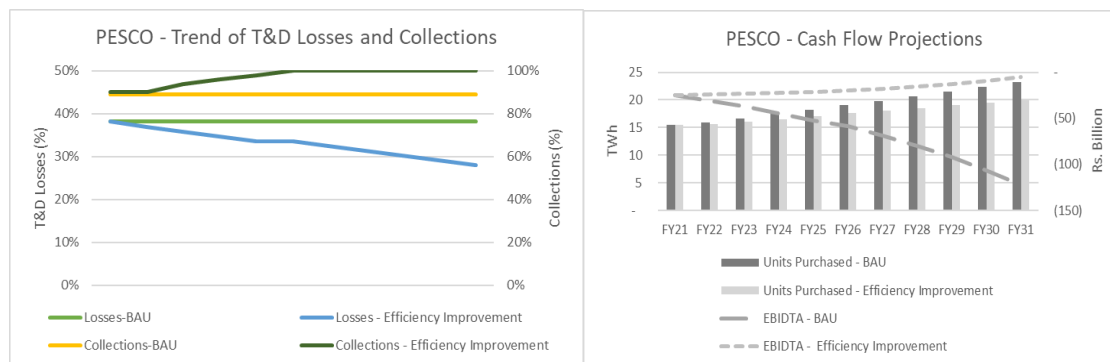
Hyderabad Electric Supply Company



Multan Electric Power Company



Peshawar Electric Supply Company





### ANNEX 3: Governance and Financial Management Assessment

COUNTRY: Pakistan

#### Electricity Distribution Efficiency Improvement Project

1. **An assessment was done for the selected DISCOs (HESCO, MEPCO, and PESCO) and at institutional level** following the Integrated State-Owned Enterprises Framework methodology (Module 4), to assess (i) corporate governance practices; (ii) control environment; (iii) financial reporting; and (iv) audit practices.
2. **Corporate governance assessment of project DISCOs.** The corporate governance in DISCOs is governed by the Public Sector Companies (Corporate Governance) Rules, 2013, last updated 2019 (the Rules). The key features of the existing practices as discussed below highlights the *need to improve diversity and skill mix in accounting, effective board practices and compliance with the code of corporate governance*.
  - (a) Board size: DISCOs boards comprising usually 12 members are within the board size recommended by good international practice.
  - (b) Effectiveness of the board: the respective roles of DISCO boards and of the MoE as owner are blurred and, despite the assignment of responsibilities in the legislation, specific responsibilities in some areas are not practiced reducing the board's role in the DISCOs governance to a formality. For example, the MoE carries out functions that are usually performed by boards, like oversight of the annual business plan implementation.
  - (c) Compliance with the code of Corporate Governance (CG) Rules: The DISCOs implement formal requirements of the legislation while struggling to achieve better outcomes in building a proper CG structure that would benefit DISCOs in the medium- to long-term. For example, the boards of project DISCOs reconstituted in 2020 have two-thirds of its total members as independent directors and exceed "at least one-third" requirement. In line with the good international practice independent non-executive directors are appointed as Chairmen of the boards. Three non-executive directors represent the Finance and Power Divisions of the GoP, and the Energy Department of the respective provincial government. Independent non-executive directors are represented by private sector, academics, and professionals (energy experts and engineers, investment bankers, lawyers, etc). Delegation of civil society representatives as independent non-executive directors to the boards is in process for a more balanced board. At the time of the assessment, the boards were legally reconstituted but not fully operational. In addition, from the diversity perspective, only the HESCO board has female representation in compliance with Section 154 of the Companies Act.
3. **Accounting and Financial Reporting.** Financial reporting requirements for the project DISCOs have been strengthened and are aligned with international good practices. Differences between International Financial Reporting Standards (IFRS)<sup>31</sup> and reporting standards for SOEs in Pakistan are small but significant. Full compliance cannot be claimed because of deferrals. Otherwise, these DISCOs largely

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<sup>31</sup> issued by the International Accounting Standards Board





comply with the financial reporting requirements as applicable by the Securities and Exchange Commission of Pakistan (SECP). Following areas of improvement are required in the accounting and financial reporting practices:

- (a) Transparency: While DISCOs publish annual financial statements on their websites, it is noted from the review of boards minutes that the publication of quarterly financial statements and performance reports on the results of operations by DISCOs boards is still an extremely rare case.
- (b) Compliance with IFRS: Project DISCOs are not complying with the IFRS 14-Regulatory Deferral Accounts.<sup>32</sup> IFRS-14 Regulatory Deferral Accounts applies to all DISCOs as notified by SECP and effective from July 1, 2019.
- (c) Audit qualifications: The last three years audit reports are either qualified or contains emphasis of matter paragraph or both due to inadequate accounting treatment and provision of doubtful accounts and insufficient disclosures. The auditors also raised material uncertainty with regard to going concern particularly arising from insufficient resources to meet current obligations, refer to the Table A3.1.

**Table A3.1: Reports on the audit of the financial statements – Audit Opinion**

DISCO	FY20	FY19	FY18
HESCO	Audit is in process	Qualified, material uncertainty about going concern and emphasis of matter paragraph	Qualified, material uncertainty about going concern and emphasis of matter paragraph
MEPCO	Unmodified, but with emphasis of matter	Unmodified, but with emphasis of matter	Unmodified, but with emphasis of matter
PESCO	Qualified, material uncertainty about going concern and emphasis of matter paragraph	Qualified, material uncertainty about going concern and emphasis of matter paragraph	Qualified, material uncertainty about going concern and emphasis of matter paragraph

- (d) Delayed issuance of audited financial statements: The audited financial statements of HESCO have been issued with significant delays in the last three years.
- (e) Non-disclosure of statement of compliance: The project DISCOs are not disclosing the statement of compliance for code of corporate governance as required by PSC Corporate Governance Rules.

4. **Audit arrangement**: The project DISCOs and MoE will submit separate project level financial statements audited by the AGP with the Bank not later than six months after the close of the FY.

5. **Internal Control and Internal Audit**. The key internal control assessment identified following weaknesses in the internal control framework and activities:

- (a) Weak and outdated Internal Control Framework: The WAPDA inherited Internal Control Service Rules do not allow direct hiring of other staff through a competitive process. Moreover, the controls

<sup>32</sup> IFRS 14 Regulatory Deferral Accounts applies to the entities that provides goods and services to customers at a price or rate that is subject to rate regulations.



are not effectively implemented due to the lack of resources, professional and specialized (IT) competence and non-accountability of the employees.

- (b) Ineffective internal audit: The internal audit function in project DISCOs is severely understaffed, in some cases as much as half of the positions are vacant, including position of Chief Internal Auditor. DISCOs Internal Audit follow the guidelines and methodology of the Internal Audit Manual, prepared under USAID Program back in 2012 that have to be updated in line with the recent pronouncements of the International Institute of Internal Auditors. Lack of adequate resources with the required professional expertise and understaffing results in the non-performance of internal audit, which includes the delay in the finalization of the internal audit reports, in some cases even after the lapse of the next financial year. There is no sufficient evidence to suggest internal audit function at DISCOs are effective and independent and that boards are considering reports of internal audit function and risk management officers at least quarterly.
- (c) Use of IT: DISCOs are at different level of success with the introduction of ERP to enhance efficiency of operations and decision-making, as well as to strengthen the internal control system. For example, at HESCO there is limited progress with implementation of the information system capable of integrating all the management functions and generating extensive MIS reports. HESCO is currently using separate database, software or Microsoft Excel applications for different functions (e.g. sales, debtors, billing and collection, material management, payroll and preparation of financial statements). *As observed by the external auditor of HESCO “the financial reporting system is not computerized and/or integrated with divisions, which produces inefficient, unreliable results and delayed information and reports.”* At the same time, other project DISCOs are putting efforts to adopt international practices and ERP is currently implemented or already implemented in such areas as financials, human resource, inventory management, and billing system.
- (d) Role of audit committees: The Audit Committee, as well as the other committees’ mandates or terms of reference are not publicly disclosed as recommended by good international practice. At the moment, the project DISCOs are compliant with the provision of the Rules that the Chairman of the board and the company’s CEO may not be members of the Audit Committee. The Committee’s functions include reviewing internal audit reports and choosing the company’s external auditor, and pre-approval of any non-audit services. The Internal Auditor reports directly to the Audit Committee. The DISCOs’ Audit Committee usually discuss the external audit matters only twice a year, i.e. during the selection process and then at the time of the audit report sign off. However, good international practice suggests at least two additional meetings at the planning and interim stages of the audit.
- (e) Delegation of power: Financial approval authority and decision-making in DISCOs is governed by DISCO’s Book of Financial Powers. As part of WAPDA Power Wing restructuring/reform program, WAPDA/PEPCO publishes and amends as needed the “Book of Financial Powers for Distribution Companies” that is adopted by DISCOs after approval by their respective boards. Approval authorities vary based on category of procurement. For example, delegation of authorities outlines delegations that are currently documented in the Book of Financial Powers at MEPCO. All decisions regarding large contract exceeding PKR 100 million require an additional approval by the MEPCO board. This centralized power often contributes to delays in contract awards.



- (f) Staffing: The CFO in all the three DISCOs holds professional qualification as required by the Act and Rules; however, it was through internal transfers/postings without following competitive processes.

6. **Audit**: Project DISCOs are audited by mid-tier local member firms of international networks. The only audit firms that comply with the IFAC Code of Ethics and have received a satisfactory rating by the Institute of Chartered Accountants of Pakistan may be hired as external auditors by the project DISCOs. These audit firms are acceptable to the Bank. Audit is conducted in accordance with the International Standards on Auditing (ISAs), including those related to quality control (QC) and the new audit report format, which has been required by the SECP since the beginning of 2017. DISCOs observe the SECP regulations that require the mandatory rotation of external auditors after every five years to safeguard independence. DISCOs are required to provide the external auditors with full financial information, including the company's internal audit reports. In addition to the completeness and accuracy of financial accounts, external auditors need to review DISCO's compliance with applicable laws and regulations, including the Rules. External auditors' reports are to be submitted to the board and disseminated to all shareholders. Like other public sector entities, DISCOs may also be subject to external audit by the AGP. The project financial statements will be submitted within six months of the close of the financial year by each implementing agency.

7. The project includes TA to improve compliance with IFRS and improving books of accounts to reduce exceptions in the audit report. The TA will include adoption of Committee of Sponsoring Organizations framework and improving internal audit practices. The project will also support training to board of directors, including audit committees, to ensure proper discharge of their duties as outlined in the best practices. The performance will be monitored through bi-annual internal audit report presented to the audit committee and timely implementation of the audit recommendation. To address these issues and improve FM and governance arrangements following have been proposed for each of the selected DISCOs and will be used for management efficiency indicator.

- (a) Strengthening Board of Directors Practices for DISCOs, which includes at least one board meeting each quarter, gradually complying with Code of Corporate Governance for PSCs and compliance statement reviewed by independent auditors (this includes requirement for independent directors, effective functioning of board committees, including audit committee, management evaluation) and annual self-evaluation of Board of Directors.
- (b) Independent Internal Audit Department reporting to audit committee and headed by qualified professional.