ADB

Report and Recommendation of the President to the Board of Directors

Project Number: 47190-002
October 2015

Proposed Multitranche Financing Facility Islamic Republic of Pakistan: Second Power Distribution Enhancement Investment Program

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 1 October 2015)

Currency unit	–	Pakistan rupee/s (PRe/PRs)
PRe1.00	=	$0.0096
$1.00	=	PRs104.12

ABBREVIATIONS

ADB	–	Asian Development Bank
ADF	–	Asian Development Fund
AMI	–	advanced metering infrastructure
CIS	–	customer information system
FAM	–	facility administration manual
GDP	–	gross domestic product
IESCO	–	Islamabad Electric Supply Company
LESCO	–	Lahore Electric Supply Company
MDMS	–	meter data management system
MFF	–	multitranche financing facility
MOWP	–	Ministry of Water and Power
OCR	–	ordinary capital resources
PLC	–	power line carrier
PMU	–	project management unit

NOTE

In this report, "$" refers to US dollars.

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INVESTMENT PROGRAM[a] AT A GLANCE

1. Basic Data — **Project Number:** 47190-002

Project Name	Second Power Distribution Enhancement Investment Program	**Department /Division**	CWRD/CWEN
Country	Pakistan	**Executing Agency**	Ministry of Water and Power
Borrower	Islamic Republic of Pakistan		

2. Sector

Sector	Subsector(s)	ADB Financing ($ million)
✓ **Energy**	Electricity transmission and distribution	990.00
	Total	**990.00**

3. Strategic Agenda

Strategic Agenda	Subcomponents	Climate Change Information	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Climate Change impact on the Project	Medium

4. Drivers of Change

Drivers of Change	Components	Gender Equity and Mainstreaming	
Partnerships (PAR)	Bilateral institutions (not client government) International finance institutions (IFI) Official cofinancing	No gender elements (NGE)	✓

5. Poverty Targeting

Poverty Targeting		Location Impact	
Project directly targets poverty	No	Rural	Medium
		Urban	Medium
		Nation-wide	High

6. Risk Categorization: Complex

7. Safeguards Categorization [Tranche 1] **Environment:** C **Involuntary Resettlement:** C **Indigenous Peoples:** C

8. Financing

Modality and Sources	Indicative Tranches ($million)				Amount ($million)
	I	II	III	IV	
ADB					**990.00**
Sovereign MFF-Tranche (Loan): Asian Development Fund	20.00	0.00	0.00	0.00	20.00
Sovereign MFF-Tranche (Loan): Ordinary capital resources	380.00	200.00	270.00	120.00	970.00
Cofinancing					**0.00**
None					
Counterpart					**258.00**
Others	110.50	50.00	67.50	30.00	258.00
Total	**510.50**	**250.00**	**337.50**	**150.00**	**1,248.00**

9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	Yes

INVESTMENT PROGRAM[a] AT A GLANCE

10. Country Operations Business Plan

CPS	http://www.adb.org/sites/default/files/institutional-document/171824/cps-pak-2015-2019.pdf
COBP	http://www.adb.org/sites/default/files/institutional-document/152080/cobp-pak-2015-2017.pdf

11. Investment Program Summary

The investment program aims to improve the financial viability of Pakistan's power distribution sector. By introducing advanced metering infrastructure (AMI) to power distribution companies (DISCOs) throughout Pakistan, the investment program would (i) reduce power distribution losses, and improve revenue collection; (ii) reduce power outages by enhancing load control and load management; (iii) provide automated power consumption data; (iv) modernize the electricity metering and billing system; and (v) improve customer services by installation of customer information system (CIS). An MFF is proposed for this investment. The rollout of the AMI will be in phases covering various DISCOs of Pakistan.

Impact and Outcome: The impact (of the facility) is Financial viability of the power distribution sector improved (program-defined). The outcome (of the facility) is Electricity revenues increased in the targeted regions.

Outputs: (i)Smart meters and communication equipment installed and functional, (ii)New billing system and CIS implemented and operational, (iii)Meter data management system implemented and operational, and (iv)Operations manual updated and monitoring procedure improved.

Implementation Arrangements: Ministry of Water and Power will be the executing agency.

Project Readiness: Program and Project preparation was completed with support from PPTA consultants under TA 8410.

12. Milestones

Modality	**Estimated Approval**	**Estimated Completion**[b]
Multitranche financing facility	20 November 2015	30 June 2024
Tranche I	1 December 2015	30 June 2024
Tranche II	29 November 2016	30 June 2020
Tranche III	20 June 2017	30 June 2023
Tranche IV	20 June 2019	30 June 2024

13. Project Data Sheet (PDS)

PDS[c] http://www.adb.org/projects/47190-002/main

[a] Multitranche Financing Facility (MFF).
[b] For MFF, this refers to the end of the availability period; for tranches, this refers to the tranche closing date.
[c] Safeguard documents can be viewed by clicking the Document's hyperlink in the Project Data Sheet (PDS) page.

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed multitranche financing facility (MFF) to the Islamic Republic of Pakistan for the Second Power Distribution Enhancement Investment Program.[1]

2. The investment program aims to improve the financial viability of Pakistan's power distribution sector. By introducing advanced metering infrastructure (AMI)[2] to power distribution companies (DISCOs) throughout Pakistan, the investment program would (i) reduce power distribution losses and improve revenue collection, (ii) reduce power outages by enhancing load control and load management, (iii) provide automated power consumption data, (iv) modernize the electricity metering and billing system, and (v) improve customer services by installing the customer information system (CIS). AMI will be implemented in several phases to cover Pakistan's major cities, and industrial and commercial hubs.[3] An MFF instead of a stand-alone project is proposed for investment because the introduction of AMI requires a long-term partnership between the Government of Pakistan and the Asian Development Bank (ADB), and being a large-scale and complex investment, the government intends to implement it in phases and MFF has been accordingly designed in multiple tranches to cover different regions.[4]

II. THE INVESTMENT PROGRAM

A. Rationale

3. **Energy crisis.** Reliable and sufficient electricity supply is the backbone for Pakistan's economic growth. In the last 10 years, Pakistan has been suffering from electricity shortages, leaving 33% of the population without access to electricity, and load shedding of around 25% of system demand.[5] While standby electricity amounted to about 30% in 2003–2004, the country now suffers from a severe power crisis resulting in routine load shedding of up to 12 hours in urban areas, and 18–20 hours in rural areas.[6] This is considered to be the worst of four such electricity crises in Pakistan since 1974. It has hurt the country's economy, as reflected in an estimated annual loss of 4%–7% in the country's gross domestic product (GDP), and a 2% reduction in real GDP growth. The power shortfall is also deemed to be the major cause of a decline in large-scale manufacturing, which grew by just 1.2% in 2012 and 2.8% in 2013. Domestic private investment dropped from 14% of GDP in 2007–2008 to an estimated 10.9% of GDP in 2012–2013. Pakistan's economic growth slowed in 2013, resulting in a 5-year average of 3%, which is well below the 7% annual growth rate necessary for sufficient employment creation to absorb the new entrants into the labor force. The power shortage is dampening business confidence, which is already affected by the country's security situation.

4. **Power distribution sector.** The supply–demand gap (5,000 megawatts) is attributed to increased demand, insufficient generation, and system inefficiencies. DISCOs are contributing the most to the inefficiency in delivering generated power. Their system efficiency and financial

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1 The design and monitoring framework is in Appendix 1.
2 AMI comprises systems that measure, collect, and analyze energy usage, and communicate with the metering devices either on request or under a schedule. These systems include hardware, software, communication systems, customer energy displays, customer associated systems, meter data management software.
3 The Asian Development Bank (ADB) provided project preparatory technical assistance to develop the proposed Second Power Distribution Enhancement Investment Program (TA 8410).
4 A matrix showing a comparison between different financing modalities is in Comparison of Multitranche Financing Facility and Project Loan (accessible from the list of linked documents in Appendix 2).
5 Government of Pakistan, Ministry of Planning, Development and Reforms. 2014. *Pakistan Vision 2025.* Islamabad.
6 Government of Pakistan, National Electric Power Regulatory Authority. 2012. *State of Industry Report 2012.* Islamabad.

viability are critical to efficient operations and the sector's sustainability and growth. DISCOs' customer tariff does not cover the full cost of power distribution, transmission, and generation because the system losses are higher than those allowed by the regulator and revenue collection is low. The cash shortfall hampers DISCOs' performance, and payments to power-generating entities are delayed or subsidized by the government. This is not sustainable given the fiscal impact.

5. **Road map and strategic context.** The government approved the National Power Policy 2013 to alleviate the chronic energy crisis through short, medium-, and long-term measures. The government has taken some measures to reduce electricity shortages by adding generation capacity and removing some of the bottlenecks in transmission and distribution systems. The government acknowledges the need to develop a long-term investment plan to resolve the power crisis, and to bring financial sustainability to the sector. While the policy focuses on the most crippling effect of the crisis by reducing the supply–demand gap, it also envisages reforms to make the power sector sustainable and financially viable. For the distribution subsector, the goal of the policy is to improve the operational and financial efficiency of the distribution system. A key strategy is to deploy smart meters and real-time monitoring. Other key strategies are the execution of performance contracts that compel the heads of DISCOs to focus on the reduction of distribution losses and, in the longer term, the privatization of DISCOs.

6. Investment plans for generation and transmission, and business plans for distribution system improvements have been prepared. The investment requirements are significant and beyond the capacity of the country's development budget, requiring financing from outside. While ADB, the World Bank, and other bilateral development partners have been requested to fund some of these investments, the government itself is also utilizing its development funds and encouraging private sector investment to resolve the energy crisis.

7. **Policy framework.** The government's policy framework, Pakistan Vision 2025, developed by the Ministry of Planning, Development and Reforms, is aligned with the strategic context and recognizes that sufficient, reliable, clean, and cost-effective energy—for now and the future—is indispensable to ensure sustainable economic growth and development. It aims to (i) increase new power generation with a more balanced generation mix, (ii) provide uninterrupted electricity to all, (iii) increase electricity access to 90% of the population by 2025, and (iv) improve demand management.

8. Pakistan Vision 2025—backed by the National Power Policy, investment plans for power generation and transmission, and business plans for the distribution sector—will be leading Pakistan into resolving the power crises. The investment program is one of the key drivers for the government to realize this. ADB, in close coordination with other international financial institutions and donors, is in continuous dialogue with the government on reforms required to create the right environment for sector stability, and has agreed on a policy matrix with the government, which is being implemented in phases.[7] The MFF will support the policy dialogue by providing effective tools and inputs to the following three objectives in the policy matrix agreed with the government: (i) loss reduction and collection improvement in DISCOs, (ii) improved demand-side efficiency and strengthened energy conservation, and (iii) improved performance of public sector companies in the power sector. Similarly, the reform program will create the basis for the benefits envisaged under the MFF through implementation of tariff regulation and subsidy reforms.

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[7] ADB. 2014. *Sustainable Energy Sector Reform Program.* Manila.

9. **ADB assistance and country partnership strategy.** ADB is the leading donor in the Pakistan energy sector and provides funds for energy efficiency, power transmission and distribution, cross-border natural gas pipelines, power generation, and renewable energy projects. ADB has been engaged in program lending and assisting the government in developing sector policies and strategies since 2000.[8] ADB has supported the government's focus on enhancing the power distribution and transmission system by upgrading, extending, and constructing new grid stations and transmission lines. The existing MFF[9] for DISCOs has shown satisfactory results with no major implementation issues. ADB has approved all four tranches under that MFF, with one financially closed and three under implementation. About 3,956 megavolt-amperes of transformer capacity and 115 kilometers of transmission lines have already been added to the system through the existing MFF. While the existing MFF focuses on enhancements in the grid stations and transmission lines of DISCOs, the second MFF would be a targeted intervention to secure the metering and billing systems of DISCOs. Support through such and other ADB interventions is being provided to make DISCOs financially self-sustaining with a true cost-of-service tariff and a transparent multi-buyer–multi-seller model.

10. The investment program is aligned with ADB's country partnership strategy, 2015–2019 for Pakistan, which names the energy sector as one of the key priority areas.[10] The program is also included in ADB's country operations business plan, 2015–2017, and is consistent with the development coordination framework.[11]

11. **Investment program.** The government's sector investment strategy is to resolve the following main issues: (i) low revenue collection from public and private customers, and high losses in the distribution system (averaging 18.9% countrywide, and between 9.8% and 39.6% among different DISCOs); (ii) recurring circular debt largely stemming from low revenue collection; (iii) increasing demand stress on the transmission and distribution networks; (iv) overreliance on fuel imports and failure to exploit additional indigenous resources; (v) low availability and efficiency of existing power plants; and (vi) declining power generation from cheaper sources (hydro and natural gas). While some of the above issues are being dealt with through existing ADB interventions,[12] issues (i)–(iii) will be tackled through the investment program, which follows the government's strategy for the next 10 years and builds upon the existing ADB MFF for power distribution.

12. The investment program, through installation of AMI and billing systems, would enhance the operational efficiency of DISCOs, including loss reduction to a level that the regulator deems acceptable to be passed on in the tariff, an increase in revenue collection, and efficient use of available power through demand-side management. With its theft-control technology, revenue-collection enforcement options (remote disconnection against nonpayment) and load-management capabilities, DISCOs would strategically resolve issues relating to high network

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8 (i) Power Sector Restructuring Program and technical assistance loans, approved in 2000; (ii) Friends of Democratic Pakistan Energy Task Force Report, approved in 2010; and (iii) Sustainable Energy Reform Program and subprogram 1, approved in 2014.

9 ADB. 2008. *Report and Recommendation of the President to the Board of Directors: Multitranche Financing Facility to the Islamic Republic of Pakistan for the [First] Power Distribution Enhancement Investment Program.* Manila. About 690 subprojects under four tranches have been approved, more than 250 of which are completed, and the rest are to be completed by June 2017.

10 ADB. 2015. *Country Partnership Strategy: Pakistan, 2015–2019.* Manila.

11 ADB. 2014. *Country Operations Business Plan: Pakistan, 2015–2017.* Manila.

12 ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Islamic Republic of Pakistan for the Jamshoro Power Generation Project*. Manila; and ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the Islamic Republic of Pakistan for the Power Transmission Enhancement Investment Program.* Manila.

losses and low cost recovery, as well as manage system stresses and power blackouts. Overall, these would improve system stability and security, and the financial viability of DISCOs.

13. The Ministry of Water and Power (MOWP) intends to install AMI throughout the country in all major cities, and industrial and commercial hubs, and requested ADB in May 2013 to support its initiative. Investments worth $4.9 billion—both physical and nonphysical (capacity building)—are required, and ADB has been requested to finance a portion of the government's investment plan. As part of the feasibility study for adopting AMI, an investment plan for the AMI rollout was developed and approved for the Islamabad Electric Supply Company (IESCO) and Lahore Electric Supply Company (LESCO) under tranche 1 of the investment program. Both DISCOs will seek regulatory approval of the revised integrated distribution business plan, including AMI-related investments, within 1 year of project approval.

B. Impact and Outcome

14. The investment program's impact will be improved financial viability of the power distribution sector in Pakistan. The outcome will be increased electricity revenues in the targeted regions. The investment program will be implemented throughout Pakistan, covering major cities, and industrial and commercial hubs.

C. Outputs

15. The investment program will have four outputs: (i) smart meters and communication equipment installed and functional, (ii) meter data management system (MDMS) implemented and operational, (iii) new billing system and CIS implemented and operational, and (iv) operations manual updated and monitoring procedure improved. The investment program will improve (i) metering accuracy and reliability, anti-tampering, and fault detection; (ii) tariff collection and billing efficiency; and (iii) load monitoring and management. Tranche 1 will have the same outputs as the investment program, but only with regard to IESCO and LESCO.

16. AMI will be established in various DISCOs throughout Pakistan in four tranches under the investment program, with the following components:

(i) **Advance metering infrastructure and billing system.** (a) Procurement and installation of smart meters and associated equipment at common delivery points, 11-kilovolt feeders, and distribution transformers for all customers; (b) development of communication infrastructure; and (c) installation of MDMS, upgrade of billing system, and CIS.

(ii) **Capacity development of DISCO personnel.** Operator personnel and management will receive training, from suppliers as well as consultants, to be able to operate and manage the system effectively. The information technology, metering, and testing departments will be restructured in each DISCO.

(iii) **Monitoring and updating of documents.** Consultants will be hired to monitor the physical progress of each of the program tranches and update the operation manuals.

D. Investment and Financing Plans

17. The overall financing need for installing AMI throughout the country is $4.9 billion. The MFF will finance a portion of this investment program worth $1.25 billion. Eligible expenditures will include goods, works, and consulting services as more particularly described in the detailed

cost estimates in the FAM. The MFF will have four tranches[13] from 2015 to 2024. Proceeds of the loan under each tranche will be relent by the government to the respective DISCOs. Tranche 1 is expected to be executed in 2015. Table 1 shows the portion of the investment program to be financed by the MFF.

Table 1: Investment Program
($ million)

Item		MFF	Tranche 1
		Amount[a]	
A.	**Base Cost[b]**		
	1. AMI development and distribution system improvement	1,062.3	428.1
	2. Project preparatory and capacity development consultants	1.5	1.5
	3. Project implementation consultants	18.3	18.3
	Subtotal (A)	**1,082.1**	**447.9**
B.	**Contingencies[c]**	**141.4**	**52.9**
C.	**Financing Charges During Implementation[d]**	**24.5**	**9.7**
	Total (A+B+C)	**1,248.0**	**510.5**

AMI = advanced metering infrastructure, MFF = multitranche financing facility.

[a] Includes taxes and duties of $206.4 million to be financed from government resources for the multitranche financing facility; and taxes and duties of $87.2 million to be financed from government resources for tranche 1.

[b] In 2014 prices.

[c] Physical contingencies computed at 5% for equipment. Price contingencies computed at 1.4% on foreign exchange costs and 7.7% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges. Interest during construction for ordinary capital resources of the Asian Development Bank (ADB) loan has been computed at the 5-year forward London interbank offered rate plus a spread of 0.5%. ADB's loan from Special Funds resources has been computed at 2% per annum. Commitment charges for ADB's loan from ordinary capital resources are 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

18. The government has requested an MFF in an amount up to $990 million from ADB's ordinary capital resources (OCR) and Special Funds resources to help finance a part of the investment program. The MFF will consist of several tranches, subject to the government's submission of related periodic financing requests, execution of the related loan and project agreements for each tranche, and fulfillment of terms and conditions and undertakings as set forth in the framework financing agreement.

19. The MFF combines OCR and Special Funds resources, i.e., Asian Development Fund (ADF) resources, up to the aggregate MFF amount. The provision of any ADF resources will be balanced by a corresponding reduction in available OCR financing (and vice versa), with total financing provided under the MFF not to exceed the aggregate MFF total of $990 million. Any ADF allocation will be subject to (i) the availability of ADF resources, (ii) Pakistan's access to such resources pursuant to ADB's then applicable Graduation Policy[14] and the requirements of ADF donors, and (iii) the availability of such resources to Pakistan given ADB's then applicable policy on performance-based allocation of ADF resources.[15]

20. For the first tranche of the MFF, the government has requested the following loans to help finance the project:

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[13] Four tranches are envisaged now, but they may be adjusted to accommodate the implementation schedule.

[14] ADB. 2008. *Review of the 1998 Graduation Policy of the Asian Development Bank*. Manila.

[15] ADB. 2004. *Review of the Asian Development Bank's Policy on the Performance-Based Allocation of Asian Development Fund Resources*. Manila; and ADB. 2008. *Refining the Performance-Based Allocation of Asian Development Fund Resources.* Manila.

(i) A loan of $380 million from ADB's OCR. The loan will have a 21-year term, including a grace period of 4 years, custom-tailored repayment schedule, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per year (interest and other charges during construction to be capitalized in the loan), and such other terms and conditions as set forth in the draft loan and project agreements.

(ii) A loan in various currencies equivalent to SDR14,208,000 from ADB's Special Funds resources. The loan will have a 25-year term, including a grace period of 5 years, an interest rate of 2.0% per annum during the grace period and thereafter, and such other terms and conditions as set forth in the draft loan and project agreements.

21. The financing plan is in Table 2. A part of ADB's loan from Special Funds resources for the first tranche of the MFF will be used for project implementation consultants and program tranche preparation consultants for tranches 2–4. ADB financing constitutes 79.3% of the cost of the portion of the investment program that will be supported by the MFF.

Table 2: Financing Plan

	Tranche 1	Tranche 2	Tranche 3	Tranche 4	MFF	
Source	**Amount** ($ million)	**Amount** ($ million)	**Amount** ($ million)	**Amount** ($ million)	**Amount** ($ million)	**Share of Total** (%)
Asian Development Bank						
Ordinary capital resources (loan)	380.0	200.0	270.0	120.0	970.0	77.7
Special Funds resources (loan)	20.0				20.0	1.6
Others (Distribution companies)	110.5	50.0	67.5	30.0	258.0	20.7
Total	**510.5**	**250.0**	**337.5**	**150.0**	**1,248.0**	**100.0**

MFF = multitranche financing facility, DISCO = distribution company.
Source: Asian Development Bank estimates.

22. Cofinancing possibilities for the investment program will be explored. If any cofinancing is confirmed, all necessary approvals for the incorporation of such cofinancing into the financing plan of the MFF, or the relevant project financed or to be financed by the MFF, as applicable, will be obtained. These approvals will include any waiver of member country procurement eligibility restrictions that might be necessary in connection with the provision of the cofinancing.

E. Implementation Arrangements

23. MOWP will be the executing agency of the investment program. Each DISCO will be the implementing agency in its own geographic area of jurisdiction. Project management units (PMUs) set up under ADB's earlier MFF for power distribution (para. 9), which are fully operational and well familiar with ADB policies and guidelines, will be responsible for implementing and monitoring the investment program. A dedicated technical team within each PMU will be established with AMI-specific staff resources. The PMUs will be provided with consulting support on project implementation covered by the ADF loan. Implementation arrangements are summarized in Table 3 and described in detail in the facility administration manual (FAM).[16]

[16] Facility Administration Manual (accessible from the list of linked documents in Appendix 2).

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	Investment program: December 2015–June 2024; tranche 1 (ordinary capital resources): December 2015–June 2019; tranche 1 (Asian Development Fund): December 2015–June 2024		
Estimated completion date	Investment program: 30 June 2024		
Implementation unit	Project implementation unit to be set up within the MFF tranche 1 project management unit in each DISCO; number of staff to be determined depending on each tranche's scope		
Management			
(i) Oversight body	Ministry of Water and Power Secretary (chair) Joint secretary (DISCOs); joint secretary, Economic Affairs Division; and chief executive officer (DISCO concerned) (members)		
(ii) Executing agency	Ministry of Water and Power		
(iii) Implementing agencies	LESCO, IESCO, MEPCO, PESCO, HESCO, GEPCO, FESCO, QESCO, and SEPCO		
Procurement	International competitive bidding	Multiple contracts	$970 million
Consulting services	QCBS method	344 person-months	$8.2 million
	QCBS method	[TBD] person-months	$10.3 million
Retroactive financing and/or advance contracting	ADB may, subject to its policies and procedures, allow upon request advance contracting of goods, works, and consulting services. Any approval of advance contracting will not constitute a commitment by ADB to finance the project. Retroactive financing will be considered for all tranches. For each tranche, ADB management may permit retroactive financing of eligible expenditures incurred for goods, works, and consulting services no earlier than 12 months before the loan signing date and not exceeding 20% of the loan amount.		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2015, as amended from time to time) and detailed arrangements agreed upon between the government and ADB.		

ADB = Asian Development Bank, DISCO = distribution company, FESCO = Faisalabad Electric Supply Company, GEPCO = Gujranwala Electric Power Company, HESCO = Hyderabad Electric Supply Company, IESCO = Islamabad Electric Supply Company, LESCO = Lahore Electric Supply Company, MEPCO = Multan Electric Power Company, MFF = multitranche financing facility, PESCO = Peshawar Electric Supply Company, QCBS = quality- and cost-based selection, QESCO = Quetta Electric Supply Company, SEPCO = Sukkur Electric Power Company, TBD = to be determined.
Source: Asian Development Bank estimates.

III. DUE DILIGENCE

A. Technical

24. Under the investment program, AMI will be rolled out in phases. In the first phase under tranche 1 of the MFF, about 2 million customers in two circles of LESCO's and IESCO's Rawalpindi region have been selected, which is about one-third of each company's clientele. Once developed, the phase will be replicated and implemented in the remaining technically and commercially feasible regions or circles of the various DISCOs. The AMI and billing system will include state-of-the-art equipment and software that will put Pakistan to the forefront of smart grid technologies in the region. A few pilot advanced metering projects have been successfully implemented in IESCO and LESCO. A small-scale automatic meter reading project is being piloted by the United States Agency for International Development in some DISCOs.

25. DISCO staff will install the meters and communication infrastructure, while the contractor will implement the MDMS, billing system, and CIS. DISCO staff will work under the close direction of the contractor and project implementation consultant, who will also provide training on AMI operation and maintenance. All parties will be jointly responsible for the successful commissioning of AMI.

26. **Smart meters and communication systems.** The technology selected for smart meters will follow international standards, including some specific local requirements and functionalities needed to achieve the investment program's targets, such as remote data collection for billing, remote disconnection and connection of the meters, alarms for theft detection, and demand control. The recommended meters are proven technologies operated all over the world. The communication infrastructure proposed in IESCO and LESCO for domestic and small and medium-sized commercial customers will be power line carrier (PLC)-based, and general packet radio service-based for industrial and high-consumption commercial customers.

27. Before recommending the PLC-based communication infrastructure, the feasibility consultants had analyzed all other options. Because the radio frequency bands normally required for this kind of application are not regulatory available, and since massive general packet radio service rollout entails high initial investment and operational costs, the feasibility study recommended PLC as the technically, economically, and financially most viable among the three available options.

28. **Meter data management systems.** AMI comprises the head-end system and MDMS to remotely exchange information with the meters, process information, and provide the required alarms or inputs to manage the meters. The modular design solution recommended in the feasibility study follows international standards, and will allow other meter manufacturers to be integrated in future AMI development in DISCOs. Interoperability and the possibility of using several brands were carefully considered. The project also incorporates the supporting software to manage the information technology networks and the meters' rollout. The AMI control centers will be duplicated to ensure operational response during unexpected blackouts.

29. **Billing systems and customer information system.** The billing system and CIS, integrated with the AMI, will be deployed for the whole customer base of the DISCO concerned to fully automate the "meter to cash" process. The billing system and CIS will also be accessible in each customer service center, which will improve the quality of services. The systems will allow interfaces with other corporate systems to ensure automatic information flow.

B. Economic and Financial

30. Economic and financial analyses will be carried out separately for each DISCO and for each tranche under the investment program. For tranche 1, the financial internal rate of return is 12.4%, which is greater than the weighted average cost of capital at 4.8%, confirming the investment's financial viability. The financial benefits accrued from a reduction in network losses translate into more revenues from electricity sales and lower operation and maintenance costs. The economic internal rate of return is 18.6%, which is greater than the economic opportunity cost of 12%, confirming the investment's economic viability. The economic benefits are measured based on the value of the tariff net of taxes for incremental power consumption that stems from reduced system losses.

31. The financial performance of IESCO and LESCO was assessed for tranche 1. Except for fiscal year 2012, when the fuel cost surged and the timing for tariff increase was substantially delayed, both DISCOs have been financially stable with a low level of debt and are expected to remain so even with the investment. The tariffs may need to rise marginally for a short time to reflect the cost of financing, but no significant direct impacts on tariffs are expected from the investment.

C. Governance

32. The financial management assessment[17] for tranche 1 was conducted in November 2014 and shows that the pre-mitigation risks are substantial. Both IESCO and LESCO are under a capacity development program with the United States Agency for International Development to introduce a new accounting manual and system. Although the DISCOs are familiar with ADB's Procurement Guidelines (2015, as amended from time to time), capacity development in procuring such turnkey contracts and contract management is essential.

33. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and the DISCOs. The specific policy requirements and supplementary measures are described in the FAM.

D. Poverty and Social

34. The investment program's poverty and social impacts are indirect. Improved systems will increase household savings and reduce operating costs of small entrepreneurs who spend much on backup power generators. The CIS will not only provide facilities to customers for billing and accurate reading, but also allow them to monitor consumption trends. A communication strategy will be devised to increase public awareness of AMI and its benefits.

35. With no direct benefits to women, tranche 1 is categorized as having no gender element, as detailed in the summary poverty reduction and social strategy.[18] The project will also have minimal or no social impacts related to HIV/AIDS, human trafficking, and labor.

E. Safeguards

36. No civil works will be required for the AMI. No permanent or temporary land acquisition will occur, nor any impact on assets or livelihoods. No indigenous peoples, as defined in ADB's Safeguard Policy Statement (2009), were identified in areas to be covered by the investment program, which neither targets nor excludes individuals or specific groups of people.

37. The MFF is expected to have minimal environmental impact, and no involuntary resettlement or indigenous peoples impact.[19] However, to mitigate any impacts that may arise in any of the tranches, an environmental assessment and review framework, and a resettlement framework were prepared.[20] DISCOs have adequately staffed environment and social safeguard cells within their PMUs to implement the requirements of ADB's Safeguard Policy Statement (2009).

F. Risks and Mitigating Measures

38. The investment program's benefits and impacts are expected to outweigh the costs. Major risks and mitigating measures are summarized in Table 4, and described in detail in the risk assessment and risk management plan.[21]

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[17] The financial management assessment was conducted in November 2014.
[18] Summary Poverty Reduction and Social Strategy (accessible from the list of linked documents in Appendix 2).
[19] Tranche 1 has been categorized as C for environmental impact as well as for involuntary resettlement and indigenous peoples, and the potential impacts of future tranches are expected to be the same.
[20] Resettlement Framework, and Environmental Assessment and Review Framework were disclosed on 15 January 2015 (accessible from the list of linked documents in Appendix 2).
[21] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures by Distribution Companies
Existing business processes are no longer applicable with AMI.	The project implementation consultant will update, within 1 year of mobilization, the commercial procedures handbook to reflect the changes in business procedures required for AMI operations.
Non-integrated solutions will require homemade interfaces.	Focus on integrated solution. Procurement will be done as a single responsibility contract with all three components as part of the same package, and proof of concept to be approved before contract signing.
DISCO resources and capacity are not sufficient for such bidding or to implement and operate the investment.	Provide (i) additional technical support through project preparatory technical assistance consultants, (ii) hands-on training by contractor, and (iii) special capacity development program by project implementation consultant. Also, hire meter installers on a daily wage basis in case staff is lacking in the DISCO.

AMI = advanced metering infrastructure; DISCO = distribution company.
Source: Asian Development Bank.

IV. ASSURANCES AND CONDITIONS

39. The government, MOWP, and DISCOs have assured ADB that implementation of the investment program shall conform to all applicable ADB policies including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursements as described in detail in the FAM and loan documents.

40. The government, MOWP, and DISCOs have given ADB certain undertakings for the MFF, which are set forth in the framework financing agreement. Specific covenants agreed by the government and DISCOs with respect to individual tranches under the MFF are set forth in the loan and project agreements for the respective tranches.

41. No withdrawal shall be made under any loan agreement for goods, works, or consulting services until ADB has received a relending agreement executed between Pakistan and the relevant DISCO or DISCOs in form and substance satisfactory to ADB.

V. RECOMMENDATION

42. I am satisfied that the proposed multitranche financing facility would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the multitranche financing facility to the Islamic Republic of Pakistan for the Second Power Distribution Enhancement Investment Program in an aggregate principal amount not exceeding the equivalent of $990,000,000, which comprises:

(i) the provision of loans from ADB's Special Funds resources, with interest and other terms to be determined in accordance with ADB's applicable policies relating to Special Funds resources; and

(ii) the provision of loans from ADB's ordinary capital resources, with interest and other terms to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility

and is subject to such other terms and conditions as are substantially in accordance with those set forth in the framework financing agreement presented to the Board.

Takehiko Nakao
President

30 October 2015

DESIGN AND MONITORING FRAMEWORK FOR THE INVESTMENT PROGRAM

Impact the Program is Aligned with:

Financial viability of the power distribution sector improved.[1]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
Outcome Electricity revenues increased in the targeted regions	a. Nationwide distribution of network losses reduced from 18.9% in 2013 to 11% in 2024. b. Revenue collection increased in the targeted DISCOs from 89.6% in 2013 to 95% in 2024. c. Load shedding (power blackouts) eliminated in the targeted regions of DISCOs from year 2024 onward (2013 baseline: up to 12 hours a day in urban areas and 18–20 hours a day in rural areas)	a. DISCOs' annual report b. DISCOs' annual report c. National Electric Power Regulatory Authority's State of Industry Report	Customers of DISCOs resist subsidy reduction and tariff increase and stop payments for consumption.
Outputs 1. Smart meters and communication equipment installed and functional	1a. About 6 million customers and all substations in the targeted regions of DISCOs are operating with smart meters by 2024 (2013 baseline: zero of similar type). 1b. Communication infrastructure commissioned in the targeted regions of DISCOs by 2024 (2014 baseline: None).	1a. Targeted distribution centers' customer data 1b. Commissioning certificate by DISCOs	Proposed communication technology may not work as required by AMI. Non-integrated solutions may require homemade interfaces. DISCO resources and capacity may not be enough to implement and operate the system.
2. Meter data management system implemented and operational	2a. Database and data management system developed and operational in the targeted regions by 2024 (2014 baseline: None) 2b. 700 personnel trained on data collection and data management system by 2024 (2014 baseline: None)	2a. Commissioning certificate by DISCOs 2b. Executing agency's project training report	Deployment process may be underestimated, and not be well supported by information technology. Weak procurement capacity of DISCO staff compromises adherence to ADB's ICB 1S2E bidding procedure.
3. New billing system and CIS implemented and operational	3a. Billing and CIS implemented and operational in the targeted regions by 2022 (2014 baseline: None).	3a. Commissioning certificate by DISCOs	

[1] Government of Pakistan. 2013. *National Power Policy.* Islamabad.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	3b. 3000 personnel trained on billing system and CIS by 2022 (2014 baseline: None).	3b. Executing agency's project training report	
4. Operations manual updated and monitoring procedure improved	4a. Manual for theft detection updated by 2017 (2014 baseline: Old and outdated manual) 4b. Operational procedures for M&I unit updated, testing laboratories upgraded, and staff capacity on AMI developed in various DISCOs by 2022 (2014 baseline: None or outdated)	4a-b. DISCOs' project progress reports	

Key Activities with Milestones

1. Outputs 1–3
1.1 Complete bidding process for tranche 1 by September 2016.
1.2 Start installation works by January 2017.
1.3 Complete tranche 1 implementation by December 2018.
1.4 Complete tranche 2 implementation by December 2019.
1.5 Complete tranche 3 implementation by December 2022.
1.6 Complete tranche 4 implementation by December 2023.

2. Output 4
2.1 Consultant hired by September 2016.
2.2 Work on operational manual started by January 2017.
2.3 Capacity building program started by June 2017.
2.4 Complete tranche 1 (support component) by June 2024.

Inputs

Multitranche financing facility
ADB: $970.0 million (OCR Loan)
ADB: $20.0 million (ADF Loan)
DISCOs: $258.0 million
Tranche 1
ADB: $380.0 million (OCR Loan)
ADB: $20.0 million (ADF Loan)
DISCOs: $110.5 million

Assumptions for Partner Financing

Not Applicable

ADB = Asian Development Bank; ADF = Asian Development Fund; AMI = advanced metering infrastructure; CIS = customer information system; DISCO = distribution company; ICB 1S2E = international competitive bidding single-stage, two-envelope; kWh = kilowatt-hour; M&I = monitoring and inspection; OCR = ordinary capital resources.
Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/RRPs/?id=47190-002-3

1. Framework Financing Agreement
2. Periodic Financing Request for Project 1
3. Sector Assessment (Summary): Energy
4. Facility Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Financial Analysis: Tranche 1 of the Investment Program
8. Economic Analysis: Tranche 1 of the Investment Program
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Environmental Assessment and Review Framework
12. Resettlement Framework
13. Risk Assessment and Risk Management Plan

Supplementary Documents

14. Feasibility Report
15. Procurement Capacity Assessment
16. Financial Management Assessment
17. Comparison of Multitranche Financing Facility and Project Loan