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PAKISTAN

PERFORMANCE MONITORING PLAN (PMP)

TARBELA HYDRO POWER STATION REPAIR & REHABILITATION PROJECT

AGREEMENT NO: 391-TDR-FARA-002-00

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1. Background

Pakistan's chronic, severe electricity shortages have created an energy crisis that threatens the country's political and economic stability. In the political domain, routine power interruptions of 10-12 hours have caused riots across the country, most notably in Karachi, where hundreds took to the streets each summer when prolonged power outages interrupted public access to potable water. In the economic realm, enormous debt in the power sector crowds out Government of Pakistan (GOP) investment in public sector essentials like health and education. Constant, prolonged power outages disrupt business, especially major manufacturing industries. During the summer of 2011, the estimated power shortage reached a high of 6,000 MW; in winter, the gap narrowed to a still serious 4,000 MW.

Pakistan's electricity shortage results from a lack of investment to maintain existing infrastructure, explore and exploit new oil and gas reserves, and build new power generation plants. Major systemic constraints impede energy sector investment. These center on: (1) diffuse policy, regulatory and management responsibilities; (2) weak managerial and technical expertise in the public energy sector that cannot achieve international standards and practices; and (3) unsustainable tariffs, prices, subsidies and payment arrangements that distort efficient operations of electricity distribution companies. The power industry's "circular debt" (about \$3 billion) arises from the GOP's inability to pay subsidized tariffs that subsequently prevent payments to independent power producers and fuel suppliers. However, without a full cost of service recovery and a rate of return on investment, the system cannot sustain or expand operations, or attract vitally-needed investment.

The U.S. Mission to Pakistan is assisting the GOP in its efforts to address these broad, systemic constraints through on-going and planned programs in energy policy dialogue and reform, investments in facility upgrades, management and operational enhancements, and support for energy efficiency initiatives. The U.S. Government's Signature Energy Program Phase I was designed for the purpose of alleviating the power crisis. Secretary of State Hillary Clinton announced during her October 2009 visit to Pakistan that this program will increase access to power and water to citizens of Pakistan in the near term through four specific actions: (1) repair of the Tarbela Dam; (2) repair of three existing thermal plants in Jamshoro, Muzaffargarh and Guddu; (3) restructuring electric distribution companies; and (4) replacement of up to 11,000 energy-inefficient tubewells pump-motor sets.

2. The Project

The Tarbela Dam is a large dam on the Indus River in Pakistan. It is located in Haripur district within the Hazara Division of the North-West Frontier Province (NWFP) about 120 km (by road) northwest of Islamabad, at a height of 485 ft (148 m) above the river bed. The reservoir size of some 95 sq mi (250 km²) makes it the largest earth-filled dam in the world. The dam was completed in 1974 and was

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designed to store water from the Indus River for irrigation and flood control, and for the generation of hydro-electric power.

The Tarbela Hydropower Station (HPS) has a nominal capacity of 3,478 MW, and is operated by the Water & Power Development Authority (WAPDA) of Pakistan. It has 14 generating units installed on three power/irrigation tunnels. The fourth tunnel has yet to be converted to a power tunnel to generate $2 \times 480 = 960$ MW of electrical power. On tunnels one and two, ten units of 175MW each are installed, whereas on tunnel three, four units of 460 MW each are installed.

The power plant has been operating up to 3,700 MW in high head during the high flow months of summer. However, the plant sometimes fails to operate at its maximum capacity.

The existing unit # 4 has a total capacity of 175 MW and can be operated at 195MW under overload conditions. However, due to damage to the generator windings, the unit could not be operated at full capacity.

The existing units 1 and 3 have a total capacity of 175 MW each though both can be overloaded up to 195 MW. If the class B stator winding is replaced with class F, this would provide an additional capacity of 20 MW each. The availability of essential spare parts for preventative maintenance will improve the reliability and availability of this power plant to a substantial degree. It would also improve the plant factor, particularly due to higher utilization in the high water months, and will ultimately lead towards increased energy output from the Tarbela power plant.

The training of O&M staff should benefit improved operations which, in turn, will result in higher generation availability of Tarbela units and higher production ultimately. WAPDA O&M staff should be trained to establish O&M at the Tarbela units in accordance with prudent utility practices.

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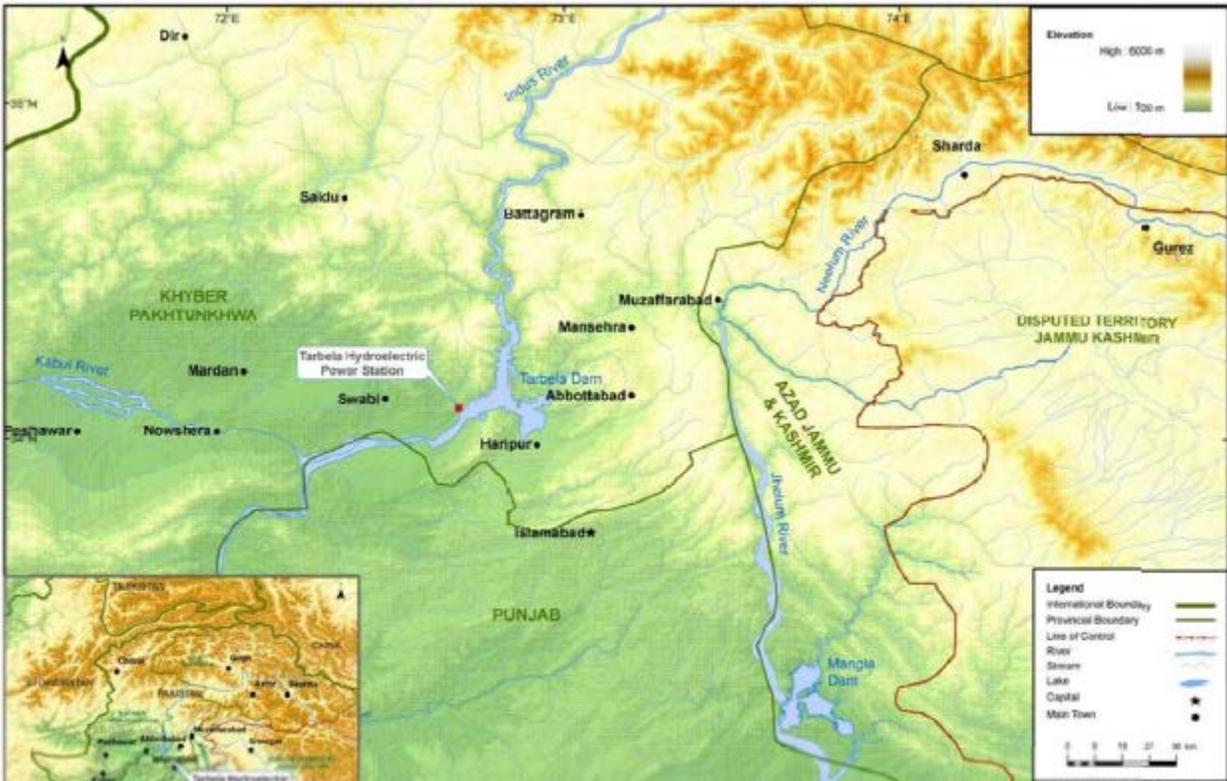


Figure 1: Project Location Map

3. USAID Contribution

USAID has allocated \$16.5 million for the repair and rehabilitation of Tarbela hydroelectric power station. This includes the replacement of old windings for three units, digital governors, SCADA system, seals, pumps and training for plant engineers.

4. Results Framework

The Results Framework presented in Figure 2 outlines the three strategic objectives of USAID Energy Office:

Objective: Increased Sustainable Energy Supplied to the Economy

- a) Gigawatt-hours (GW-h) of energy sold
- b) Hours of unplanned load-shedding
- c) Tariff Differential Subsidy

The first sub objective focuses on selected infrastructure projects by investing to help accelerate rehabilitation of existing facilities and addition of new generating capacity. Additional capacity, if utilized, can lead to increased energy sold. Program activities under this objective cover monitoring and support of ongoing projects and 'Due Diligence' for identifying and selecting new generation and transmission projects for potential USG funding as deemed appropriate by USAID.

The second sub objective focuses on providing technical assistance to support energy sector restructuring and reform. This includes supporting generation, transmission and fuel supply related studies and policy reform activities request by GOP energy sector entities and approved by USAID. It also includes the secondment of the technical staff to GOP energy sector entities (MWP, MOF, PC, and MPNR) in further development and implementation of Power Generation, Power Transmission, and Fuel Related Elements of the GOP's Power Sector and Energy Sector Reform Programs. Building capacity of the existing personnel of these public sector entities for both strategic and tactical areas is yet another feature of this objective. To increase awareness about the energy sector issues and challenges, encourage conservation, EPP is reaching out to educational institutions by organizing seminars/workshops.

The power sector entities mainly comprise of generation, transmission, distribution companies. Improvements in the financial performance of these entities will help in the overall improvement of development objective. EPP's current scope of work does involve working with some of the above mentioned companies. The set of assigned tasks can improve the financial performance of these companies. For instance, consider the circular debt issue. Among several things, the basic reason for circular debt is that the cost of generation of electricity is higher than its selling price, which requires the GOP to provide subsidies. Any business which produces at a higher cost and sells at a lower price is likely to suffer. This problem can be addressed either by increasing the selling price or decreasing the cost of generation. EPP is trying to help GOP add cheap electricity in the overall fuel mix. Addition of megawatts from repair and rehabilitation of Guddu, Jamshoro, Muzaffargarh power stations and Tarbela dam, and completion of Gomal Zam and Satpara multipurpose dam projects are going to reduce the overall cost of generation. Similarly the EPP appointed advisor, at GOP's request is assisting NPCC to implement economic despatch which if implemented will reduce the cost of generation. Percentage decrease in the circular debt will improve the cash flow positions of these entities and decrease the need for subsidies.

The highlighted indicators in the USAID results framework are for the Tarbela repair and rehabilitation projects indicators.

USAID Energy Office Results Framework

DEVELOPMENT CONTEXT

- The energy crisis manifests in load shedding, is pervasive, and affects livelihoods and private sector growth in Pakistan.
- Political interests affect decision making and reform.
- Rule of law is weak so there are difficulties implementing reforms
- The population and users of electricity are dynamic.
 - Increases in prices related to energy drive up inflation.
 - Energy demand has grown at about 6% rate over the past 6 years

CRITICAL ASSUMPTIONS

- The energy crisis and load shedding will last 3 to 4 years.
- Self-interest is interfering with progress.
 - USAID support in collaboration with other donor programs can have an impact on the development objective after several years.
 - Political will is needed to resolve the energy crisis.

DO 1: Increased Sustainable Energy Supplied to the Economy

- gigawatt-hours (GW·h) of energy sold
- hours of unplanned load shedding
- Tariff Differential Subsidy

IR 1.1: Increased Energy Supply

- number of beneficiaries with improved energy services due to United States Government assistance (4.4.1-31)
- gigawatt-hours (GW·h) of energy availability
- gap between supply and demand for power (megawatts) as result of USG assistance

IR 1.2: Improved Energy Sector Governance

- number of positive responses from citizens surveyed on transparency in the energy sector in Pakistan
- percent change in the gross annual accumulation of circular debt

IR 1.1.1: Increased Generation and Transmission Capacity

- megawatts (MW) of electrical power added or saved as a result of United States Government supported construction, rehabilitation, and other generation and transmission improvements
- efficiency of thermal power plants (British thermal units of input heat energy per kilowatt-hour of electrical output energy (Btu/kW·h))
- number of United States Government supported installations and operations and maintenance improvements of generation plants and transmission networks
- number of transmission bottlenecks resolved

IR 1.2.1: Improved Policy Implementation

- number of key policies and regulations in development stages of analysis, drafting, stakeholder consultation, legislative review, approval, or implementation as a result of United States Government assistance

IR 1.1.2: Improved Efficiency of Consumption and the Distribution Systems

- megawatts (MW) of electrical power saved as a result of United States Government support to distribution companies
- number of installations and operations and maintenance improvements

IR 1.2.2: More Autonomous Energy Sector Entities

- number of policies following international best practices developed and implemented
- number of board recommendations following international best practices implemented by public sector entities

IR 1.1.3: Increased Financial Sustainability of Power Supply

- revenue at distribution companies
- number of days in the distribution company billing and collections cycle
- number of days for fuel adjustment process

IR 1.2.3: Improved Capacity of USAID-Supported Energy Public-Sector Entities

- number of best practice-driven systems created, improved, and implemented

IR 1.1.4: Increased Non-USG Investment in the Energy Sector

- public and private funds leveraged by the United States Government for energy infrastructure projects (alternative F indicator 4.4.1-32)

IR 1.2.4: Increased constructive civil society engagement in the energy sector

- number of civil society organizations receiving United States Government assistance engaged in advocacy interventions (energy disaggregate of the democracy and governance indicator)
- number of public forums resulting from United States Government assistance in which government officials and citizens interact

5. Performance Monitoring Approach

To effectively implement the Performance Monitoring Plan (PMP), EPP applies a monitoring and evaluation system (M&E) that is set up to provide timely and credible data for analysis on progress towards achieving results. In this way project management, the United States Agency for International Development (USAID), and other stakeholders can see progress and more actively support program implementation to achieve better results. The project monitoring system is intended to supply data on indicators related to implementation, and will serve to provide information about activities and document any changes in design.

For the purposes of performance evaluation, the M&E system will focus on tracking outcomes of activity indicators to evaluate quality of implementation. In conjunction with monitoring data for performance evaluation, the results and trends will be used by management and implementing partners to make adjustments and improve results.

The M&E system is built on the following underlying principles:

Performance management: Monitoring and performance evaluation will be used for project improvement. M&E data will be reviewed during project meetings, routinely discussed with Government of Pakistan and USAID.

Data quality: The M&E system places a heavy emphasis on ensuring data quality through activities including the documentation of data collection procedures, data on key indicators, and monitoring or auditing of collected data.

Adaptability: The M&E system will follow a dynamic process that will allow it to adapt to changing circumstances. The focus will be on regular review of data to ensure that it is fulfilling its function.

6. Performance Monitoring Indicators and Activities

Performance monitoring indicators for Tarbela repair & rehab project are selected to measure progress towards stated objectives at the activity, intermediate result and sub-intermediate result levels. These are a combination of custom-made and standard indicators.

Table 1 provides the indicators, targets, frequency of collecting data for progress monitoring, level of disaggregation, and data sources.

Table 1: INDICATORS AND DATA COLLECTION PLAN

Indicator	FY 2013 Target	Disaggregation	Data collection schedule	Data source
Intermediate Result 1.1: INCREASED ENERGY SUPPLY				
1.1 (a) Number of beneficiaries with improved energy services due to United States Government assistance (4.4.1-31)	Target already achieved	National Level	Quarterly	Data is provided by Energy Policy Project (EPP), and derived from the megawatts data collected from the GOP implementing partner (WAPDA/Tarbela) and duly verified for onward submission to USAID
Sub-Intermediate Result 1.1.1: INCREASED GENERATION AND TRANSMISSION CAPACITY				
1.1.1 (a) Megawatts (MW) of electrical power added or saved as a result of United States Government supported construction, rehabilitation, and other generation and transmission improvements	Target already achieved	Project locations and utility-wise	Quarterly	Data is provided by Energy Policy Project (EPP) and collected from WAPDA/Tarbela, and duly verified for onward submission to USAID
1.1.1 (c) Number of United States Government supported installations and operations and maintenance improvements of generation plants and transmission networks	1	Project type plant location and type of generation installation (hydro, thermal, etc.) and utility wise	Bi-annually	Data is provided by Energy Policy Project (EPP) and collected from WAPDA/Tarbela, and duly verified for onward submission to USAID

2 Data systems

The key prerequisite for project success is a well-established data system that ensures that

- a) information about project activities is captured on time and the data is of high quality; and
- b) the data is used to make programmatic decisions.

Database: A database system will be set up to monitor and evaluate data. It is suggested that Microsoft Excel be used as a tool for storing data. It can easily generate reports, as well as tables, charts, and bar graphs. The database will be developed to ensure easy data transfer from partners and organizational beneficiaries, since the GOP implementing partners are familiar with Microsoft Excel

Data quality: Data quality refers to the extent to which the data adheres to six, specific dimensions of quality, which include: accuracy, reliability, completeness, precision, timeliness and integrity¹. Table 2 articulates the mechanisms the EPP data system will put in place to ensure high quality of M&E data.

Table 2. OPERATIONAL DEFINITIONS OF DATA QUALITY

Dimension of data quality	Operational definition	EPP Data System
Accuracy (Validity)	Accurate data are considered correct: the data measure what they are intended to measure.	To assure data accuracy of the program monitoring indicators, M&E staff will help make each indicator “operational” and data will be impromptu spot-checked on a regular basis.
Reliability	The data generated by a program’s information system are based on protocols and procedures that do not change according to who is using them and when or how often they are used. The data are reliable because they are measured and collected consistently.	Forms and protocols for data capturing are being developed early in the project to assure data consistency. M&E staff in conjunction with field engineers will develop data collection procedures.
Completeness	Completeness means that an information system from which the results are derived is appropriately inclusive: it represents the complete	Procedures to ensure completeness of the data will be included in the data collection procedures developed for each method of data collection activity.

¹ The table is based on the six dimensions of data quality as outlined in *Data Quality Assurance Tool for Program-Level Indicators*, USAID, 2007.

	list of eligible persons or units and not a fraction of the list.	
Precision	Precision means that the data have sufficient detail. An information system lacks precision if it is not designed to record variables that may be required later for disaggregation.	Disaggregation categories for each indicator will be established in accordance with this Performance Monitoring Plan and reflect project's goals and objectives.
Timeliness	Data are timely when they are up-to-date (current) and when the information is available on time.	Program monitoring data will be collected as the project activities occur and according to the schedule. The M&E staff will coordinate data collection, data entry into the database, and data verification.
Integrity	Integrity is when data are generated by a program's information system are protected from deliberate bias or manipulation for political or personal reasons.	Data integrity will be assured through manual verification of entered data by staff other than the original data entry person.

Data processing. A database entry and management procedure will be set-up in consultation with the M&E and Information Technology (IT) staff. It is anticipated that the M&E along with the IT staff will take primary responsibility for database management. The M&E staff will be responsible for the schedule of data entry, data verification, and data checking.

Data security. The M&E staff will assume primary responsibility for regular security management of the data and database, and will take backups as scheduled. Members accessing the database will have unique username and password protected login information.

Data utilization. The M&E staff will use the periodic findings of performance evaluations to inform the management team of progress. The management team will make course corrections in response to indicators that show discrepancies between planned and achieved targets at each reporting period. The flow of data through reports to USAID will also serve as a tool for program sector and mission-level decision-making regarding lessons learned best practices and gaps in programming.

3 Performance Evaluation

Performance evaluation by EPP, formal and informal, is a continual process to ensure WAPDA/Tarbela is in compliance with the contract and responsive to the evolving needs and priorities of USAID. Basis for the evaluations will be analyzing qualitative and quantitative information. The evaluation of EPP is designed to generate information to (a) provide

feedback on how well the Project is working; (b) provide feedback on where the project may need adjustment and/or fine tuning; and (c) provide USAID with information on whether the outputs and outcomes are being achieved as planned. All completed activities, for example, will be reviewed by the principles and management to apply lessons learned towards on-going and future activities.

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