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PAKISTAN UTILITIES ACQUIRE TECHNIQUES & TECHNOLOGIES FROM SOUTH AFRICA TO IMPROVE ELECTRICITY DELIVERY

EXECUTIVE EXCHANGE TO JOHANNESBURG & PRETORIA, SOUTH AFRICA

WASHINGTON, DC – Senior engineers and managers from Pakistan’s largest electricity distribution utilities recently gained exposure to high-impact, low-cost methods to improve electricity distribution and reduce energy losses by meeting with leading utilities in South Africa, as part of an ongoing project supported by the U.S. Agency for International Development (USAID).

USAID’s Power Distribution Program is a three-year project aimed at working jointly with government-owned electric power distribution companies in Pakistan to improve their performance in the areas of loss-reduction, revenue collection, and customer services. As part of the Power Distribution Program’s capacity-building efforts in Pakistan, a delegation of twelve distribution experts engaged in meetings, presentations, roundtable discussions, and technical site visits in Johannesburg and Pretoria to identify the latest strategies and technologies utilized throughout South Africa’s electricity distribution sector.

Key training providers in South Africa included Eskom Distribution, Johannesburg City Power, and the City of Tshwane’s Energy & Electricity Division.

EXECUTIVE EXCHANGE HIGHLIGHTS

The weeklong program focused on planning, engineering and operations for electricity distribution, with emphasis on the relevance and applicability of advanced techniques and technologies for the Pakistani distribution sector. Core topics addressed included demand forecasting, demand side management and loss reduction strategies.

At right, the Pakistani delegation assembles outside Eskom’s National Control Complex at Megawatt Park near Johannesburg, after touring Eskom’s meter repair and testing facility, regional control center, and dispatch center. Bandile Jack, Operations & Maintenance Manager (standing, far left) and Pravind Orrie, Business Strategy & Performance Manager (kneeling, third from left) organized the visit for Eskom Distribution. Eskom is South Africa’s largest utility and the largest producer of electricity in Africa.



RELEVANT TOPICS

Advanced condition monitoring tools used in the field by Johannesburg City Power employees, but not widely used in Pakistan, were of significant interest to the delegation. Condition monitoring devices, such as thermal scanners and acoustic monitors, track machinery changes that may indicate imminent failure. The devices used in South Africa and shown to the delegation were affordable, widely available and easy-to-use. Most importantly, they allow distribution workers in the field to detect faults in electrical equipment before they occur, thus preventing major outages, preserving equipment, and increasing worker safety as well.



At Eskom's Regional Meter Testing & Repair Center in Johannesburg, the delegates witnessed live testing and repairs of both analog and newer digital and AMR meters.

Automatic meter reading (AMR) is another technology being widely deployed in South Africa that was of particular interest to the Pakistani delegation. AMR provides numerous benefits to distribution utilities and their customers alike. Benefits include reduced meter reading expenses, increased accuracy, improved reliability, reduced likelihood of tampering or theft. It provides customers the flexibility to pre-pay for electricity, while empowering them to monitor usage online and track expenses. The delegation was particularly impressed that one small facility with a limited staff was responsible for the testing and repairs of all meters within the densely populated central province served by Eskom Distribution. This efficiency was made possible by the aggressive rollout of AMR technology.

Loss reduction was an additional popular topic with the delegation, as their distribution companies face significant challenges in this area. Eskom's experts in the areas of theft prevention and detection explained how an integrated approach to the problem has effectively reduced losses. This approach includes public advertising about the health risks and societal harms of electricity theft, national legislation enabling utilities to remove meters and other electrical equipment after the third confirmed case of theft or tampering, split metering, steel enclosures and house audits.

BACKGROUND ON PAKISTAN'S POWER & ELECTRICITY DISTRIBUTION SECTOR

Pakistan's power sector is confronted by significant challenges, including limited availability of reliable and affordable electric power, aging and inadequate transmission and distribution networks, and utility policies and practices that lag those of advanced utilities. For distribution utilities in Pakistan, these deficiencies translate into levels of financial performance that are not self-sustaining. Yet financial self-sufficiency is critical, as Pakistan's power industry is undergoing sweeping changes, including transitioning from Government-owned utilities to fully autonomous companies that will engage in power generation, transmission, and distribution under the Government's reform agenda. A similar industry structure exists and functions smoothly in many other countries today. In Pakistan, however, outdated policies, procedures and work practices, as well as low investment in infrastructure, are barriers to a successful transition. The PDP was designed to overcome those barriers.



Johannesburg City Power's utilization of condition monitoring diagnostic equipment was of particular interest to the delegation, as it enables field staff to detect faults before they occur.

EXECUTIVE EXCHANGE RESULTS

The Pakistani delegation had the opportunity to witness the approach of three unique and advanced electricity distribution utilities for one week in South Africa. These utilities shared many of the challenges experienced by those in Pakistan, and with varying levels of financial, technological and human resources to solve those challenges. While planning, engineering and operations were the foundational topics throughout the week of training, other topics including tariff policy, voltage standards, and live-line transmission system work were also included to provide an intensive, integrated program designed to improve knowledge, skills, and understanding of best practices throughout Pakistan's electricity distribution system.

As a result of this program, the delegation:

- Witnessed **live-line transmission network work** performed by an American company with operations in South Africa and in South Asia. This powerful demonstration of system maintenance while avoiding outages has real applicability in Pakistan.
- Learned that **condition monitoring equipment** does not have to be expensive nor difficult to train employees how to use. One delegate stated that the presentation in this area "made the entire trip worthwhile."
- Understood that **loss reduction** requires numerous simultaneous approaches to be most effective. These include marketing, detection, incentivizing employees, and empowering consumers.
- Gained understanding in **geographic information systems (GIS)** and their value to both planners in the office as well as employees working in the field.



Eskom Distribution provided a tour of one of its newest substations in the suburbs of Johannesburg, the Beyers Substation featuring 11kV switchgear, built to handle urban development that coincided with the 2010 FIFA World Cup.



Johannesburg City Power's Zimu Technical Training Center provides safety instruction to the utility's employees throughout their professional development. Proper techniques for testing field equipment were demonstrated as part of the delegation's training.

- Observed both modern and older **SCADA** systems, and received information on the hardware and software considered necessary to implement SCADA today.
- Received detailed specifications of advanced **communications systems** that have replaced analog radio communications as the new standard for linking meters, equipment, and workers with control rooms and dispatch centers.
- Toured an efficient coal-fired **power generation facility** to see a low employee – to – megawatt ratio operation in practice, and better understand the corporate and employee culture in South Africa.
- Evaluated different **software packages** for planning purposes, including PowerFactory and PSSE.
- Established strong **professional relationships** with experts in numerous areas of electricity distribution with three separate utilities in South Africa. These contacts all offered to answer follow-on questions or provide advice to the delegates after they returned to their duties in Pakistan.

HOST ORGANIZATIONS

- Eskom Distribution
- Johannesburg City Power
- City of Tshwane, Energy & Electricity Division
- Quanta Services

UTILITY EXCHANGE PROGRAM PARTICIPANTS

- **Shahbaz Ahmad Khan**, Company Secretary, Multan Electric Power Company (MEPCO)
- **Zia-ur-Rehman**, Superintending Engineer, MEPCO
- **Muhammad Arshad Rafiq**, Operations Manager, Lahore Electric Supply Company (LESCO)
- **Muhammad Saleem**, Superintending Engineer / Manager (Operation), LESCO
- **Syed Hassan Fazil**, Superintending Engineer, Peshawar Electric Supply Company (PESCO)
- **Arbab Khudadad Khan**, Superintending Engineer, PESCO
- **Khalid Nazir**, Superintending Engineer, Islamabad Electric Supply Company (IESCO)
- **Abid Iqbal**, Superintending Engineer / Manager (Operation), IESCO
- **Mohammad Rafique Noonari**, Superintending Engineer, Quetta Electric Power Company (QESCO)
- **Habib-ur-Rehman**, Superintending Engineer, Sukkur Electric Power Company (SEPCO)
- **Ghulam Muhammad**, Manager (Marketing & Tariff), Gujranwala Electric Power Company (GEPCO)
- **Munawar Nazir Abbasi**, Superintending Engineer, Hyderabad Electric Supply Company (HESCO)



The delegation witnessed live-line transmission repair and maintenance work performed by Quanta Services for Johannesburg City Power. The techniques employed here improved electricity delivery in South Africa during the 2010 World Cup, and could be utilized in Pakistan to minimize outages during line work.