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**PILOT PROJECT PLAN TO INTRODUCE  
HANDHELD METER READING TECHNOLOGIES  
AT THE KOMITAS ELECTRICITY  
DISTRIBUTION NETWORK IN ARMENIA**

**Contract No CCN-Q-00-93-00152-00  
Delivery Order No 15  
Armenia Commercial Reform**

*Final Report*

*Prepared for*

United States Agency for International Development  
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TECHNOLOGIES AT THE KOMITAS NETWORK IN ARMENIA**

**1. INTRODUCTION**

This brief report provides an overview of the pilot project to introduce semi-automatic metering system to Komitas distribution company in Yerevan, Armenia <sup>1</sup> Komitas serves about 24,000 customers, over 80 % of them residential. Specifically, the following aspects of the process are discussed

- ▶ Background to the project including objectives of the pilot,
- ▶ Metering system description,
- ▶ Project implementation activities,
- ▶ Respective Hagler Bailly and Komitas duties,
- ▶ Conclusions

**2. BACKGROUND**

Komitas, together with other distribution companies in Armenia, experienced low collection levels for actually delivered electricity that resulted in significant payment imbalances. Komitas is one of the pilot project areas included in the electricity distribution pilot project undertaken as part of Delivery Order no 12. In that project, a metering, billing and collection system was implemented, improved business practices put in place, and equipment procured to revamp the metering, billing and collections processes at the distribution utility.

Based on an examination of the situation at Komitas, a number of additional problems were identified. These include (1) a paper based system of recording meter reads which have to be rekeyed into a database, this leads to data transcription errors and is a time-consuming as well as cumbersome process, (2) extremely low meter reader productivity, (3) poor internal controls in the meter reading process, (4) insufficient information available to the meter reader to be able to detect possible meter tampering.

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<sup>1</sup> This pilot project is being undertaken as part of Delivery Order no 15 of USAID contract CCN-0002-Q-15-3152

As a result of this review, it was determined that a novel pilot experiment would be to test the effectiveness of handheld meter reading devices. These devices are essentially small handheld computerized devices into which the meter reader records meter readings. The devices provide the meter reader with information about past readings and can detect suspicious meter readings through high/low checks of past usage. This same type of system had also been recommended for implementation by the project team investigating the project components for the World Bank transmission and distribution rehabilitation loan.

The objectives of this pilot are several:

- ▶ To assess the performance of this system and its applicability in the Armenian power sector, specific factors to be investigated include the cost effectiveness of the technology and the potential role it can play in improving internal financial controls within the distribution utility,
- ▶ To reduce the number of errors through the integration of this metering system with the billing system to permit direct data flow,
- ▶ To improve control over meter reader work and significantly increase meter reader productivity.

The implementation of such a semi-automated metering pilot is a prudent step towards investigating ways to improve metering, billing and collection processes. The current paper-based system is inadequate, while fully automated metering systems are not cost-effective for residential customers. Further, automated metering systems are considered too complicated to be implemented now in Armenian circumstances, given implementation issues being confronted in other countries deploying automated meter reading technologies.

Project team staff and Komitas representatives met on numerous occasions to work through the details associated with project implementation. This included:

- ▶ To discuss how this metering system will be integrated with the billing system,
- ▶ To specify the roles of both Hagler Bailly and Komitas,
- ▶ To develop the steps required for successful implementation.

All participants agreed in principle to the process. It was decided that Hagler Bailly would coordinate the project, contact vendors, develop requirements for the metering system and assist in implementation including staff training.

### **3. METERING SYSTEM DESCRIPTION**

Handheld metering equipment manufactured by U.S.-based Logicon was procured for this project. Logicon is a vendor with a significant experience in supplying utilities with such systems. There are several components to the meter reading system:

- ▶ Handheld computers – used by the meter reader use to collect meter readings,

- ▶ RouteManager – a trademark software that consists of about 50 programs that control all aspects of operations from downloading empty routes into handheld computers to uploading read routes into the billing system,
- ▶ ChargerLink – equipment to charge the handheld devices and to download and upload routes between them and PCs where the RouteManager software is installed

To make the system easier to use in Armenia, a number of modifications have been made to the original system design. This includes customization of the internal software of the handheld device to provide information sought by Komitas management and to display all information in the Armenian language. Additionally, the metering, billing and collection program has been modified to permit information to be uploaded and downloaded directly from the handheld devices into the program, thus eliminating the need for data to be rekeyed.

The handheld system works in the following manner:

- ▶ Empty routes are downloaded from the billing system into the same directory where the metering system is located,
- ▶ Those empty routes are uploaded into appropriate handheld computers during a transmission session,
- ▶ Handheld meters are unplugged and given to meter readers who collect meter readings on their assigned routes,
- ▶ Upon return to the office, the handheld computers are plugged back into ChargerLink,
- ▶ Routes are uploaded from handheld computers into the same directory where RouteManager is located,
- ▶ After checking for data integrity, routes are loaded into the billing program where the meter data is used to prepare bills for customers.

#### **4. PROJECT IMPLEMENTATION**

The project to implement handheld meter reading consists of three distinct phases:

- ▶ Project scoping and requirements assessment
  - Development of bid requirement documents,
  - Evaluation of bids and vendor selection,
  - Analysis of handheld data display needs,
  - Analysis of integration needs between the metering and billing system,
  - Customizing the RouteManager program to meet Komitas needs

- ▶ Testing and training
  - Delivery of metering system to Armenia in laboratory conditions,
  - Training of Komitas staff in operations and meter read acquisition,
  - Assessment of further needs based on this initial implementation
- ▶ Implementation at Komitas
  - Finalization of metering capabilities based on initial testing,
  - Installation of the metering system at Komitas,
  - Integration with the billing system,
  - Supervised implementation

## **5. RESPECTIVE DUTIES OF HAGLER BAILLY AND KOMITAS**

Hagler Bailly has taken responsibility for the following duties

- ▶ Specify, select and procure equipment,
- ▶ Modify metering, billing and collection system to upload and download directly into the handheld devices,
- ▶ Modify the software for the handheld meter reading devices to permit the display to show in the Armenian language,
- ▶ Provide training in the use of the handheld metering system,
- ▶ Evaluate the results of the project

Komitas management agreed to the following

- ▶ Participate in the development of the handheld computer displays, including identifying the kind of information that should be displayed for the use of the meter reader,
- ▶ Identify staff for training,
- ▶ Implement the project and permit Hagler Bailly, USAID or any other party so designated by USAID to access information about the system to permit proper project evaluation,
- ▶ Undertake proper care and maintenance of the equipment,
- ▶ Implement the equipment at the Kievyan local office of Komitas

The equipment and software modification costs of the pilot are shown in the following table

<i>Equipment &amp; Services</i>	<i>Approximate Cost</i>
Handheld meter reading equipment and accessories (8)	\$21,500
Charger and uploading/downloading equipment (2)	\$8,000
Software license (1)	\$2,500
Modification of the metering, billing and collection system to permit uploading and downloading of information from the handheld equipment	\$600
Total	\$32,600

## 7 ENVIRONMENTAL ASSESSMENT

The equipment procured as part of this pilot project is simply computerized equipment already in use at numerous utilities. The project team was unable to identify a single negative environmental consideration associated with use of this equipment.

## 8 CONCLUSION

This pilot project is an important and highly visible effort to improve the metering, billing and collection practices at the distribution companies. This project offers an opportunity to provide a number of benefits. These benefits include the following:

- ▶ Improve the meter reading process by eliminating some manual operations,
- ▶ Improve meter reading accuracy,
- ▶ Introduce a new technology that replaces paper processes and increases the speed and efficiency of the meter reading process.

Most importantly, the project provides an opportunity to evaluate the cost-effectiveness of this technology in Armenia. Handheld equipment has been discussed as a possible technology for some time. Some have questioned the equipment's cost-effectiveness given the cost of the equipment. Others have felt that it is an important step towards increasing the financial controls in the metering, billing and collection process. Still others have felt that an even more advanced type of handheld equipment (with ability to read meters via an optical port) should be considered.

for implementation <sup>2</sup> This project provides an opportunity to gain actual field test and user experience with the technology to be able to assess its longer-term usefulness in the Armenian power sector

Finally, it should be noted that the link between the handheld equipment and the project team's metering, billing and collection software system offers considerable potential for use not just in the electricity sector but in the gas sector as well. In its present configuration, the technology could also be immediately deployed in the natural gas distribution sector

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<sup>2</sup> This step would also require replacement of current meters with electronic meters having an infrared port