

USAID, New Delhi

Water and Energy Nexus Project, Phase II: Quarterly Report June 2006

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Submitted Under Contract Number: GS-10F-0052P Order No. 386-O-00-04-00189-00

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1. Introduction

1.1 Background

The Water and Energy Nexus Project (WENEXA) Project falls under the Indo-US Bilateral Agreement entitled Energy Conservation and Commercialization between the Governments of India and the United States. The Ministry of Power is the authorized nodal agency representing the Government of India within the context of this agreement. The agreement finances various energy conservation initiatives and also includes the USAID Distribution Reform Upgrade Management (DRUM) program that comprises: 1) DRUM technical assistance and demonstration project; 2) Training Initiative; 3) Rural electrification technical assistance through an agreement with the US Department of Agriculture’s Rural Utility Service (RUS); and, 4) the Water and Energy Nexus Activity. The two Governments have organized a DRUM Project Advisory Committee (PAC) to ensure joint coordination of this initiative.

The activities under this project support USAID’s Strategic Objective (SO) 16. Improved Access to Clean Energy and Water in Selected States. Performance indicators associated with this SO include:

1. Number of men and women that have access to improved power supply.
2. Number of men and women with access to sustainable water supply.
3. Number of tons of CO2 avoided.

WENEXA II responds to IR 16.2: Improved groundwater management in selected states. Intermediate results include the following results: 1) Adoption of energy efficient pumps; and, 2) Number of hectares of cropland under improved irrigation techniques. The WENEXA Project also respond to a common indicator that reflects the number of people benefiting from USAID physical infrastructure programs not already identified in an indicator above.

The WENEXA Project includes the following components and tasks.

Component A: Policy Dialogue

- Task 1. Support Development of Energy and Water Co-Management Framework
- Task 2. Provision of Central and State Level Programmatic and Institutional Support
- Task 3 Support Institutional Arrangements and Capacity Building for Sustainable Water Resources Management in Target Areas

1 Improved power supply is defined by the number of new connections and the increase in hours of electricity supply per day within a defined geographic area.

2 Standard equations will be used to estimate the amount of CO2 avoided through adoption of energy efficient technologies and practices.

3 Use of energy efficient pumps is a key measure for the adoption of technology for improved water-energy management.

4 Adoption of improved irrigation techniques (such as drip or sprinkle) is a key measure for water end-use efficiency.

Component B: Sector Reforms—Site Based Activities

- Task 4. Provide Site Based Activities to Enhance Commercial Power Distribution and Sustainable Water Management in Agriculture

- Task 5. Support Basin Level Hydrological Information Collection and Analysis in Target Areas
Task 6. Provide Site Based Support to Improve Urban Energy/Water Accessibility, delivery, efficient use, and waste management
Task 7. Support to Improve Water Service Delivery, Reliability and Pollution Reduction in the Industrial Sector

Component C: Customer Service and User Group Participation

- Task 8. Develop and Implement a Communication Strategy with the Engagement of Civil Society/Industrial groups to extend and promote water energy concepts and technologies
Task 9. Design of Participatory Models to Improve Local Ownership and Management of Rural Power Distribution
Task 10. Promote Sustainable Water Resources Management through Grass Roots Institution

2. Task-Specific Activity Highlights

During the March through June 06 Quarter, the Water and Energy Nexus Project focused on the following activity areas:

2.1 Task 1. Support Development of Energy and Water Co-Management Framework

2.1.1 Interaction with the Power Trading Corporation (PTC) related to pumpset efficiency financing through Energy Service Companies (ESCOs)

From June 16 through July 4, USAID, PA Consulting and the Power Trading Corporation held three meetings to discuss the potential role PTC could play in facilitating investments in pumpset efficiency in groundwater irrigated agriculture. PTC is currently involved in power trading, obtaining a fee of 4 paise per KWh. It now has an interest in expanding its business into energy efficiency and is concluding an agreement with PCRA to jointly pursue such projects. Its exposure to ESCO-arrangements is primarily in the context of the industrial sector. Its interest in WENEXA would be in facilitating arrangements for the payment security arrangement and providing a comfort factor between utilities and ESCO's. Over the short term, it is not interested assuming the performance risk as an ESCO. However, it is interested in supporting project structuring and placing the "savings" from energy efficiency projects for onward sale to higher tariff category consumers. For this it would charge a standard fee for trading the savings. In partnering with WENEXA, PTC has agreed to assist in developing the project structure and financial engineering, including payment security mechanisms to make the structure acceptable to the ESCO, assist in marketing the project to potential ESCOs, and assist the utility in decision-making towards selection of an ESCO. In the longer term PTC wishes to perform in the role of a power trader.

2.2 Task 2. Provision of Central and State Level Programmatic and Institutional Support

2.2.1 Karnataka Policy Activities

Interaction with the Karnataka Electricity Regulatory Commission

During a joint meeting between NABARD and BESCOM on February 16, the Managing Director of BESCOM, agreed in principle, to a third-party contracting arrangement with an Energy Service Company to finance the pumpset efficiency DPR recommendations. He offered the caveat that the KERC would need to agree in advance to maintain BESCOM's current power quotation and IP set tariff, including maintaining the cross-subsidy in place, to cover the cost of investment. A number of meetings were scheduled for April 4, May 15, May 26 and May 29. All were postponed on short notice by KERC. Thus, this issue remains outstanding.

Interaction with NABARD Karnataka Regional Office

On June 1, the WENEXA team met with Dr. Rahman Khan of the NABARD Regional office to introduce new WENEXA team members and to discuss NABARD's comments on the pumpset and irrigation

efficiency detailed project reports. NABARD's comments related primarily to the energy efficiency report. They suggested that more information be included regarding retrofication as an alternative to full replacement. They were also interested in seeing the groundwater augmentation program included in the DPRs, but we explained that those issues are addressed in the watershed development plans that our NGO, IYD, is currently conducting. They also said that the implementation arrangements need to be more fully described in particular, the business model for financing the pumping systems seemed lacking. The WENEXA team agreed that the implementation arrangements had not been finalized and that there was a need to get the important government stakeholders to discuss roles and responsibilities. We stressed that a Water and Energy Service Company arrangement was the preferred strategy for financing both the energy and irrigation investment components, but that this could not go forward without clearance from the KERC that BESCOM would retain benefits from the energy savings to finance the pumpset investments and the administrative cost and profits related to the irrigation investments. Once this had been agreed, then it would be important NABARD to bring BESCOM, the Horticulture Department, and the Sericulture Department on how financing arrangements based on energy savings and micro-irrigation subsidies could be arranged to secure the ESCO investments. Dr. Khan suggested that once the KERC had taken a decision that the WENEXA project should draft an implementation plan for the investment. Once the plan was drafted, NABARD could coordinate a meeting with the key stakeholders.

Interaction with BESCOM

The WENEXA team interacted with BESCOM staff throughout the quarter. The primary focus was on preparing the presentation to KERC on the ESCO concept and associated quota and tariff issues associated with financing through energy savings resulting from demand side management. However, on May 5, WENEXA was informed that Mr. Kumar Naik, the Managing Director, had been transferred. On June 2, the WENEXA team met with the new Managing Director, Mr. Gonal Beemappa. It was evident from the meeting that BESCOM was not now continuing to agree to finance the HVDS upgrades for Doddaballapur Feeder Lines DF 12 and 13, a pre-requisite for pumpset replacement. Furthermore, the Technical Director expressed new concerns about the ESCO financing concept that had not been raised earlier.

Karnataka Power Trading Corporation, Ltd. (KPTCL)

On June 2, WENEXA's COP met with Mr. Bharatlal Meena, IAS, Managing Director of KPTCL. During the course of the meeting, the MD noted that he expected that BESCOM would move forward with implementation of the DRUM DPR, which includes the implementation HVDS on Feeders 12 & 13 and is a prerequisite to implementing WENEXA's efficient pump-set pilot project, once the DRUM DPR review was done by a sub-committee of the Board of Directors and after all funding issues were concluded.

2.2.2 Andhra Pradesh Policy Activities

Shifting policy activities from Andhra Pradesh to Karnataka was discussed with the CTO on June 12. The last interaction with the Technical Coordination Group was in November 2005. It was suggested that a final workshop that outlines the results and findings from the WENEXA technical assistance activities be conducted to close this out. Future policy work at the state level would take place in Karnataka in association with the site based activity in groundwater irrigated agriculture in Doddaballapur.

2.3 *Task 3. Support Institutional Arrangements and Capacity Building for Sustainable Water Resources Management in Target Areas*

Nothing to report

2.4 *Task 4. Provide Site Based Activities to Enhance Commercial Power Distribution and Sustainable Water Management in Agriculture*

2.4.1 Progress towards Performance Targets

Number of Energy Efficient Pumpsets

The Results Indicator Target for FY 2006 is the testing, retrofication, or testing of 66 energy efficient pumpsets at the Doddaballapur site in Karnataka. IYD, the local NGO providing field based assistance to the local farming community here, has noted that farmers have not installed new energy efficient pumpsets in this area, not doubt in anticipation of the proposed pumpset replacement program. Financing for the replacement program is in limbo, awaiting a fresh commitment from BESCO to finance the requisite system upgrades to support operation of energy efficient pumps and agreement for a third party contractual arrangement with an ESCO investor. Without these necessary conditions being met, financing of the pumpset efficiency program cannot likely go forward.

Number of Hectares of Groundwater Irrigated Area under improved irrigation techniques

The Results Indicator Target for FY 2006 related to improvements in irrigation techniques is 50 hectares. This target has been met with 134 acres, or 54 hectares, being shifted from flood to drip irrigation during the period of October 1, 2005 through June 30, 2006. This constitutes 11% of the total irrigated area. Updated population information shows and area population of 17,000, 58% males and 48% females. Thus, 1870 people have benefited from improved water supply, 972 males and 898 females. At the inception of the Project, drip irrigation was used on only 10% of the area. Over the course of the two years WENEXA has been active at this site, drip irrigation has increased to 34%, with 40% of the mulberry area and 75% of the grape area using drip irrigation systems.

Common Indicator

Approximately 500 hectares of cropped area are irrigated with groundwater in the Project agricultural site based activity in Karnataka. WENEXA will facilitate investment in improved irrigation and irrigation pumpset energy efficiency which can reduce groundwater use by 40-50% thus improving water supply for village and farm communities in the Project site area. In FY 2005, the Project improved efficiency of 10.5% of the irrigated area and 8.5% of the operation pumpsets, thus, improving supply to 2347 people, 52% of which are men and 48% of which are women. During FY 06 and as of June 30 2006, the Project has facilitated improvements in irrigation on 54 hectares benefiting 11% of the population. Based on updated information, the total population size of the Project area is 17,000. Thus for FY 06, the total population benefiting from improved water supply is 1870, 972 males 898 females. The cumulative total is 4217, 2193 males and 2024 females.

2.4.2 Pumpset Replacement Program

Pumpset Replacement Case Study

The WENEXA project completed a case study of the pumpset replacement program requested by the DRUM Project Advisory Monitoring Committee. In September 2005, the WENEXA Project installed 15 energy efficient pumpsets in exchange for farmers shifting at least one acre of flood irrigated crops into drip irrigation. The case study is based on information obtained from the vendor that installed the 15 energy efficient pumpsets at the Project site area who measured power consumption (watts) and water discharge (Liters per minute) for the old and new pumpsets. He also measured the new pumps again in March 2006. IYD obtained information from the farmers on the performance of the new pumpsets and their conclusions about the number of pumping hours per week for both the old and new pumpsets. IYD also documented that the pilot farms, after initially agreeing to install 50 acres of drip irrigation, had been so satisfied with the results that as of March 2006, they had installed a total of 65 acres of drip. The major findings of the case study were: 1) Energy efficient pumping systems in combination with drip irrigation led to a 71% reduction in electricity use and a 61% reduction in water use from that of the inefficient pumping system in combination with drip irrigation systems; 2) energy efficient pumpsets were already beginning to fail after six months due to poor system voltage; and 3) 100% of the pilot farms are highly satisfied with drip irrigation and are finding it increases crop yields and lowers production input costs.

June 06 Pumpset Pilot Farm Data

In the data provided with IYD's June Quarterly report, an additional 4 acres has been shifted into drip irrigation. The poor voltage quality continues to plague operation of the pumpsets, with farmers reporting that 8 of the 15 pumpsets have burned out in within less than a year of operation.

2.4.3 Baseline Data Reconciliation

At the end of March, IYD completed the update of the water and energy user survey which reconciled the farmers with the IIEC pumpset inventory. The data was refined and a unique farmer number was assigned to the 653 pumpset farmers, the 58 borewell control farms, and 336 rainfed farms that were interviewed. The original data sheets were organized according to unique farmer number, copied and scanned.

2.4.4 Project Area Maps

Using the new data from the IYD Water and Energy User Survey and IIEC's network and pumpset inventory, IIEC completed a distribution network map with the locations of pumpsets, transformers, high tension and low tension from both feeder lines. It also completed a present land use map which provides the land use for the area based remote sensing information and cropping for the surveyed farmers. These maps can be used for making crop plans, watershed plans, proposed land use plans, and plans for improving network distribution.

2.4.5 Watershed Development Planning

A meeting was held with IYD on June 2 to review their current program plans. The approach IYD will use for the watershed development planning was discussed which essentially serves as the DPR for the groundwater augmentation investments. We agreed that they will use the standard NABARD Watershed Development Planning Guidelines for developing a plan for Melekote Gram Panchayat. Plans have already been developed for the other four Gram Panchayat areas. Once the Melekote plan is drafting, IYD will integrate the plans from the other Gram Panchayats into a project area plan that covers only the area served by BESCOM's Doddaballapur Subdivision Feeder Lines 12 and 13.

2.5 Task 5. Support Basin Level Hydrological Information Collection and Analysis in Target Areas

The Project obtained baseline watershed maps from the Watershed Department to begin the mapping exercise to support the water balance analysis. A tender notice for the activity was completed under contract to IIEC. However, due to uncertainties about the investment program going forward, this activity is on hold until issues with BESCOM can be resolved.

2.5 Task 6. Provide Site Based Support To Improve Urban Energy/Water Accessibility, delivery, efficient use, and waste management

This activity's main achievement through June includes 1) completion of the detailed project report and submitted to NMC and MahaGenco for review; comments received and incorporated in the final report and 2) hi-level process and decision meeting with USAID, NMC, MahaGenco, and PA Consulting Group (meeting held at Mantralya on June 22 with Messrs. Patil (GOM), Commissioner Lokesh Chandra, Prakash Urade (NMC) and Goel and Pampanwar (MahaGenco) and the WENEXA team. Ms. Nutan Zarapkar from USAID/Mumbai also attended the meeting).

PA provided a status of the WENEXA project and excerpts from the executive summary of the project feasibility report findings on each project option and associated cost. Three potential project structures were selected for discussion; each one involves the construction of a new STP (secondary) and tertiary treatment plant and a pipeline. Main differences are on location and costs. Option No. 1 or supply through Pioli Nadi (North Zone) has been selected as the preferred option.

Overall, MahaGenco has accepted the feasibility report after extensive review of each option presented. The following items were agreed upon:

For NMC

- Land acquisition to start immediately with funds sanctioned under CDP and Commission resources; of the 30 ha under D.P. reservation; this project needs ~12 ha, of which ~6 ha is available for acquisition with no notice or resettlement issues, remaining 6 ha needs removal actions. NMC internal process has moved forward for land acquisition;
- NMC agreed to Option 1 request by MahaGenco and detailed agreement draft between NMC and MahaGenco can begin;

For MahaGenco

- Technical review group has clearly accepted that NMC is the lowest cost option, as compared to Kochi water supply – MahaGenco has now committed to the project – MahaGenco will issue a formal letter to NMC describing summary project scope, water demand, locations and quality criteria. Koradi and NMC water reuse project time lines are also similar. MahaGenco expects ground breaking for Koradi and water reuse project by November 2006;
- Agreed that locating tertiary treatment plant at Koradi will allow for 1) higher degree of operational flexibility; and 2) optimizing treatment costs by re-allocation for water use (using secondary treated waste water to be used directly for ash handling);
- MahaGenco awaits Koradi Power Plant environmental clearance certificate from MOEF. This is as per schedule and is expected end-July. Once environmental clearance has been received, internal processes to begin procurement and institutional agreements with NMC will begin;
- Agreed that MahaGenco will undertake all tendering arrangements and organize financing for Option 1. In fact, this project will be included as part of Koradi power generation project funding being organized by ordinary capital resources of MahaGenco and loan financing from PFC; on the matter of deducting portion of NMC obligation to provide secondary treatment, this will be included in the financial model in the form of tariff scenarios;
- Going forward, WENEXA to support: 1) creating a draft MahaGenco-NMC agreement document (include reliability criteria and connectivity with Bhandewadi, 2) technical support for RFQ/RFP, project structuring, risk matrix & mitigation plan, vendor selection process management;
- MahaGenco prefers straight EPC with project management consultant to be hired as per current power project practice; Maharashtra Jeevan Pradhikaran (MJB will provide a sample bid package, items/list price list based contract and all materials for pipeline), also, as MahaGenco is now unbundled, there may be changes in procurement practice which will need to be incorporated.

For Urban Development, GoM

- GoM has submitted “Water Reuse Policy Document” to working group within the government and it has been accepted as a mandate for State implementation by all municipalities;
- GoM has drafted internal meeting minutes and these will be shared with WENEXA team;
- As of June 26th, Mr. Nanasaheb Patil has been transferred to head Revenues Department at GoM. Mr. J. Pathak will assume responsibilities at UD on July 6th.

For WENEXA team:

- While MahaGenco and NMC formalize their agreement to move forward into the next phase of the water reuse project, WENEXA will work towards:

- a) structuring a procurement model (EPC+O&M contract or partial or full BOT) and financial model;
- b) draft agreement between parties and assist NMC on project execution;
- c) conduct a briefing for Mr. Pathak in late July time frame to make him current on project scope and issues;
- d) draft scope of work for next phase of work (July through December 2006) and LOE for subcontractors.

The next step is to hold a meeting to facilitate a formal agreement between NMC and MahaGenco on the finalized institutional arrangements, including ownership and the O&M operator such that the RFP can be prepared to best meet the needs of the issuing agency.

2.7 Task 7. Support to Improve Water Service Delivery, Reliability and Pollution Reduction in the Industrial Sector

This activity has been placed on hold due to a reduced level of funding for FY 2006. A stop work order was issued to CII/GBC with direction to complete the updated water users options survey. This deliverable was submitted and approved.

2.8 Task 8. Develop and Implement a Communication Strategy with the Engagement of Civil Society/Industrial groups to extend and promote water energy concepts and technologies

Nothing to report

2.9 Task 9. Design of Participatory Models to Improve Local Ownership and Management of Rural Power Distribution

- Nothing to report

2.10 Task 10. Promote Sustainable Water Resources Management through Grass Roots Institutions

IYD developed a training program and budget for training and exposure visits for water and energy use and conservation. A summary of the training activities to run from August 1 through December 31, 2006 is provided below. The objective of the training programs is to facilitate on-farm investments in efficient pumping and irrigation systems.

3. Issues and Corrective Action

3.1 Reduction and Changes in Staffing

Due to reduced funding levels for FY 2006 the Chief of Party position for WENEXA was reduced to 50% time. Mr. Jim Hogan became the Chief of Party for WENEXA on May 11 and Ms. Barbara Britton continued as an advisor to the Project through June 15. A new Deputy Chief of Party to work fulltime on WENEXA was recruited during this period, and Mr. Anand Srivastava joined the Project on May 25. Mr. Sanjay Dube of IIEC, who had been serving as Acting Deputy Chief of Party since September 05, left IIEC on June 1 to join another firm. The changes in staffing and budget reductions could affect program plans and the pace of progress in a number of areas

3.2 Management Changes at BESCOM

Management changes within BESCOM will slow the pace of implementation of the pumpset replacement program. The ESCO or WESCOM model for financing energy efficient pumpsets through savings that accrue to the State and Utility are the only viable business model identified for financing. Furthermore, lack of commitment to the systems upgrades necessary to support new, energy efficient pumpset operation further complicates the issue. These developments are outside control of the WENEXA Project and will likely need resolution at a higher level.

4. Program Plans for Upcoming Quarter

- Stakeholder Roundtable to discuss Doddaballapur DRP Implementation
- Resolve institutional issues related to DPR implementation
- Field level training programs for farm community
- Initiated watershed planning
- Initiate design of communication and outreach strategy
- Finalize Task 6 DPR And submit to USAID as Deliverable under MIS Schedule
- Support Mahagenco in drafting the procurement document
- Finalize WENEXA documents due on MOP MIS Schedule
- Update website
- Develop local materials for distribution to farm communities in Doddaballapur based on the results and findings of the DPRs and the pumpset replacement case study
- Approve IYD Training Plan
- Implement IYD Training Program