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EVALUATION OF USAID/EGYPT'S UTILITY PROJECTS

FINAL REPORT



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ACRONYMS

ARENTO	Arab Republic of Egypt National Telecommunications Organization
ATM	Asynchronous Transfer Mode
AWCO	Alexandria Water Company
AWP	Alexandria Wastewater Project
BOOT	Build-Own-Operate-Transfer
CGOSD	Cairo General Organization for Sanitary Drainage
CIP	Commodity Import Program
CSI	Cairo Sewerage I
CSII	Cairo Sewerage II
CSC	Customer Services Centers
CW I	Cairo Water I
CW II	Cairo Water II
CWO	Cairo Wastewater Organization
DSL	Designated Service Provider
DSS	Digital Switching System
EEA	Egyptian Electric Power Authority
EGP	Egyptian Pounds
EIB	European Investment Bank
ERA	Egyptian Electric Utility and Consumer Protection (Regulatory Authority)
ESS	Electronic Switching System
FARA	Fixed Amount Reimbursement Agreement
FDI	Foreign Direct Investment
FIDIC	International Federation of Consulting Engineers
GDP	Gross Domestic Product
GEEC	General Egyptian Electric Corporation
GIS	Geographic Information Systems
GOGCWS	General Organization for Greater Cairo Water Supply
GOE	Government of Egypt
GW	Gigawatts
HRSG	Heat Recovery Steam Generators
IMR	Infant Mortality Rate
IR	Intermediate Result
ISP	Internet Service Provider

kWh	Kilowatt Hour
LIRR	Legal, Institutional, and Regulatory Reform project
MCIT	Ministry of Communications & Information Technology
MDF	Mechanical Dewatering Facility
MOU	Memorandum of Understanding
MW	Megawatt
NECC	National Energy Control Center
NOC	Network Operations Center
NOPWASD	National Organization for Potable Water and Sanitary Drainage
NPV	Net Present Value
NTP	National Telecommunications Policy
O&M	Operations & Maintenance
OSP	Outside Plant
OTH	Orascom Telecom Holdings
PACR	Project Assistance Completion Report
PEA	Public Economic Authorities
PIP	Performance Improvement Programs
PMO	Performance Management Office
PPP	Purchasing Power Parity
PSTN	Public Switched Telephone Network
QOS	Quality of Service
SCA	Suez Canal Authority
2G	Second Generation
SO	Strategic Objective
SpO18	Special Objective 18
TE	Telecom Egypt
3G	Third Generation
TRA	Telecommunications Regulatory Authority
TSSP	Telecommunications Sector Support Project
WASH	Water and Sanitation for Health Project
WTP	Water Treatment Plants

1. EXECUTIVE SUMMARY

1.1. Objective

This evaluation set out to appraise the achievements of USAID's thirty-year utility assistance program, representing a \$5.7 billion investment in Egypt's water and wastewater, power, and telecommunications sectors since 1975. The primary objectives of this exercise were to (a) determine the impacts and outputs of the infrastructure investments, and (b) identify the lessons learned in the execution of these utility projects. In addition, the evaluation assessed the financial and physical sustainability of these sectors in the absence of future major donor assistance. Taking each sector in turn, this evaluation report documents the pre- and post-program state of Egypt's utilities, analyzes trends, considers benchmarks against achievements, identifies lessons learned, offers recommendations, and discusses prospects for the future.

1.2. Background

In the mid-1970s, USAID formulated an extensive infrastructure investment program in support of the Government of Egypt's (GOE) economic and social development strategy. This urban utility program covered three infrastructure sectors: water and wastewater, power, and telecommunications. The GOE's principal objective was to enhance and expand public utilities. USAID's program package added several other programming priorities: support for institutional strengthening, legislative streamlining, and sector reforms aimed at creating an environment to attract private sector investment. Since the program's inception in 1975, USAID has invested \$5.7 billion in the expansion and modernization of the water and wastewater (\$3.3 billion), power (\$1.8 billion), and telecommunications (\$604 million) sectors in Egypt¹. As a result, Egypt's utility sector benefits from one of the largest USAID investments made in any one country.

Sector	Years of USAID Assistance	Amount of USAID Assistance	Percent of Total USAID Utility Assistance by Sector
Water/Wastewater	1977-2006	\$3,290,080,000	58%
Power	1975-2006	\$1,796,101,000	32%
Telecommunications	1978-2006	\$604,639,000	10%
All Sectors	1975-2006	\$5,690,820,000	100%

USAID and the Government of Egypt have a long history of partnership, having worked collaboratively to improve the utilities sector for thirty years. Reliable utilities are considered one of the most critical factors necessary for sustaining economic growth and meeting basic citizen needs. Looking across a range of development indicators, it is estimated that the combined utility sector work has benefited nearly the entire Egyptian population across social and economic strata². The improvements supported by USAID have paved the way for increased industrial and commercial development (including in the hospitality

1 Information is from the various USAID project documents.

2 There have been 22 million direct beneficiaries for USAID water/wastewater assistance and likewise 4.2 million direct beneficiaries from USAID telecommunications assistance. All Egyptians have also directly and indirectly benefited from USAID's power assistance as in 2005 over 99% of the Egyptian population has reliable access to the power grid. Although this access has not all been the direct result of USAID's programs, the stability and quality of power supply has been positively affected virtually everywhere in the Egyptian power system by USAID's interventions.

industry), an enhanced role for the private sector, and measurable improvements in public health throughout Egypt.

USAID's support to Egypt's utilities arrived at an opportune moment. In the mid-1970s, Egypt was recovering from successive Arab-Israeli wars, and suffering from an economic slump. From the mid-1960s through the early 1970s, per capita GDP grew at less than one percent. From 1960 to 1973, Egypt was caught in a significant wave of nationalization; particularly of banks, insurance companies, and industrial enterprises. Known as the Central Planned Era, the Egyptian charter advocated socialism as the basis for economic development. Efforts towards the national goals of free medical care and education, employment, minimum wages, and insurance benefits in old age and sickness resulted in the creation of a large centralized bureaucracy which slowed down innovation, entrepreneurship, and independence.

By the end of the 1970s, Egypt had a bloated bureaucracy and was relying heavily on foreign remittances and loans. Price subsidies and employment guarantee policies were causing severe economic distortions at the macro level. Organizations such as the IMF, the World Bank, and USAID stepped in to assist with privatization, cancellation of subsidies, the encouragement of foreign investment, and the freeing of external trade. Realizing that difficulties were escalating, the Government of Egypt accepted many international recommendations and loan programs, knowing that Egypt had to significantly restructure the macro economy in order to stimulate production and self-reliance at the micro level. This leadership era was characterized by the move to liberalize the management of the economy. It was during this transition time that USAID stepped in to help.

Economic growth had just begun to pick up when USAID's investment program was launched. At that time, the GOE's fiscal deficit was very high, and there was no room in the budget for capital investments in the utilities sectors. The state of the power, telecommunications, and water and sewer facilities was dismal at the start of USAID assistance. Service was unreliable and access was limited. Water and wastewater systems were facing loads more than twice their design capacity. People living in Cairo and Alexandria suffered from widespread waterborne diseases caused by sewage flooding and inadequate water supply systems. The coastal areas of Alexandria and Suez Canal were heavily polluted because of raw wastewater discharge and the same was true of many of the country's canals and rivers. Just 34 percent of Egyptians had access to electricity in 1981³. Teledensity stood at just 13 per 1000 people in Cairo or Alexandria.⁴

Thirty years later, twenty-two million Egyptians have benefited directly from the improvements in water supply and wastewater facilities supported by USAID. USAID assistance in the telecommunications sector has directly benefited 4.2 million people. In 2005, over 99 percent of the Egyptian population had reliable access to the power grid system-wide, with the stability and quality of Egypt's power supply having been positively affected by interventions sponsored by USAID.

1.3. Summary of Achievements

USAID's assistance to Egypt's water and wastewater, power, and telecommunications sectors is recognized as one of the agency's most outstanding successes worldwide. Between 1975 and 2006, the United States Government contributed approximately **\$5.7 billion** - more than 20 percent of its total assistance to Egypt to this effort. This investment has not only supported vast improvements in water and wastewater, electric power, and telecommunications services available to the Egyptian people, but has led to better health and spurred economic growth.

In the **water and wastewater sector**, USAID's cumulative investments in **13 water-related projects total \$3.3 billion** since 1977. In the earliest years of the program, wastewater infrastructure construction

3 EEHC reported data - 2006

4 USAID Technical Report No. 19.

to stop the flooding of raw sewage in Cairo and Alexandria caused by inadequate wastewater facilities was top priority. At that time, water and wastewater infrastructure in the war-damaged cities along the Suez Canal was rehabilitated or replaced. In the mid-1990s, the program focus shifted to the smaller urban areas of the Delta, South Sinai, and Middle and Upper Egypt. Assistance for the institutional capacity development in the water and wastewater facilities and legal and regulatory reforms came in the late 1980s.

By the end of fiscal year 2006, more than 22 million people will have expanded access to improved drinking water and wastewater services because of interventions sponsored by USAID/Egypt.⁵ **Overall, USAID water and wastewater infrastructure development projects have increased the access of almost a third of Egypt's population to sustainable water supply and sanitation, and contributed to the significant improvement of health and the environment.**⁶ Today, infant mortality rates in Egypt are one-fifth of what they were in the 1970s, dropping from 145 per 1,000 live births in 1975 to 26.4 per 1,000 in 2004.⁷ Better water and wastewater services and facilities have also contributed directly to improvements in tourism, trade, and investment.

In the **power sector**, USAID's cumulative investments total nearly **\$1.8 billion over thirteen power sector projects**. It is the most significant of any foreign assistance agency, at 22% of total foreign assistance to the power sector. The power sector now provides adequate services to virtually the entire country with reasonable efficiency and reliability – a dramatic improvement over what existed at the inception of USAID's program of assistance in 1975. As such, USAID's investment has benefited the welfare of virtually every Egyptian. USAID's support to the construction or rehabilitation to Egypt's generation capacity accounts directly and indirectly for roughly one-third of total present capacity (6,005 of 18,500 MW in 2005). By 2005, over 99 percent of the Egyptian population could reliably access the power grid.⁸ Every community of 1000 or more inhabitants is now connected.⁹ Growth in the consumption and production of electricity can be directly attributed to Egyptian and foreign donor investments made at the generation, transmission, and distribution levels.

USAID's program of support for the development of Egypt's power sector achieved successes at multiple levels. As compared to the baseline condition of the sector in 1975, Egypt's power sector has been substantially transformed, in terms of both its technical sophistication and institutional capacity. **Since USAID began investing in the power sector in 1975, annual electric power production has increased ten-fold, while per-capita consumption has grown by over 600 percent.**¹⁰ It must also be noted that the contributions made by USAID's interventions in the power sector have exceeded the sum of their individual parts. For example, while USAID's rehabilitation and modernization of the Aswan High Dam rectified an original design fault and kept generation capacity on-line, it was the combination of measures taken across the sector as a whole which made a significant impact on the sector's incredible growth. Greater availability and reliability of electric power has fuelled Egypt's economic growth. The power industry's efficiency has also dramatically increased, and important institutional changes have set the stage for further expansion of the sector. Increased efficiency and the prospect for more direct private-sector investment in this critical economic sector are also expected. Opportunities for further improvements in Egypt's physical and institutional utility infrastructures still exist, as do a number of deficiencies that now threaten past successes.

5 Project Assistance Completion Reports, Project Papers, and SpO 18 Annual Reports.

6 22 million direct beneficiaries, with total population of 71 million people.

7 World Bank World Development Indicators, <http://publications.worldbank.org/subscriptions/WDI>

8 Egypt Demographic and Health Survey, 2000 and 2005 <http://www.cspro.org/pubs/>

9 EEHC reported data, 2006.

10 Egypt Electricity Holding Company (EEHC) and World Bank World Development Indicators Data.

In the **telecommunications sector**, USAID's cumulative investments total **\$604 million over five telecom sector projects**. Their primary goal was to help create an efficient telecommunication system capable of supporting Egypt's social and economic growth. The first project was initiated in 1978, and the fifth and final project concluded in 2006.

Common geographically-defined indicators for positive growth such as increases in line access per geographic area and/or increases in overall line density show considerable improvement. Teledensity in Egypt has grown by 1600 percent - from 9.42 telephone lines per 1,000 people in 1978 to 150 lines per 1,000 persons in 2006.¹¹ The total number of telephone lines grew from 374,000 in 1978 to 10.7 million in 2006.¹² Public, commercial, and private subscriber satisfaction have risen substantially as measured by smaller waiting lists for new telephone lines and fewer faults per line.¹³

By the end of FY 2006, USAID assistance was responsible for directly improving telecommunications access for over 4.2 million Egyptians,¹⁴ as well as for the tourists and business travelers who more readily visited and invested, partly because they knew they could now "connect back home." **USAID investments of more than \$604 million led to the installation of more than 840,875 telephone lines (roughly 8.1 percent of all new telephone lines)¹⁵, institutional strengthening for Telecom Egypt, and the improvement and expansion of telecommunications networks in Cairo, Alexandria, and Port Said, including through technology transfer such as the Asynchronous Transfer Mode (ATM) and Network Operations Center (NOC) projects.** Developing the telecommunications sector has been, and remains, critical to Egypt's ability to increase trade and investment¹⁶.

1.4. Overall Conclusions

Since the mid-1970s, Egypt has been the recipient of one of the largest-ever USAID investments; over \$5.7 billion invested in expanding and modernizing water and wastewater, power, and telecommunications infrastructure. These three sectors have proven to be very effective engines of economic reform.¹⁷ A 2004 World Health Organization report has determined that \$1 invested in improved water supply and sanitation services provides an economic return of \$3 or more, dependent upon the region¹⁸.

The program results, supported by the documentation evaluated in this study, speak for themselves: USAID's construction assistance accounts directly and indirectly for roughly one-third of Egypt's total current power generation capacity and today 99 percent of Egyptian households are connected with power, while only 25 years ago, just 34 percent of households had electricity. USAID interventions have increased the access of almost a third of Egypt's population to sustainable water supply and sanitation and key performance indicators in the water and wastewater sector have steadily improved, e.g. cost recovery

11 MCIT, Record of Achievements 2006; 1984 Central Agency for Public Mobilization and Statistics (CAPMAS) Year Book (1952-1983), page 16.

12 See above note.

13 Based on Egypt ICT Indicators sent to International Telecommunications Union, Quality of Services, 2003, 2004, 2005. The waiting list for main telephone lines decreased from 99,520 in 2004 to 64,764 in 2006. The number of faults per 100 main lines per year decreased from 0.50 in 2004 to 0.10 in 2006.

14 Figure based on an average family size in Egypt of five persons, and assumes all family members share the telephone line. 840,875 additional installed lines is equivalent to improved access for 4.2 million Egyptians. This constitutes a conservative estimate in the view of the authors.

15 Sustainability of USAID-Financed Utility Infrastructure Activities in Egypt (Report No. 6-263-05-001-S), October 2004.

16 According to a USAID/Egypt 2002/2003 status report

17 World Bank "Comparative Development Strategies for Emerging Markets", Staff Paper, March 2001.

18 "Costs and Benefits of Water and Sanitation Improvements at the Global Level" (Evaluation of the)", Guy Hutton and Laurence Haller, 2004. See https://www.who.int/water_sanitation_health/wsh0404/en/index.html

is at about 90 percent (not including depreciation) and water not-accounted-for has dropped from 49 percent in 1999 to 43 percent in 2004¹⁹. Telephone density in Egypt rose from 9 telephones per 1000 people in 1978 to 150 per 1000 persons in 2005, of which 8.1% of that increase was directly related to USAID assistance.

On the whole, projects were well selected and fell within USAID's country development strategy, the GOE's stated priorities, and the urgent needs of an Egyptian population lacking the basic necessities of the modern world. The interventions were well timed; water and wastewater and power projects requiring a three to five year period to become operational were started in time to come on-line as the demand for improved services grew urgent. Earlier institutional and regulatory development assistance, however, could have enhanced future management of the physical assets created. In general, projects were well supervised. Service standards and the quality of physical assets have been improved by USAID's interventions.

Corporatization and related administrative reforms have improved utility management significantly. Consistent with program objectives, both the water and electricity holding companies began to cover their operational and maintenance costs. USAID investments created an enabling environment for greater privatization and private investment. Telecommunications and power had the most success, with water lagging far behind.

Moving forward, a number of challenges present themselves, including:

- Persistent indirect and massive subsidies for the power and water sectors from the Government of Egypt have left those demands upon the state budget while retarding the incentive for full sector cost recovery.
- Low water tariffs in Cairo fail to cover operation & maintenance and capital costs (for capital replacement and expansion).
- Regulatory functions need further definition and strengthening, particularly in the water and power sector, to be better able to support the reasonable recovery by utilities of operating and debt service costs (costs of service).
- Physical sustainability of water and wastewater facilities is threatened due to inconsistent operation and maintenance regimes.

1.5. Lessons Learned

Lessons emerging from USAID investments highlighted the need for flexibility and realistic planning in smooth project execution and implementation, and the critical role of early and sustained institutional development in infrastructure development.

1.5.1. Lessons Learned: Project Execution

In the water and wastewater sector, it is critical for implementation to clearly establish ground rules, roles, and responsibilities of project team members and to communicate those rules to all key players involved. It became evident that all implementing agencies needed to have the capability to manage the execution of contracts, and to be willing to put forward their own in-kind management to the project. **Lessons: Clearly define roles and responsibilities among partners. In-kind contribution and engagement from the implementing agencies are a necessary addition to the project.**

19 FY 2004 Performance Monitoring Reporting for SpO18

From the experience of USAID's Telecom I, II, and III investments (which were bundled together for implementation), it was learned that contract consolidation can lead to improved contractor management and purchasing efficiencies. Similarly, the additions to Telecom IV achieved through two amendments to that project, led to improved contractor management and purchasing efficiencies. In these undertakings, it also became evident that materials customization and cross-cultural gaps pose challenges that take time to resolve. This time must be accounted for in project design timetables. Moreover, it is wise to establish a contract dispute resolution board at the start of a project, before a crisis arises. **Lessons: Contract consolidation can lead to improved contractor management and purchasing efficiencies. Create mechanisms to deal with contract problems before they arise.**

While USAID's five telecommunications projects from 1976 to 2006 were extremely effective in facilitating network development, institutional capacity building, and overall sector and regulatory reform; there were three primary lessons learned which could assist with future efforts in the Egyptian ICT sector. First, based on a review of all of the reports, it appeared that the consulting mindset and methodology resulted in consultancies that were designed *for* the client as opposed to *with* the client. In the future, project goals, work scopes, schedules, and deliverables might be more easily and effectively managed if the consultant and the client worked together in shaping and managing the project. This implies that senior managers with decision-making authority from both USAID and the client participate in project design and management. **Lesson: Successful consultancies are developed with the client rather than for the client. Collaborative working arrangements are essential.**

It is also important to sequence all work activities that involve either the client or non-client organizations and might impact the ability to implement project activities (for example, gaining permission from a local authority to enter a building to upgrade a switching installation). By integrating related organizations throughout the project cycle, staff time could be better utilized and operational resource efficiencies improved. **Lesson: Know what it will take to implement project activities, and sequence work accordingly.**

Lastly, inadequate attention was paid to the staffing constraints of client organizations. When creating project scopes, it is vital that USAID project design teams consider all the obligations an organization is managing, and be realistic about how effectively the local client can support the USAID initiative. Rescheduling consultants' schedules accordingly will bring better results, even if it means that USAID project timelines might need to be extended. **Lesson: Set realistic plans which take into account current obligations, assess local capacity adequately, and leave room to maneuver.**

1.5.2. Lessons Learned: Infrastructure Development and Institutional Development

Given the appalling conditions that existed in the late seventies, the focus of the early water and wastewater infrastructure development activities (correctly) was to increase water pressure and remove raw sewage from flooded neighborhoods by rehabilitating the existing systems and expanding the water and wastewater networks. During the first decade of USAID's assistance, activities concentrated mainly on the physical components of the infrastructure. The operational and institutional needs of the utilities were, on the other hand, inadequately addressed or neglected. Facilities worth hundreds of millions of dollars were completed and went online with only minimal attention given to operation and maintenance. Eventually the operations, maintenance, and training requirements of the facilities were addressed, but financial and governance constraints continued to significantly threaten the sustainability of the infrastructure. Legal and regulatory reforms were needed in order to enact the appropriate tariff structures and fees and revamp governance structures. During the peak of USAID-funded institutional strengthening activities in the early and mid nineties, the absence of such reforms limited the effectiveness of the programs. More than twenty-five years passed before legal and regulatory reforms would be approved by the GOE. By then, almost all of the USAID direct assistance to the utility organizations had ended. This oversight has eroded more than an inconsequential portion of the progress achieved in past thirty years.

Lesson: Operational and institutional reforms are as important to the long-term success of infrastructure projects as rehabilitation and expansion.

If the present-day state of the water and wastewater infrastructure is testimony to the fact that infrastructure development requires institutional development interventions such as operational restructuring and regulatory enhancement to be fully effective, it is also true that institutional development takes time. The institutionalization of programs and procedures usually requires several years of continuous effort. If assistance ends before reforms are fully institutionalized, there is an increased risk of regression to pre-assistance conditions. Perhaps the most important lesson learned has been that progress in institutional development is built-up from a low percentage of utility personnel and therefore that institutional strengthening and sector reform programs should be designed mindful of the full time necessary for their inculcation. **Lesson: Operational and institutional reforms take time and require continuous effort. Generous timelines can help reforms “stick.”**

It should be noted that USAID’s program of assistance was initiated and executed during a turbulent period in the region. The rationale for the program was primarily political, with immediate economic development and stability and the ingratiation of the United States to the GOE being the foremost objectives. Nevertheless, the most pointed criticism that can be made of USAID’s assistance program to the Egyptian power sector was the late introduction of policy reform and industry restructuring objectives into project activities. When these targets were introduced and the provision of capital for physical infrastructure investments was made conditional on their achievement, they were often not well defined. The failure to steer Egypt away from using the power sector as a tool of social and economic policy (and as a mechanism for the provision of inefficient subsidies to industry and households) has left a legacy of economic distortions in the economy and a drain on the state budget. Energy subsidies are expected to account for some 15 percent of the 2007 state budget²⁰ – more than expenditures on healthcare and education combined. **Lesson: Policy reform and industry restructuring objectives cannot be easily introduced late in the program life. Projects must specify and sufficiently define targets that work to overcome, rather than reinforce, economic distortions caused by poor policy.**

1.6. Recommendations

Recommendations for the future of the water/wastewater sector in Egypt are as follows:

1. Expanding the capacity of existing facilities and increasing access to water and sanitation services for the entire Egyptian population should continue as a high priority for the governments of Egypt and the United States. It is recommended that USAID continue its support of the sector. USAID is for example continuing to provide some assistance for slow sand filter water treatment plants in rural areas in several governorates, but where other water sector needs remain, USAID and the GOE could extend technical assistance.
2. An assessment should be conducted to prioritize the USAID-assisted water/wastewater facilities that need continued assistance and to make an estimate of the possible cost of a program of support. Although over time operational and institutional reform will and must address many of these sustainability issues, an assessment of the need and costs of an interim program of continued assistance would be helpful.
3. Likewise, efforts towards financial and operational sustainability should be continued and strengthened. For already existing facilities, ongoing efforts to attain optimal performance will be important. At the direction and supervision of the Holding Company, performance indicators (financial, operational, effluent quality, customer service) and a performance compliance monitoring

20 Rasromani, W. “The Question of Subsidies,” The Daily Star – Egypt (5 June 2006).
<http://www.dailystaregypt.com/article.aspx?ArticleID=1779>

system are two important steps in this direction. Quality control, management information systems, and maintenance management systems are additional areas where support is needed. All training, certification of technicians and managers, laboratory testing, and maintenance management systems done at the facility level should begin and end with the performance of the facilities in mind. This performance-based system has the potential to be used by the Holding Company as a compliance monitoring and utility comparison tool. The corporate leadership of the Holding Company and subsidiary companies must embrace optimal performance and customer service as their central tenets before such a system can be used effectively. This change will take time to be internalized and take hold. Top to bottom, all employees must believe that they are there to serve the consumer. If facilities are operated effectively, are efficient, and protect public investments; it is more likely that the consumer will be inclined to pay more for services.

Recommendations for the future of the power sector in Egypt are as follows:

1. For USAID and other development agencies and donor institutions, future dialogue with the GOE vis-à-vis energy sector development should focus on the elimination of the economic distortions that remain within the sector. Emphasis should be placed on the creation of a more robust, objective, and autonomous energy regulatory regime; the reduction of direct and indirect subsidy in tariff policy and fuel delivery; and the introduction of private-sector competition, both in system operation (generation, distribution), *and* in the provision of construction and ancillary services.
2. Regarding future assistance in the power sector, we recommend that reform priorities be established and pursued from the outset as, once formed, a system and its institutions are difficult to transform. In addition, the conditionality for receipt of aid must be better communicated to counterparts. If host country counterparts do not fully understand the reform agenda and are not involved in its development, it often results in a lack of ownership, which in turn can lead to passive resistance and back tracking.
3. While USAID no longer plans to offer grant capital to the GOE for investment in the power sector's physical infrastructure, USAID does maintain a comparative advantage vis-à-vis the provision of technical assistance. Institutional restructuring (pre-privatization industry reforms and efficiency improvements, industry-to-industry exchanges) and legal and regulatory reform (capacity-building within regulatory agencies, legislative drafting, market design and monitoring, professional exchanges) are among these. Moreover, technical assistance can be offered at relatively low cost. If international finance institutions such as the World Bank or the African Development Bank extend credit to the EEHC for its expansion program, associated conditionality requirements for further reform are likely to create future demand for technical assistance.

Recommendations for the future of the telecommunications sector in Egypt are as follows:

1. Continued regulatory assistance is recommended as industry questions are more complex than ever, and the financial implications for U.S. suppliers as well as the Egyptian economy and customers are considerable. In addition, a strategic question about which U.S. Government institution has the resources and market focus to leverage the enormous telecom investment on behalf of the next generation of U.S. suppliers and regional beneficiaries should be considered. USAID has worked hard to develop good working relations with the Egyptian government. How can these be leveraged to help U.S. commercial interests in the region?
2. Project goals, work scopes, schedules, and deliverables will benefit from joint development by USAID and the client organization. Senior managers with decision-making authority from both USAID and the client organization must participate in project planning and implementation.
3. At the start of a project, USAID consultants should work closely with the client organization to determine which institutions and/or organizations outside of the client organization could impact decisions, activities, and/or project functions. The USAID consultant should work with the client

organization to involve these non-client organizations in the project schedule and task planning, and provide ongoing updates. This type of ongoing project communication could facilitate more effective use of operational and staff resources and help to lessen project slowdowns.

4. While USAID may be ambitious in setting its goals and in meeting its deadlines, a more realistic assessment of available staff resources in developing and emerging markets will lead to more realistic schedules that can be achieved by all parties involved.

Looking ahead, the telecommunications and power sectors are already attracting private sector investment, and both have significant future investment needs. Technical and financial assistance in institutional strengthening, corporate governance, and labor restructuring is still needed for all sectors. Water and wastewater facilities need critical maintenance investments now, to avoid major replacement costs in the future. The future holds both opportunities and threats for these sectors in Egypt.

1.7. Prospects for the Future

The Egyptian water and wastewater sector now has in place the key regulatory, organizational, and policy reforms that will reshape its form and substance. USAID institutional strengthening activities have delivered measurable progress towards financial viability among the subsidiary companies, especially in the past ten years. The progress has been in both an increase in tariff-generated revenue and the use of financial planning and management systems.

A hugely improved and expanded water and wastewater infrastructure has been designed, constructed, and made operational. The technologies used have been appropriate and the quality of construction has been, in most cases, exemplary. The sound physical infrastructure will continue to serve as a protection against less than optimal operational and maintenance practices. The creation of the Holding Company and of the Regulatory Agency offers great hope for the water and wastewater sector. An opportunity now presents itself for a gradual, but complete, revamping of the management of the utilities - from middle to senior managers - to reflect a new focus on performance and customer service. There is, however, a dark cloud that hangs over these accomplishments, one that threatens the sustainability of this considerable investment. It concerns both the financial and physical sustainability of the utilities.

The physical sustainability of water and wastewater infrastructure is deteriorating, slowly but surely. With cost recovery under the microscope for more than decade, the physical condition of the facilities has been too long ignored. Moreover, substantial unmet needs for rural sanitation and water supply still exist countrywide. A significant portion of the population is in need of expanded and improved water and wastewater services. There are signs that the GOE is addressing these needs with its new plans to allocate about EGP 20 billion to develop water and sewer systems for rural and poor villages in the Nile region.

The Egyptian Electricity Holding Company estimates that by 2012, peak load will reach 23.8 gigawatts. This will require the addition of some seven gigawatts of capacity. The EEHC's new-capacity construction plan calls for the construction of the bulk of this new capacity. Financing has already been secured or partially secured for much of the planned construction. Opportunities for foreign equipment manufacturers and specialized construction firms in Egypt's capacity expansion program are significant. In combined-cycle technology for example, U.S. firms such as General Electric have competitive product offerings. Such opportunities should not be overlooked.

Leaders in the Egyptian power sector are pursuing the prospect of expanded cross-border connectivity, and eventual interconnections and synchronization with the UCTE system as part of a Mediterranean Ring for power exchange. The expansion of regional interconnections with countries of the Mediterranean region, and recent significant on-shore and off-shore natural gas discoveries, should further expand opportunities for investment in Egypt's generation capacity.

Growth in Egypt's mobile communications sector is explosive. As incomes rise, demand for mobile telephony and more data-intensive services such as video, educational services, and high-bandwidth-

intensive service deliveries among the business and wealthier population segments will certainly grow as well. These consumers will want seamless wireless connectivity where they live, work, play, and learn via their mobile communications services. A critical issue facing Egypt will be its ability to maintain a regulatory environment and ICT infrastructure that together, are responsive to evolving technologies and service demands. Next Generation Networks (NGN) are now being designed to meet new needs.

USAID may wish to consider supporting regulatory and industry players in Egypt's telecom sector. Investments and collaborative activities, support for education to alert industry leaders about new service trends, and assistance for research and development activities could help position this industry segment for future growth. Increased competition in advanced mobile and landline communication services will require timely, strategic, and insightful regulations. This will help maintain a level playing field for competitors, and ensure that consumers receive uninterrupted, high-quality, affordable communications services. Such assistance will help this vital sector player not only serve as an institutional referee on disputes, but also provide the critical leadership and technical standards to ensure balanced network growth in Egypt for the future.

2. INTRODUCTION

2.1. Methodology

The period for data collection was three weeks, from August 27 through September 18, 2006, with work commencing immediately upon contract execution. Given time and budget constraints, the evaluation team relied solely upon project-specific and SO-specific documentation that USAID provided or otherwise made directly available, and on a limited number of illustrative stakeholder interviews. The team of experts identified and reviewed available policy, strategic plan, component, sector, and project level documents supplied by USAID/Egypt as well as some collected from other sources, such as the GOE and the World Bank. The team's analysis and conclusions are thus based primarily on the review of this project documentation and should be considered as an expert assessment rather than an extensive evaluation.

The bulk of the evaluation relied on detailed analysis of key project documents, including Project Assistance Completion Reports (PACR). However, the evaluation team also interviewed key stakeholders in the water, power, and telecommunications sectors.

The team's review methodology was specifically developed to suit the task at hand, and included a set of questions that served to address the key issues. The evaluation covers five assessment areas:

1. Baseline state of each utility sector prior to USAID intervention;
2. Direct and Indirect Outputs of USAID's construction, institutional development, and regulatory interventions;
3. Broad Outcomes that resulted from improved service delivery;
4. Lessons Learned from USAID's assistance in Egypt; and
5. Future Prospects for future investment in Egyptian utilities.

The findings obtained from the specific project analyses were used to make an informed assessment of the performance of the sector as a whole. Preliminary findings were reinforced by a limited number of field visits and interviews with key stakeholders.

2.1.1. Literature and Documentation Review

The evaluation team focused its attention on reviewing the evaluation reports available for the major projects funded under the USAID program, as well as several past reports produced by consultants on the performance of the sectors under review. Additionally, we sourced a number of sector reports developed by the World Bank. The full list of project documents consulted can be found in Appendix IV.

2.1.2. Detailed Review of Key Strategic Projects

The evaluation team reviewed the outcome of each project and sub-project covered under the program, but gave special attention to projects covering major geographic and population centers and with higher investment value. A composite of these results were used to arrive at the overall success or failure of achievements against the objectives.

2.1.3. Site Visits and Interviews

In cooperation with relevant USAID staff in Cairo, government officials, and project managers; the evaluation team compiled a list of key stakeholders to be personally interviewed. The team interviewed a

total of 40 individuals and visited 12 sites in the water and wastewater, power, and telecommunications sectors. The full list of sites and persons interviewed can be found in Appendix II.

2.2. Review Limitations

As indicated above, budget and time constraints kept the scope of the evaluation to extensive desk review, selected interviews, and a small number of site visits. One limitation of the evaluation was the difficulty in obtaining supporting documentation. In those cases, the evaluation team relied upon other studies and documents relevant to, but not directly related to, project performance.

3. EVALUATION AND ANALYSIS

3.1. Water and Wastewater Sector

3.1.1. Background

From 1977 to 2006, USAID invested \$3.3 billion in thirteen water and wastewater projects in Egypt. In the mid-1970s, poor water quality, pollution, and over-extended sanitation facilities presented a serious public health hazard, particularly in urban areas. In Cairo for example, the dirt and mud made it difficult to keep children clean and healthy when they played outdoors and residents attributed diseases such as eye infections, diarrheal fever, and rheumatism to contact with sewage in the environment²¹. Over the next thirty years, USAID/Egypt's utility assistance program brought sustainable water supply and sanitation services to more than 22 million people, directly improving health and the environment for almost a third of Egypt's population.²²

In the earliest years of the program, wastewater infrastructure was constructed to relieve the flooding of raw sewage in Cairo and Alexandria, while water and wastewater infrastructure in the war-damaged cities along the Suez Canal was rehabilitated or replaced. Cairo, Alexandria, and the Canal Cities received multiple grants for infrastructure development and institutional capacity building. Initial infrastructure components were often linked to existing facilities. Subsequent projects expanded or made improvements to these earlier construction phases.

Beginning in the mid-1990s, the geographic focus shifted to the smaller urban areas of the Delta, South Sinai, and Middle and Upper Egypt. The program also turned attention in recent years to strengthening the institutional capacity of water and wastewater facilities and enacting legal and regulatory reforms.

USAID/Egypt's Water and Wastewater Projects 1977 – 2006²³

Number	Project Title and Target	Years	Funding (US \$)
263-0038	Cairo Water I – Rehabilitate and expand the Rod El Farag Water Treatment Plant, and install 40,000 house-service connections with the means to dispose of wastewater	1977-1989	97,265,000
263-0193	Cairo Water II - Rehabilitate and expand water transmission and distribution facilities in Central Cairo, and strengthen the institutional capabilities of the General Organization for Greater Cairo Water Supply	1988-1998	144,840,000
263-0091	Cairo Sewerage I - Rehabilitate and expand the wastewater collection system and design system expansion projects	1978-1988	128,275,000
263-0173	Cairo Sewerage II - Improve, expand, and develop sustainable wastewater collection, treatment, and disposal facilities on the West Bank of Cairo, and to ensure proper management of the system	1984 - 2006	727,985,000
263-	Alexandria Water Company (AWCO) Construction Contract -	1997 -	78,000,000

21 Cairo Water and Wastewater Economic Benefit Assessment, April 1996

22 USAID. FY 2005 SpO18 Performance Overview, Project Assistance Completion Reports, Project Papers.

23 A project-by-project analysis was considered neither useful nor feasible. Instead, the analysis and results are grouped on a utility and service area basis. The present-day names of the water and wastewater utilities are used for clarity purposes such that they match the current structure of the Holding Company for Water and Wastewater.

Number	Project Title and Target	Years	Funding (US \$)
0270.02	Improve the reliability and safety of AWCO's water supply system, and improve water distribution systems and water treatment plants; Master Plan preparation	2006	
263-0270.02	Institutional Strengthening Contract - Strengthen the institutional capacity of AWCO to achieve (a) improved recovery of O&M costs; (b) improved decentralization of its management; and (c) improved capacity to deliver services; preparation of strategic plan, automation of water meter reading and billing collection	1999-2005	16,000,000
263-0100	Alexandria Wastewater System Expansion I – Stop raw sewage flooding into city streets; expand the system to serve previously unsewered areas; eliminate beach pollution; and provide O&M and institutional strengthening assistance	1979 - 1997	422,076,000
263-0241	Alexandria Wastewater System Expansion II – Expand the treatment capacity of two wastewater treatment plants and the capacity of pump stations; eliminate the last sea outfall (dumping of waste into the ocean); and continue with O&M and institutional strengthening assistance	1997 - 2006	203,000,000
263-0048	Canal Cities Water and Sewer - Provide sustainable water and wastewater services and facilities in the cities of Suez, Ismailia, and Port Said, and to strengthen the institutional capabilities of the Suez Canal Authority and the three municipalities	1978-1988	165,332,000
263-0174	Canal Cities Water and Wastewater II - Provide sustainable water and wastewater services and facilities in the cities of Suez, Ismailia, and Port Said; and strengthen the institutional capabilities of the Suez Canal Authority and three municipalities	1987 – 2000	377,078,000
263-0127 263-0161	Provincial Cities Development (Middle Egypt) - Improve and expand the water and wastewater systems in Beni Suef, Minia, and Fayoum; and further improve the institutional capacities of those cities to plan, implement, and maintain the systems	1982 - 1995	384,229,000
263-0270	Egypt Utilities Management (Middle Egypt) - Improve and expand the water and wastewater systems in Beni Suef, Minia, and Fayoum; and further improve the institutional capacities of those cities to plan, implement, and maintain the systems	1997 - 2006	221,000,000
263-0236	Secondary Cities Development - Expand and develop sustainable, replicable water and wastewater facilities in selected urban centers in Egypt	1994- 2005	325,000,000
		Total:	\$3,290,080,000

3.1.2. Baseline of The Water and Wastewater Sector

In 1977, water and wastewater services in Egypt's major urban complexes were woefully inadequate. After decades of warfare and neglect, the systems frequently failed. Most of the systems in place were designed to handle water demands and wastewater loads less than half of those they were actually facing. Inadequate distribution systems caused water shortages in many areas, despite sufficient levels of water production. Demand for water far outstripped service availability in the rapidly growing settlements on the peripheries of Cairo and Alexandria. Poor water pressure and high leakage resulted in poor service quality and high consumer dissatisfaction.

Where wastewater was concerned, the problems were even more acute. Unable to process the flow of generated wastewater, wastewater collection systems frequently discharged raw sewage. Serious flooding was a daily occurrence in many sections of Cairo, Alexandria, and the Canal Cities. These conditions posed serious health risks to the residents of the affected areas, and hindered economic growth in what constituted three of Egypt's key economic centers.

This section describes the connections between urban population growth and water and wastewater service capacity, as well as the public health implications of water shortages and wastewater system flooding in Egypt prior to 1977. It provides an overview of the state of Egypt's water and wastewater infrastructure and the institutional and regulatory environment that governed its operation.

Population, Urbanization, and Targeted Beneficiaries

As of April 1980, Egypt had a population of 42 million people. The total population was projected to reach 68 million by the year 2000, with the highest growth rates expected in urban areas. In 1907, the country's urban population was 19 percent. By 1976 it stood at 44 percent. The implications were clear. Egypt's need for substantial and continuing investments in urban water and wastewater services over a 20-year period was urgent.

The population size, density, and incidence rates of waterborne diseases in large urban centers dictated that infrastructure interventions in these three urban centers take top priority. The major metropolitan areas of Cairo and Alexandria were expected to absorb the bulk of Egypt's urban population increases. The Greater Cairo region was expected to receive the greatest share of the projected urban population (43 percent) in the year 2000, reaching a population of approximately 16.5 million. The Alexandria Wastewater Master Plan projected that its service population would total more than five million people by the year 2000.

Infrastructure and Service Level Conditions

Intermittent water supply, low pressure, huge losses due to leakage, and frequent sewage flooding incidents were common in the 1970s. The real water problem did not stem from a lack of availability or production. Rather, the problems were due to old, damaged, and inadequate distribution networks.

Despite the general adequacy of the water supply in the major Egyptian cities, wastewater disposal systems were dangerously overloaded. Facilities simply could not handle wastewater flows. In Greater Cairo alone, as many as 500 wastewater-flooding incidents took place every day. Similar situations prevailed in Alexandria and the Canal Cities. The situation was worse in the peripheral areas of these large population centers. Wastewater collection and treatment systems were hugely inadequate in the central areas of the cities, but worse still, basic sanitation services were totally absent in the peripheries.

Extensive portions of the wastewater collection systems in Cairo, Alexandria, and Canal Cities operated in surcharged conditions. Untreated wastewater was being discharged into agricultural drains, lakes, Suez Bay, and the Mediterranean Sea. Large quantities of garbage, trash, hazardous industrial and medical wastes, and other materials were illegally dumped into the wastewater collection system. This reduced flow capacity, blocked sewers, and allowed for the transmission of dangerous and contagious substances into the receiving bodies of water.

Public Health

The epidemiological linkages between disease and the availability of sanitation services are well documented. Numerous World Bank, WHO, and other United Nations agency reports have discussed the negative impacts of inadequate or impure water supplies and unsanitary sewage disposal practices on public health.

In Egypt, extensive research into waterborne diseases has been conducted by the Naval Medical Research Unit and the Ministry of Health. These studies indicate that diseases such as cholera and typhoid fever are transmitted through contact with improperly treated water or by the unsanitary disposal of sewage. As expected, waterborne diseases such as infectious hepatitis, typhoid, paratyphoid, and dysentery were widespread and spreading throughout Egypt in the early 1980s. One district in Cairo which had among the lowest sewage treatment services in the city, also had a cholera incidence rate of 538/100,000 - more than 30 times the national average.²⁴ In the early 1980s, 46 percent of infant and child mortality in Egypt was caused by diarrhea and the Infant Mortality Rate (IMR) stood at 116 per 1,000 live births, one of the highest in the world.²⁵ Deplorable water and wastewater conditions were a major public health hazard in Egypt.

Flooding brought other problems as well. Households commonly complained about local environmental conditions associated with sewage flooding. They spoke of foul odors, flies and mosquitoes, diseases, dirty streets, and the need to place stepping stones and planks in the streets to cross areas flooded by sewage. Mud and potholes from sewage impeded traffic. The dirt and mud also made difficult to keep children clean and healthy when they played outdoors. Residents attributed diseases such as eye infections, diarrheal fever, and rheumatism to contact with sewage in the environment. In addition, sewage may have polluted potable water sources.

Sector Organizations and Financing

The water and wastewater sector was administered by a variety of GOE organizations prior to 1976. At the national level, the Ministry of Development had primary responsibility for coordinating the development and operation of the sector. In the water sub-sector, Cairo and Alexandria had fully-integrated water authorities responsible for developing and operating water treatment and distribution facilities. The chairmen of all water and wastewater authorities were under the administrative control of their respective governors. The three Suez Canal cities had a similarly integrated development/operations service. Water service was administered by the Suez Canal Authority (SCA), but was not controlled by the three governorates or the Ministry of Planning. In all other urban and rural areas, the National Organization for Potable Water and Sanitary Drainage (NOPWASD) was responsible for the rehabilitation or expansion of water infrastructure before turning over to local authorities. NOPWASD was a governmental organization under the control of the Ministry of Development.

In the wastewater sub-sector, Alexandria's wastewater authority was responsible for the development and operation of its facilities. Cairo had a similar authority, except that major, foreign-financed wastewater system development projects came under the control of Cairo Wastewater Organization (CWO), an administrative arm of the Ministry of Development. NOPWASD was responsible for all other wastewater systems throughout Egypt. The governorates were responsible for the operation of the systems turned over to them by NOPWASD. The Ministry of Health was indirectly involved in ensuring compliance with pollution control laws and water quality standards.

Historically, the provision of water and wastewater investment in Egypt was viewed as a government service. The primary goals were to improve national health and safety and promote economic development. The development of infrastructure in the water and wastewater sector was financed with loans from the Central Investment Bank and through the Ministry of Planning. Foreign grants and loans further supported these welfare-oriented goals, the bulk of which were USAID funds. From 1977 to 1981, the total Government of Egypt investment in the water and wastewater sector was approximately EGP 1.77 billion or \$3.41 billion while from 1982 to 2006 the government's investment totaled EGP 65

24 USAID. Water and Wastewater Sector Assessment, May 1983.

25 see note above.

billion or \$22.47 billion.²⁶ USAID's total investment in Egypt's water and wastewater sector from 1977-2006 was \$3.3 billion and was thus 12.7 percent of the GOE's \$25.88 billion contribution during that same time period.

Financial viability was also a pressing concern. Revenues from tariffs and services were not sufficient to cover operating costs. The principal reasons for this shortfall were low water and wastewater tariffs, water leakage, large volumes of unaccounted-for water, very low collection rates, and a considerably higher-than-required workforce. Through the Ministry of Finance, the GOE subsidized the utilities to alleviate this shortfall in revenues. This practice was a large burden on the Egyptian treasury and drained funds available to other urgently-needed social and economic programs. The cost of capital and operational financial subsidies to Egypt's water and wastewater sector was untenable. Over EGP 38 billion of capital was invested from 1982 to 2000. Subsidies for operations and current debt installments were estimated at over EGP 5 billion. The financial burden was likely to grow unless effective action was taken to improve the financial performance of the sector.

Sector Constraints

Sector Investment Planning, Contracting, and Execution

Starting at this time, the GOE conceived a massive sector investment program to be funded partially from its own budget and partially by foreign donors. This plan represented a substantial increase in utility investment levels over the past and signaled a shift in investment priorities. The planning, design, construction, and management capacity required for its execution presented a major challenge to national and local authorities. When USAID launched its water and wastewater infrastructure development program, these tasks were placed in the hands of newly-established or minimally-experienced organizations. These institutions were unfamiliar with the demands of managing large construction projects as well as with the technical and operational requirements of operating large, modern utility systems. Moreover, these agencies were required to operate as public sector authorities without financial independence or full authority over their practices and programs.²⁷

The capital spending levels necessary to execute improvements in the water and wastewater sector also raised serious concerns. Based on the past performance of the sector, some doubted the absorptive capacity of the sector and questioned the ability of the economy to sustain such increased levels of investment. The Egyptian construction industry was already stretched thin, and could not be realistically expected to accommodate the extraordinary requirements of the planned water and wastewater program. Similarly, local materials production, though growing, was not in a position to meet the sudden surge in demand for pipes, fittings, pumps, water meters, and other materials.

Local currency availability for the sector had also been a problem in the past. Notwithstanding all assurances and plans to the contrary, it was difficult for the GOE to raise the necessary investment funds without resorting to an expansion of the money supply. This problem was expected to intensify as new water and wastewater facilities came on line and required more capital for operations and maintenance.

26 GOE investment data in the water and wastewater sectors was provided to evaluation team by Mohamed El Alfy, Assistant Minister, Ministry of Housing, Utilities and Urban Development in a meeting on August 31, 2006.

The amount for 1977 to 1981 is based on a weighted average exchange rate over that period of 0.52 EGP/USD to reach a total investment of \$3.41 billion. During the period from 1982 – 2006, the total investment by the Egyptian government was 65 billion EGP. There is no additional information on the breakdown of these investments, so a weighted average of 2.8926 EGP/USD was used over the entire 25-year period. Therefore, the investment by the Egyptian government during 1982-2006 was approximately \$22.47 billion.

27 USAID Project Paper, Cairo Sewerage, September 1978; USAID Water and Wastewater Sector Assessment, May 1983; USAID Project Paper, Cairo Sewerage II Project, September, 1984.

Revenue Generation

Because the scarcity of GOE funds for the water and wastewater sector was a major constraint on the sector's development, it was essential that the water and wastewater utility organizations improve their capacity to generate revenue. Reducing the subsidy burden created by the sector was essential. Revenue generation in the sector originated, for the most part, in the water sub-sector where billing for wastewater services was accomplished through a surcharge on water tariffs. The level of revenue generated by the sector depended upon the amount of accounted-for water sold, the water/wastewater tariff rates, and the rate of collection of water billed. The sector was experiencing serious deficiencies in all three areas.

The fact that agencies could not retain collected revenues further weakened the possibility for financial viability. All revenues were turned over to the Ministry of Finance which arbitrarily allocated budgets to the organizations without regard to the revenues they produced, or even to the organizations' own estimates of the funds required to adequately operate and maintain their systems. As a result, sector organizations had no incentive to undertake the difficult and unpopular steps needed to increase their revenue generation capacity.

Management Capability and Institutional Development

Weak management capacity was a key constraint to developing water and wastewater systems in Egypt. The organizations responsible for designing and building capital projects as well as for operating existing and planned water supply and wastewater systems were not necessarily in a position to take on this massive expansion of services. This observation had been made in numerous consultant reports, as well as the USAID sector assessments of 1983 and 1985 and the World Bank Sector Memorandum (January 1984). Projects were selected and designed without sufficient attention to cost-effectiveness, technical appropriateness, or economic justification. Project design did not pay sufficient attention to the ability of operating agencies to operate and maintain facilities adequately; and the investment funding process led to excessively long project implementation periods. The quality of civil works construction and equipment and material was often poor.

The assessments mentioned above, along with other reports and studies on facilities design and construction, systems operation and maintenance, and management structure, documented three critical problems: (1) weak, non-responsive, and non-directive management systems, (2) the absence of an adequate supply of trained and dedicated management and technical staff, and (3) poor construction management and operation and maintenance practices.

Specific factors characterizing management at this time included:

1. Considerable fragmentation of authority and responsibility
2. Managers without the technical skills to define, implement, and monitor their respective tasks
3. Organization and management practices shaped by politics rather than efficacy and favoring committee consensus-building and decision making
4. Little delegation of decision-making authority and very little communication across and among departments and between and among managers
5. Few incentives (in the form of increased pay and promotions) for improved performance on the part of staff

Government policies and practices at the national level also worked against effective sector management. GOE policy also contributed to poor performance in the form of GOE-guaranteed employment policies that produced overstaffing, subsidy practices that fixed tariffs at levels insufficient to cover operations and maintenance costs, and organizational policies that restricted the authority of local organizations. The sector was also characterized by non-competitive wages and benefits and low status. A lack of

coordination among sector institutions, coupled with inadequate delegations of responsibility to operating agencies, made effective operations difficult.

Training and Human Resources Development

Human resource capacity in the water and wastewater sector had been given low priority over the years. Government employment practice treated water and wastewater organizations as a “dumping ground” for excess labor. Managers used transfers to water, and especially, wastewater treatment facilities as a form of punishment for employees who were difficult or had fallen from grace. Training was not viewed as a priority by either management or employees. Even in the best-run utilities, training was not used as a management tool to improve performance. Instead, training was perceived as a rite of passage that all staff endured, but was rarely taken back to their work. Because job classifications were relatively inflexible, training did not necessarily guarantee promotion or even that new skills would be utilized. Neither learning, nor improved job performance was rewarded at the job site. This led to disillusionment on the part of employees who, unable to perform tasks for which they had been trained, eventually lost interest in their jobs. This was particularly true for technical staff and junior management. A severe shortage of experienced and qualified utility managers, administrators, planners, financial experts, engineers, and operators compounded human resource problems.

3.1.3. Outputs And Outcomes at the Program Level

USAID’s response to Egypt’s water and wastewater infrastructure problems was swift and massive. The result was the launching of the largest utility assistance program in the history of USAID. From 1977 to 2006, USAID invested close to \$3.3 billion in 14 water and wastewater projects²⁸

USAID’s program of support for the development of Egypt’s water and wastewater sector has achieved many successes: development of world-class infrastructure, the strengthening of institutional and operational capacity, the development of national water and wastewater services capacity, improvements in public health, and improvements in the financial and operational performance of the sector. As compared to 1977, Egypt’s water and wastewater sector has been substantially transformed. USAID’s interventions either expanded access or improved the quality of drinking water and wastewater services for more than 22 million Egyptians. Infant mortality rates in Egypt are today one-fifth of what they were in the 1970s, having dropped from 145 per 1,000 live births in 1975 to 26.4 per 1,000 in 2004. USAID’s programs supported the construction and the institutional strengthening of Egypt’s water utilities. Besides increasing access of the Egyptian population to water and wastewater services, a goal of USAID assistance was to foster institutional improvements and strengthen the sustainability of the utilities by improving cost recovery, reducing water losses, and improving service quality.

In Egypt’s capital city, USAID’s support addressed Cairo’s water supply problems by rehabilitating and expanding the capacity of Cairo’s major water filtration plant at Rod El Farag from 300,000 cubic meters per day to 750,000 cubic meters per day. In addition, USAID improved the distribution network, increased storage capacity, and supported improved water services in central Cairo for approximately two million residents and three million workers. USAID funding for the Cairo sewerage sector included planning, engineering design, personnel training, and capital investments; and rehabilitated 53 pumping stations (and associated infrastructure) and 39 ejector stations. The second phase of USAID investments in Cairo’s wastewater sector focused on improving the wastewater system on the west bank of the Nile. These efforts sought to improve and expand wastewater conveyance and treatment infrastructure, extend sewers into the developing areas without sewers, and conduct training activities to improve system

28 A project-by-project analysis with detailed funding levels, purpose, and duration of each project can be found in Appendix IV

management. Eleven new pumping stations were constructed, and the Zenein wastewater treatment plant was also rehabilitated. In addition, USAID worked to strengthen the institutional capabilities of Cairo's water and wastewater systems. USAID assistance established state-of-the art laboratory and training facilities at water and wastewater facilities; developed training materials; trained managerial and technical staff; and developed administrative, financial, and maintenance systems. Moreover, USAID provided financial assistance for the provision of extensive spare parts and tools necessary for the proper operation and maintenance of water and wastewater facilities.

USAID's support to the Alexandria Water Company covered studies, design of pipelines and improvements to the water treatment plants, procurement of equipment and tools, construction of High Priorities Projects and Urban Poor Projects, and the achievement of major health and environmental improvements. These have included the provision of centralized chlorine storage and reservoir; flow meters, chemical feeds, transmitters and instrumentation; repair and replacement of filter control systems; installation of on-line analyzers for turbidity, chlorine, and pH; centralized control systems; and emergency standby generators. A major goal has been improved cost recovery, including the recovery of operations and maintenance costs. Therefore, the utility's financial plan recognizes and includes the costs of long-term operation and maintenance, and its tariffs are designed to fully recover these costs as well as the debt service costs and interest on loans. Institutional assistance was also provided to reduce water losses and improve service quality.

In Alexandria, USAID provided over \$630 million of assistance to ameliorate health and environmental problems associated with deficiencies in the city's wastewater collection and treatment system. Two major primary treatment plants with a combined capacity of more than one million cmd, and seven major pump stations were built including a mechanical sludge dewatering facility and a sludge disposal site. More than 100 km of collectors transport wastewater away from the streets and the sea, and to the two wastewater treatment plants. Administrative facilities, maintenance workshops, and laboratories were constructed at the sites of both wastewater treatment plants; and a state of the art training facility was built at one of the East Treatment facilities. Tools, spare parts, and chemicals were provided for all of the facilities. In addition, a multi-year training, O&M assistance, and a institutional strengthening program led to a comprehensive solution to Alexandria's wastewater infrastructure deficiencies.

In the Canal Cities of Port Said, Ismailia, and Suez USAID intervened to provide urgently needed water and wastewater infrastructure improvement, technical assistance, and institutional support after the collapse of the infrastructure during the war and evacuation period. USAID's infrastructure interventions included new wastewater treatment facilities and the rehabilitation and expansion of the existing raw water transmission system serving the city of Port Said. Assistance was also provided for the institutional development of the operating agencies for these cities' water and wastewater facilities. The system replaced facilities that had been discharging wastewater primarily into the sea, helping to reverse health and environmental problems associated with those practices. USAID also provided assistance for institutional strengthening to improve management, operations, and maintenance at the facilities and strengthen their long-term viability.

Completion of Phase II of the Canal Cities assistance resulted in new water and wastewater facilities, the strengthening of NOPWASD and SCA capabilities, the development of operations and maintenance capabilities, and the development of water quality monitoring capabilities. As a result of USAID's assistance, raw wastewater is no longer discharged into Suez Bay, Lake Timsah, or Lake Manzala. Port Said has a new freshwater pump station that augments the city's water supply. Administrative training and laboratory facilities were provided for the three cities at the site of the wastewater treatment facilities. In addition, a cadre of managers and operations and maintenance personnel received extensive training.

In Middle Egypt (Provincial Cities), USAID intervened to improve and expand water and wastewater systems in Beni Suef, Minia, and Fayoum. There, 85 percent of USAID's assistance went to new construction, and specifically for new water treatment plants serving nearly 1.5 million people and new

wastewater systems serving nearly 500,000 people. In addition, an institutional development plan was implemented to improve the institutional capacities of the cities to plan, implement, and maintain their systems. Perhaps the most important result of this plan was growth in the collection rate from 78 percent in 1999 to 98 percent in 2004. Cost recovery jumped from 43 percent in 1999 to 91 percent in 2004.

Turning to the Secondary Cities, USAID provided contracts for Institutional Development and for Engineering Design/Construction Management. New construction included a Mansoura water treatment plant (and rehabilitation of the existing Mansoura water treatment plants), water and wastewater facilities in the Aswan cities, wastewater facilities in Luxor, and water and wastewater facilities in Nuweiba.

In summary, the direct and indirect outputs of USAID/Egypt's assistance to the water and wastewater utility sector can be summarized as follows:

- World-class infrastructure designed, built, and put into operation
- Stronger institutional and operational capacity
- Improved national water and wastewater service capability
- Improved health and environment

World-Class Infrastructure designed, built and put into operation

Extensive planning, good design, and sound construction have characterized USAID/Egypt's approach to the water and wastewater infrastructure problems facing Egypt. Water supply and wastewater systems shortcomings were properly assessed. The priorities assigned to chosen remedies were appropriate and conducted within international norms and standards. The decision to rehabilitate and expand the wastewater collection and conveyance systems in order to provide relief from sewage flooding to millions of residents in Cairo and Alexandria was technically and socially sound.

Prior to USAID's interventions, both Cairo and Alexandria had severe sewage flooding problems, which were often caused by the inability of the collection systems to carry both storm and residential wastewater. Every time it rained, the excess wastewater caused flooding. Addressing this deficiency needed to be a first priority when rehabilitating a wastewater system as prolonged sewage flooding had immediate adverse public health and social impacts. In addition, the time and cost of rehabilitating collection systems is much less than that for expanding and/or rehabilitating wastewater treatment facilities.

The majority of these projects can credit the use of appropriate technologies for their success and sustainability. These technologies, while not necessarily the "latest" at the time, have proved to be sustainable in Egypt. For example, the sludge dewatering process used in the Canal Cities projects relies on sunlight and sandy soil, which are abundant in Egypt. USAID's design, technology and construction management approach has differentiated USAID-funded projects from those of other donors.²⁹

Institutional and Operational Capacity Strengthened

USAID-funded projects from the 1990s took a holistic approach to problem resolution which made a positive contribution to institutional and operational capacity³⁰. USAID insisted on:

29 USAID. Final Evaluation of the Canal Cities Water and Wastewater Phase II (CCII) Project, Optimal, 18 November 2003; Project Assistance Completion Report for the Cairo Water Supply II Project (CWS II) USAID Project No. 263-0193, September 1998.

30 The data to support this are presented in detail in the project-by-project analysis for Cairo, Alexandria, and the Canal Cities in Appendix IV and in those Project's Final Reports.

-
- developing the operational capacity of the utilities through performance-based management, training, administrative and financial systems development, and O&M improvements
 - constructing not only conventional treatment facilities; but also the “support facilities”, the laboratories, training centers, and maintenance shops essential to the proper and efficient operation

National Water and Wastewater Services Capability Developed

The design and construction of the USAID-funded water and wastewater projects happened during a time of unparalleled infrastructure development in Egypt. The projects were large and complex and presented significant challenges to planners and builders. These projects pioneered engineering, construction, and construction management practices in Egypt. In-country expertise at both the individual and company level grew as a result, building local capabilities in contracts administration, system design, and large-scale construction.

Today, several engineering and construction companies involved in the USAID projects are providing services in Egypt and other Middle Eastern countries. The construction management area benefited in particular from an enhanced understanding and consistent application of International Federation of Consulting Engineers (FIDIC) claims resolution practices, and technology transfer to the Egyptian wastewater private sector.³¹

Another important indirect benefit of USAID assistance and its concomitant skills and technology transfer has been the development of a water pollution control industry in Egypt. Today, Egyptian design and construction companies export their expertise to other Arab and African countries. A sustainable domestic capability is now in place that can respond to future needs, such as GOE plans to expand sanitary services in minor urban and rural communities.

Health and Environment Improved

The health and environment of the Egyptian population have improved dramatically in the last three decades. Infant mortality rates are today one-fifth of what they were in the 1970s, having dropped from 145 per 1,000 live births in 1975 to 26.4 per 1,000 in 2004.³² The incidence of diarrheal diseases - a major cause of infant mortality - has also been dramatically reduced. These improvements can be partly attributed to improved and expanded water and sanitation services.

Studies that followed the Alexandria Wastewater, the Canal Cities Wastewater, and the Secondary Cities projects found a positive correlation between infrastructure improvements and health improvements. In Alexandria, improvements in the wastewater collection and treatment system are one of a number of environmental factors that contributed to lower infant mortality rates (28%) during the period covered by the Alexandria project (1987 to 1993).³³ Similarly, the incidence rates for death and illness from waterborne diseases showed dramatic decreases in the period from 1986 to 1990. Hepatitis dropped by 50

31 The fact that design and construction management expertise in Egypt was greatly facilitated by USAID’s interventions is documented in most USAID project papers and early sector assessments. See the Final Evaluation of the Canal Cities Water and Wastewater Phase II (CCII) Project, Optimal, 18 November 2003; Project Assistance Completion Report for the Cairo Water Supply II Project (CWS II) USAID Project No. 263-0193, September 1998; Project Assistance Completion report for the Cairo Sewerage II Project: USAID Project 263-0173, June 2000

32 World Bank World Development Indicators, <http://publications.worldbank.org/subscriptions/WDI>

33 Final Report, Human Health Study, Alexandria Wastewater Project-Phase II, June 1997

percent, typhoid by 76 percent, and paratyphoid by 82 percent.³⁴ New wastewater facilities removed raw sewage from the streets of Alexandria and eliminated discharge to the sea where millions bathe each year.

1995 water quality data gathered during Phase I of the Canal Cities Water and Wastewater II project recorded excessive levels of bacterial contamination at the Sayl drain outfall (outfall of the old Suez wastewater treatment plant) prior to the construction of the Suez wastewater treatment plant. Total coliform, fecal coliform, and fecal streptococci count averages were 310,890/100ml, 188,420/100ml, and 1,877/100ml respectively. In Phase II monitoring, which took place after the start-up of the new wastewater treatment plant, the total coliform, fecal coliform, and fecal streptococci counts at the Sayl drain were dramatically lower: 16,000/100ml, 16,000/100ml, and 2,400/100ml respectively. Bacterial pollution at the Bay was greatly reduced with the operation of the new Suez wastewater treatment plant.³⁵

Under the Secondary Cities Development project, deaths of children under age 5 due to diarrheal illnesses declined from between 10 and 22 percent from pre-project mortality rates in Secondary City communities.³⁶ These results support the evidence that improved water supply and sanitation improves the health of its beneficiaries.³⁷

Environment improvements are another direct benefit of the USAID infrastructure interventions. Requiring special mention are Cairo, Alexandria, and Canal Cities. In these cities, the elimination of raw wastewater discharges into agricultural drains, the Mediterranean Sea, Lake Maryout, Suez Bay, and Lakes Timsah and Manzala has improved water quality tremendously. Prior to Phase II of the Canal Cities Water and Wastewater project, pollution from untreated wastewater discharge severely limited fishing, tourism, and recreation in the three Canal Cities.

Financial and Operational Performance of Sector Improved

Key performance indicators have steadily improved³⁸, especially in the past five years.

- Cost recovery is about 90 percent (not counting depreciation)
- Percent of operation & maintenance costs covered by collected revenue goes from 61% to 100%.
- Water not-accounted-for has dropped from 49 percent to 43 percent

Other key cost-recovery improvements in the sector are:

- Debt restructuring (forgiveness) approved by the Ministry of Finance (MOF) is making the water utilities more attractive for private sector participation.
- Capital replacement costs are now covered by GOE grants and not loans, and so reducing the pressure on the water utilities to recoup these capital costs through tariffs.

Establishment of the Holding Company for Water and Wastewater and Subsidiary Companies (HCWW)

The laws setting up a Water/Wastewater Holding Company bring some optimism about the future of the water/wastewater sector. The holding company and regulatory authority were created in April of 2004 - the HCWW commenced operation in September of 2004 and a regulatory authority commenced operations in May of 2005. The new emphasis upon cost recovery and performance management has lessened the long-term burden on the Government and made the utilities more attractive for private sector participation.

- Meetings with David Osgood, CH2MHill (August 30, 2006), Dr. Abdel Kawi Khalifa, Chairman, Holding Company (August 30, 2006), and Mamdouh Raslan, Deputy Chairman Financial and Administrative Affairs, Holding Company (September 5, 2006)

34 See note above.

35 USAID Final Evaluation of the Canal Cities Water and Wastewater Phase II Project, Optimal, 18 November 2003.

36 Assessment of Economic Impacts of the Secondary Cities Project, June 2004.

37 USAID Policy Paper, "Domestic Water and Sanitation," noted that the combination of unsafe drinking water and inadequate sanitation facilities constitutes one of the major causes of death and disability among the poor in developing countries.

38 FY 2004 Performance Monitoring Reporting for SpO 18.

- Personnel policies for the Holding Company and its subsidiaries are no longer under the control of the GOE, allowing for more commercially-driven human resource decisions.
- The focus of the subsidiary companies has begun to move to a commercial mindset, shifting some of the financial burden from the Government to the utility operator.

USAID-funded water and wastewater facilities are performing their intended purpose - providing adequate treatment to water and wastewater. The water distribution networks convey water to the utility customers with significantly improved reliability, and at much higher pressure. Wastewater collection systems are carrying raw sewage away from the previously flooded neighborhoods with greatly improved reliability, and flooding incidents are rare.

3.1.4. Summary of Achievements

Investments in Egypt's water and wastewater infrastructure can be counted among USAID's most outstanding success stories. Water and wastewater systems are among a country's most important socio-economic assets, in addition to being indispensable to health and the environment. USAID support for water utility rehabilitation, improvement, and expansion has hugely enhanced the economic growth in Egypt and the well-being of its people.

USAID assistance has helped to resolve the most critical problems that stemmed from improper or insufficient water supply and sanitation in the large urban centers of Cairo and Alexandria, the Canal Cities, Middle Egypt, and selected Secondary Cities. Building upon these USAID-funded successes, the GOE is planning to allocate about EGP 20 billion to develop water and sewer systems for rural and poor villages in the Nile region, with the secondary aim of attracting private investments in the sector.³⁹

Access to Sustainable Water and Wastewater Services Increased

There were almost 22 million direct Egyptian beneficiaries of USAID-funded water and wastewater services in Egypt from 1977 to 2006. The table below totals the number of beneficiaries from each specific water/wastewater project. This actually totals 30 million as the same Egyptians in Cairo and Alexandria are double-counted for their increased/improved access to both water and wastewater services.

Beneficiaries of USAID's Water and Wastewater Services⁴⁰

Project	Beneficiaries (in millions)
Greater Cairo Water Company	2.4
Greater Cairo Wastewater Company	10.9
Alexandria Water Company	5.8
Alexandria Wastewater Company	6.1
Canal Cities Water and Wastewater	0.9
Middle Egypt (Provincial Cities)	2.3
Secondary Cities	1.6
Total	30 million ⁴¹

39 American Chamber of Commerce in Egypt, Egypt Watch Bulletin, November 2006.

40 Project Assistance Completion Reports, Project Papers, and SpO 18 Annual Reports.

41 Please note that the Beneficiaries column above counts Cairo and Alexandria beneficiaries for each sub-sector - water and wastewater – and thus most of that population is being double-counted.

Legal and Regulatory Framework Established

In the early 1990s, sector reforms were initiated with the issuance of a series of presidential decrees that established the water and wastewater Public Economic Authorities (PEA). PEAs were subsidiaries of the seven Egyptian governorates, and were intended to operate with more autonomy, and specifically as business-oriented utilities prone to less political interference. The most significant sector reform was however accomplished in 2004 with two presidential decrees: (1) Presidential Decree No. 135 establishing a Holding Company for Water and Wastewater and Subsidiary Companies; and (2) Presidential Decree No. 136 establishing the Regulatory Agency for Potable Water, Wastewater, and Consumer Protection. Together these agencies provided the basis for a modern water and wastewater sector, with a corporatized management structure and a sector regulator.

Through its Legal, Institutional, and Regulatory Reform (LIRR) project, USAID established milestones for the water and wastewater sector, and can be credited with supporting the achievements listed below. LIRR assistance supported the Ministry of Housing, Utilities, and Urban Communities in staffing, organizing, and administering the new regulatory agency; and in building its capacity. The most recent legal and regulatory milestones established with the assistance of USAID for the water and wastewater sector and the chronology for achieving them are presented in the table below.

	Legal/Regulatory Milestones in the Water/Wastewater Sector
2000	Cabinet approves draft presidential decree calling for the creation of a water/wastewater regulatory agency and related institutional reforms. <i>Achieved – May 2000</i>
2001	President issues a presidential decree calling for the establishment of a water/wastewater regulatory agency and related institutional reforms. <i>Not Achieved – State Council advised that this must be done by law, not decree.</i>
2002	Minister of Housing appoints a board of directors for a regulatory agency for water and wastewater. <i>Not Achieved – Creation of the regulatory agency is awaiting legal approval.</i>
2003	A draft law authorizing the creation of a regulatory agency for the water and wastewater sector is approved by the Cabinet. A draft law providing a legal framework for private sector participation in the water and wastewater sector is approved by the Cabinet. <i>Achieved – The planned objectives from 2001 and 2002 were achieved during FY 2003. Further, it is expected that 2003 objectives will be achieved in FY 2004.</i>
2004	A law authorizing the creation of a regulatory agency for water and wastewater is passed. A law providing a legal framework for private sector participation in the water and wastewater sector is passed. <i>Achieved:</i> The holding company and regulatory authority was established in April of 2004 with the promulgation of Presidential Decrees 135 and 136. The HCWW commenced operation in September of 2004 with the appointment of a board of directors. The regulatory authority commenced operations in May of 2005 with the appointment of a board of directors and an executive director.
2005	The Laiha (personnel policies) and the utility organizational structure were developed, approved, and implemented in the HCWW and subsidiary companies. The HCWW is actively managing the subsidiary companies and requiring performance monitoring reports and five-year financial plans. <i>Achieved:</i> The regulatory agency identifies and occupies an office, and begins to review utility certification applications and utility performance indicators on a pilot basis.

Water and Wastewater Sector: SpO 18 Assessment

The goal of USAID/Egypt's Special Object 18 (SpO18) was to increase access to sustainable utility services in the three sectors. Five water and wastewater-specific indicators and one indicator addressing all three sectors were developed in 2000 as follows to monitor the effectiveness of the infrastructure

programs⁴². Four out of five sector-specific indicators met their performance targets in 2004 (18.2.b - percent of annual billings collected for water and wastewater sold - was the only indicator which did not meet its target) and all legal and regulatory milestones have already been achieved.⁴³

1. Cumulative number of people with new or improved water or wastewater service in selected areas
2. Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector
3. Percent increase (relative to baseline) in capacity of selected water and wastewater utilities
4. Percent of produced water not-accounted-for
5. Percent of annual billings collected for water and wastewater sold
6. Cumulative number of legal and regulatory milestones attained

SO Indicator 18.a – Cumulative number of people with new or improved water or wastewater service in selected areas

The number of people with new or improved water and wastewater service is a direct measure of increased access to household water and wastewater services. Institutional development and construction management contractors were interviewed to determine the status of each USAID-funded project. When a project is completed, the projected population of the company service area in the year of completion is counted as beneficiaries of new or improved water/wastewater services. In 2004, the planned or targeted cumulative number of people with new or improved water or wastewater service in selected areas was 6.024 million persons while the actual number of persons was 6.082 million persons.⁴⁴

Rating: Positive

SO Indicator 18.c – Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector

The recovery of operating and maintenance costs is a chief indicator of financial sustainability and is key for private sector investment and expansion of services. A standardized data collection form was used to collect data on costs and collected revenue for each company evaluated. The value of the indicator is the ratio of collected revenue to operations and maintenance costs expressed as a percent and averaged over all the water and wastewater companies. Data are collected from institutional development and construction management contractors, as well as from the companies themselves.

In 2004, the planned or targeted percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector was 92 percent while the actual percentage was 100 percent.

Rating: Positive

42 The SpO 18 Performance Monitoring Report deals only with USAID-funded projects. In situations where other donors might have been involved, only the USAID-funded portion of assistance was measured against the indicator. The only city where other donors were involved is Cairo and it is not included in the results of SpO 18.

43 FY 2004 Performance Monitoring Report for Special Objective 18.

44 The validity of this indicator depends upon two assumptions: 1) that the infrastructure and institutional development projects are effective in increasing access to sustainable company services and/or improving service quality, and 2) that every household in a project service area benefits from either access to serve or some improvements in service quality once the project is completed.”, FY 2004 Performance Monitoring Report for Special Objective 18

IR Indicator 18.1.a – Percent increase (relative to baseline) in capacity of selected water and wastewater utilities

The capacity of water and wastewater companies is an indicator of both access to services and the quality of services a company is capable of providing to customers, and impacts directly on environmental quality and human health. Total capacity in the baseline year is determined by the sum of the capacities, in m³/day, over all the water and wastewater companies⁴⁵.

By 2004, the planned or targeted percent increase (relative to the baseline) in capacity of selected water and wastewater utilities was 168 percent. The actual percentage increase over the 1999 baseline was 180 percent.

Rating: Positive

IR Indicator 18.2.a – Percent of produced water not-accounted-for

Unaccounted-for-water is an indicator of the delivery efficiency of the water system. The value of the indicator in a given year is the ratio of the difference between total water produced by all the water companies and the total water billed by the companies and the total water produced by the companies. Data are collected from institutional development and construction management contractors, as well as from the companies themselves.

In 2004, the planned or targeted percent of produced water-not-accounted for was 45 percent while the actual percentage was 43.25 percent.

Rating: Positive

IR Indicator 18.2.b – Percent of annual billings collected for water and wastewater sold

Collection rates directly affect revenues, tariff rates, and sustainability of a company and are a measure of the collection efficiency of the company. The value of the indicator in a given year is the simple average over the nine water and wastewater companies of the ratio of collected tariff revenue by each company during the fiscal year to the monetary amount of bills presented to customers of each company in the fiscal year.

In 2004, the planned or targeted percentage of annual billings collected for water and wastewater services sold was 84 percent while the actual percentage was 77 percent.

Rating: Positive

IR Indicator 18.3.a – Cumulative number of legal and regulatory milestones attained

A number of legal and regulatory reforms are necessary to the commercialization and privatization of company services that will ultimately contribute to better access to sustainable services. The SpO18 team contacted officials at the appropriate oversight Ministry in each infrastructure sector, regulatory agencies, management of companies, and contractors to verify achievement of expected legal and regulatory milestones.

In April 2004, Presidential Decree established the Holding Company for Water and Wastewater and the Regulatory Authority. The Holding Company commenced operation in September 2004, while the Regulatory Authority commenced operations in May 2005.

⁴⁵ Data are collected from institutional development and construction management contractors, as well as from the companies themselves.

Rating: Positive**Principal Threats to Sustainability**

The institutional strengthening programs under SpO 18 focused on developing the institutional and management tools needed by utilities to fulfill their mission: organizations with competent professionals with the training to manage facilities properly, financial planning and systems that allowed facilities to offer cost-effective service to their customers, the means to extend their services to underserved areas, and the technical capacity to upgrade treatment processes to match the latest technological standards. These objectives have been, to a great extent, achieved and the utility systems continue to operate. There are qualitative differences, however, in the operational and maintenance performance of different facilities. Success in the operation of individual facilities appears to be the result of the efforts of individual facility managers and their staff, however, and not of an effective central management system.⁴⁶ Weaknesses in senior management have failed to institutionalize the performance management programs developed by the contractors. Management has not yet internalized the significance of performance management and customer care tools. Rather, management follows external recommendations or directives of external interventions until they cease to be a priority, and then returns to business as usual. This is a discouraging trend, but could change under the impetus of the commercial management mindset of the newly-established Holding Company for Water and Wastewater and Subsidiary Companies.

Another threat to sustainability is the deteriorating physical condition of the facilities. Alexandria Wastewater Company is a glaring example of a serious problem which Egyptian water and wastewater utilities could face country-wide. It appears that the Alexandria Company's operational and management priority is to transport wastewater away from homes, businesses, and institutions. The system is functioning in the sense that it pumps and treats wastewater, but it is steadily deteriorating due to the lack of proper operation and maintenance management. Maintenance is mostly corrective rather than preventive. One explanation is that the Egyptian operations and maintenance system is not conducive to "preventive practices" of any type. This is a mindset that will require comprehensive and long-term interventions to remedy. It is a systemic problem, deeply rooted in the management practices of almost every public agency or company in Egypt, which makes physical sustainability the Achilles' heel of the water and wastewater sector. The utilities must undergo a fundamental change in their corporate practices that can only be attained through proper national and local leadership. This is a main challenge for the new Water/Wastewater Holding Company.

The outlook for the financial sustainability of the utilities looks brighter than that for their physical sustainability. Financial practices have improved considerably in the past ten years, and particularly in the past five. Most recent data cost recovery meets the target value set in SpO 18, however, cost recovery has not consistently improved over the years. This is a worrisome trend. Almost half (43%) of water produced is not sold and remains unaccounted for, adding an additional burden on the utilities and hampering efforts to become financially independent of national subsidies. As a comparison, the benchmark in the United States for unaccounted water is not more than 10-12% of total water produced, with a suggested goal of 5%.

Operational Maintenance Challenges – West Treatment Plant and Mechanical Dewatering Facility, Alexandria

The condition of the physical infrastructure of the Alexandria Wastewater Company is an example of maintenance problems facing Egyptian water and wastewater utilities in general and the Alexandria system in particular. What is unique in Alexandria is that the condition of the wastewater infrastructure varies considerably from facility to facility. This problem is most visible at the West Treatment Plant (WTP) and especially the Mechanical Dewatering Facility (MDF). This is due to weaknesses in maintenance management which have become more obvious as operating conditions have become more challenging, as is the case with the WTP and MDF.

- Site visit to Eng. Ahmed Torky, Manager - September 2, 2006

46 Site visit on September 2, 2006 to the West Treatment Plant and Mechanical Dewatering Facility and the East Treatment Plant of the Alexandria Wastewater Company and meeting with Eng. Ahmed Torky, Manager.

Insufficient revenue generation is dangerous threat to the financial sustainability of the water and wastewater utility companies. More than two decades of intense efforts by USAID and other donors have produced only moderate improvements. The major obstacle to cost recovery for water and wastewater services is insufficient revenue generation from tariffs. There has been great resistance to tariff increases in the water and wastewater sector with many voices in the GOE insisting that water is a social and health benefit that should be provided to the public at no or very little cost. Like in many countries, the revenue for wastewater comes from a surcharge on the water charges and so, as long as water rates remain low, the revenues from wastewater will remain woefully low. Raising tariff and water rates to overcome insufficient revenue generation will require bold interventions at the Holding Company and local utility level.

Another possible threat to sustainability concerns the ability to expand services and meet the management and financial demands of this expansion. Water and wastewater companies in Egypt will face increasing demand for services in the near future, which will bring other management and financial problems. Significant improvements in the form of tariff rate increases and bill collection to achieve cost recovery, accompanied by reductions in operating expenditures, will be needed in order to achieve financial sustainability. This should be accomplished without undermining the preventive and corrective maintenance of the infrastructure.

One positive sign is that the Water Holding Company seems to be determined to put its arms around this thorny issue within the next two years by reducing the workforce (although no target percentage has been set) and allowing market forces to dictate rate increases.⁴⁷ The decision by the GOE to remove the capital improvements expenditure from the cost to operate is also a positive sign. This short-term solution will help to address the challenges that population, urbanization, and service area expansions will bring to the water and wastewater sector in Egypt.

3.1.5. Lessons Learned

At the time the infrastructure development activities began in Egypt in the late 1970s, USAID and United States engineering firms - the best that the U.S. had to offer - met the challenges of a hugely inadequate infrastructure with sound engineering practices. The objectives of these early activities were to rehabilitate the existing water and wastewater systems and quickly begin to expand the water and wastewater networks, to increase water pressure and remove raw sewage from flooded neighborhoods. The second investment priority was the rehabilitation and expansion of the water and wastewater treatment facilities. This two-phased approach was essential. Short-term needs were correctly assessed and executed.

Two primary lessons have emerged over the life of this program: 1) operations and management requirements must be addressed early on in program planning and implementation, and 2) physical sustainability and financial sustainability go hand-in-hand.

One lesson that emerged from this program centered around the inherent tendency in the engineering profession to focus almost entirely on the “brick and mortar” components of the infrastructure - those directly linked to the conveyance and treatment of water and wastewater. This mindset certainly prevailed among firms in the United States in the 1970s and early 1980s, and was exported to Egypt with the first interventions in the Cairo, Alexandria, and Canal Cities projects. Engineers were not trained to think much past the completion of the “physical” structures that they designed and constructed. The human and institutional aspects of their creations were often considered the domain of others. Compounding this problem was the fact that the Egyptian implementing agencies also resisted the inclusion of “soft”

47 Interview with Eng. Mahmoud Raslan, Deputy Chairman, Financial and Administrative Affairs, Holding Company for Water and Wastewater, 5 September 2006.

programs in the packages of offered USAID assistance. They wanted material assistance that they could see and touch. The result was that for almost the first decade of USAID's water and wastewater infrastructure program, the operational and institutional needs of the utilities were either superficially addressed or worse still, altogether neglected. Facilities worth hundreds of millions of dollars were completed and went online with only a minimal concern for operations and maintenance.

By the mid- to late 1980s, the O&M and training requirements eventually began to appear on the radar screen of USAID and its implementing agencies. By then, the first phase of the Cairo, Alexandria, and Canal Cities projects was completed and online. However, valuable time had been lost; time which could have been used to put together the badly needed institutional strengthening and sector reform components of the programs. As the focus of USAID's assistance shifted to institutional and sector reforms, cost recovery became the centerpiece of these efforts. This was wholly justified. Without the proper revenue generation mechanisms in place, the sustainability of water and wastewater treatment facilities is at great risk as capital maintenance and improvements face inadequate funding. Therefore, as USAID's water and wastewater construction efforts drew closer to the end, legal and regulatory reforms dominated its agenda, and cost recovery became the focus of SpO 18.

While cost recovery is certainly essential, perhaps more fundamentally critical to overall sustainability is their sound operation and management of the utilities. A utility may be financially viable, but will still fail to perform its mission if it has not been operated properly, or because its components fail. Moreover, the cost of rehabilitating and/or replacing worn out or damaged components of the facilities will greatly exceed the current budget shortfalls. Proper and efficient operation of these facilities is critical, along with financial viability. This is a classic example of the optimal direction *not being a choice between* cost recovery and proper operation, but rather a holistic one that *includes* both cost recovery and optimal performance.

A summary of additional lessons learned follows.

Infrastructure Development

- Implementing agencies must have the capabilities to manage contract execution, especially with regards to construction.
- Ground rules, and the roles and responsibilities – of owner, engineer, and contractor – must be clearly defined and communicated to all key players involved in the implementation of the project.
- When it will add value to the project and better serve the client, flexibility in implementation is an important attribute for program staff.
- Infrastructure development requires sector restructuring and institutional development interventions to be fully effective.

Institutional Development and Sector Reforms

- Institutional development interventions require sectoral policy reforms to be sustainable. The absence of sectoral policy reform in the past seriously impeded progress in institutional development interventions.
- Certain elements of an institutional strengthening program require considerable time to trickle down to another essential “layer” of sustainability. These elements include operational practices, maintenance management programs, and administrative and financial systems. It is one thing to develop and turn over to the utilities these programs/systems and another for them to fully understand the purpose/usefulness of these programs and to correctly utilize them. Tangible benefits from these new systems must be shown, to be followed by movement into another component.

- The institutionalization of programs and procedures often requires several years of continuous effort, especially when management is greatly influenced by social and political factors. When assistance continues until reforms are fully institutionalized, it will reduce the likelihood of regression.
- Progress in institutional development takes place first within small numbers of management. The ability to recognize progress, no matter how small it may appear, and build upon must be rewarded.
- Be willing to continue assistance for critical goals, such as cost recovery, a decrease in unaccounted for water, consistent maintenance management programs and operational practices, as long as there is evidence of measurable progress towards their sustainability.

3.1.6. Prospects For The Future

The Egyptian water and wastewater sector has in place the key regulatory, organizational, and policy reforms that will reshape the form and substance of the country's utilities. Much work remains however to be done to strengthen the financial viability of the subsidiary companies. Without doubt however, significant progress has been achieved since the USAID infrastructure interventions began, especially in the past ten years.

A dark cloud, however, hangs over USAID's accomplishments. As noted previously, the lack of proper maintenance of the facilities poses a grave threat to the physical sustainability of the infrastructure and endangers the agency's considerable investment. The slowly, but surely deteriorating, physical infrastructure is the result of many problems that continue to linger, even after almost two decades of institutional development efforts.

The development and use of performance indicators (financial, operational, effluent quality, customer service) and a performance compliance monitoring system are top priorities for action. Everything done at the facility level - training, certification of technicians and managers, laboratory testing, and maintenance management systems - should begin and end with the performance of the facility in mind. Moreover, this system should be used by the Holding Company as a compliance monitoring and utility comparison tool.

However, in order for such a performance monitoring system to be used effectively the corporate leadership of the Holding Company and subsidiary companies must embrace optimal performance and customer service as their central tenets. This change will take time to be internalized and take hold. Top to bottom, all employees must believe that they are there to serve their customers. To do that, they must operate the facilities effectively and efficiently, and protect the public investment. If this is accomplished, the consumer might be more inclined to pay more for these services.

The major challenges facing the Holding Company and its subsidiaries are:

- The subsidiary companies need to be transformed into properly functioning utilities. This process will be difficult and time consuming. For decades these utilities have been run by managers and employees who have been educated and worked in an environment rigidly controlled by antiquated and counter-productive policies and procedures.
- The capabilities of senior management and technical staff need improvement. Their focus must change from "protecting its own interests" to "protecting the consumer."
- From experience, customers do not trust the subsidiary companies to provide improved services, reliable quality, and accurate metering of water consumed.
- The utility workforce is too large and employees lack the proper incentives of attractive compensation and performance-based bonuses.
- Tariff setting is politicized, with rates in the water and wastewater sector not reflecting free market levels (as they do in Egypt's power and telecommunication sectors).

In addition, substantial unmet infrastructure needs for rural sanitation and water supply still exist in Egypt and a continuing concern revolves around the Egyptian Government's ability to adequately plan and execute projects to meet these needs. For the past three decades, the National Organization for Potable Water and Sanitary Drainage (NOPWASD) has been the agency to oversee this activity. Numerous reports have identified organizational weaknesses associated with NOPWASD's ability to effectively manage the planning, contracting, and execution of capital investments.⁴⁸ Therefore, for the future, NOPWASD's planning and contracting problems deserve serious attention.

Finally, during interviews conducted over the course of the evaluation, it was hinted that the Regulatory Agency for Potable Water, Wastewater and Consumer Protection might be headed for a collision course with the Holding Company for Water and Wastewater. This might stem from the lack of clear definition of the distinct roles and responsibilities of these two entities. It is essential, therefore, that the role of the Regulatory Agency be clearly defined. It is not the role of the Regulatory Agency to interfere with the management of the Holding Company. Both agencies exist to serve the consumer. The Holding Company and the subsidiary companies should take primary responsibility for the performance and management of the utilities.

In the end, the creation of the Water Holding Company and the Regulatory Agency presents great opportunities for a gradual revamping of utility management. A new focus on physical and financial sustainability by middle managers on up will bring substantial benefits to the Egyptian water and wastewater sector.

3.2. Power Sector

3.2.1. Background

USAID's interventions in the Egyptian power sector began in 1975 and continued through September 2006. USAID's program has captured virtually every aspect of the Egyptian power sector's development; from the expansion of generation capacity and the robustness of transmission and distribution systems, to the latter-day focus on rational state policy, industry structure and governance, and financial and operational sustainability of productive assets.

From the outset, USAID's interventions were identified and defined in consultation with Egyptian government counterparts, and coincided with the GOE's immediate priority of expanding access to reliable utility services to the entire population. Formally, the Government of Egypt submitted requests to USAID for funding to support specific project objectives, and USAID responded to these requests with offers of assistance.

Over a thirty-odd year history of assistance to the Egyptian power sector, USAID's projects have effected improvements across the entire spectrum of the sector, ranging from the relatively mundane (rehabilitation of dilapidated distribution networks) to the esoteric (assistance on the design of competitive wholesale power-markets), and touched virtually every aspect in between. A summary overview of USAID's programs is captured in the following table:

USAID/Egypt's Power Projects 1975-2006

Number	Project Title and Description	Years	Funding (US \$)
263-0001	Electric Power Distribution – restore the electric power distribution infrastructure in the cities of Port Said, Ismailia, and	1975-1980	29,834,000

48 2001 USAID Organizational Assessment of NOPWASD; 1993 World Bank Assessment; 1983 Sector Assessment.

Number	Project Title and Description	Years	Funding (US \$)
	Suez in order to facilitate industry and commerce in the Canal Zone.		
263-0008	Gas Turbine Generators Talkha-Helwan - construct one 120 MW gas turbine generator plant at Helwan, and one 180 MW gas turbine generator plant at Talkha.	1976-1980	67,299,000
263-0009	Abu Sultan (Ismailia) Thermal Power Plant - construct a 300 MW thermal power plant (steam turbine) near the city of Ismailia in the Suez Canal area.	1976-1988	249,576,000
263-0023	National Energy Control Center – install an online computerized control to improve efficiency and reliability of unified power system.	1976-1987	42,296,000
263-0030	Shoubra El Kheima Thermal Power Plant - construct a 1260 MW thermal power plant near Cairo on the site of an abandoned/disused plant with an existing infrastructure –(the largest thermal plant in all of Egypt and North Africa) to help Egypt meet demand growth of 9% per annum.	1979-1991	261,503,000
263-0033	Urban Electric Power Distribution Equipment - rehabilitate and expand the distribution networks in Cairo, Alexandria, Shebin El-Kom, and Beni Suef and improve reliability and quality of service.	1977-1991	97,128,000
263-0123	Energy Policy Planning - institution-building, professional development, and special studies related to energy planning; and institutionalize GOE capability to analyze energy policy options being considered by energy policymakers.	1982-1992	20,856,000
263-0140	Energy Conservation and Environment - promote and accelerate the adoption of improved commercial technologies, processes, and practices to save energy and increase industrial efficiency, and to enhance Egyptian institutional capacity to implement energy conservation.	1987-1998	140,975,000
263-0160	Aswan High Dam Power Station - rehabilitate and modernize the Aswan High Dam and rectify an original design fault affecting the reliability of the turbine runners, jeopardized the longevity of the station, and caused frequent and prolonged outages repairs while also affecting plant reliability and low-cost hydroelectric base-load availability.	1982-1995	139,516,000
263-0194	Alexandria Electrical Network Modernization - rehabilitate and modernize selected areas of the existing Alexandria power distribution network; and install a regional control center to optimize network operations within the Alexandria distribution system.	1989-1998	49,488,000
263-0196	Talkha Combined Cycle Plant – install Heat Recovery Steam Generators (HRSGs) and steam turbines to use the thermal energy in the form of exhaust gases being discharged from the existing gas turbines, converting the heat into steam to drive two steam turbines of nameplate 55 MW capacities each.	1982-1991	64,674,000
263-0215	Power Sector Support I - promote the reduction of subsidies to the power sector through the provision of capital infrastructure incentives to the GOE. Project funding was released in tranches upon satisfaction of performance milestones and conditions.	1989-2004	460,656,000

Number	Project Title and Description	Years	Funding (US \$)
263-0224	Power Sector Support II – fund capital investments at selected power-sector installations and provide targeted technical assistance as an enticement to the GOE to fulfill sector-reform commitments.	1994-2006	172,300,000
		Total:	1,796,101,000

USAID's \$1.8 billion contribution to the development of the Egyptian power sector is the most significant of any foreign assistance agency, standing at 22 percent of total foreign assistance to the sector's development. Total donor assistance since 1975 is summarized in the table below.

Donor/Institution:	Years	Currency	Amount	Exchange rate FCU/USD*	USD**	Percentage of Donor Funds
United States	1975-2006	USD	1,796,101,000	1.0000	1,796,101,000	22.07%
Arab Fund	1988-2006	KWD	380,863,000	0.2970	1,282,367,003	15.76%
European Investment Bank	1983-1994	XEU	232,400,000	0.8079	941,366,629	11.56%
European Investment Bank	2001-2005	EUR	610,000,000	0.9331		
African Development Bank	1984-1991	SDR (Special Drawing Rights)	602,409,000	1.2300	710,234,051	8.73%
African Development Bank	2006	EUR	175,910,000	0.7979		
Germany (West)	1981-2000	DEM	1,049,294,000	1.9571	606,913,099	7.46%
Germany (West)	1981-2000	EUR	66,194,000	0.9353		
World Bank	1985-2006	USD	471,870,000	1.0000	471,870,000	5.80%
Kuwaiti Fund	1992-2006	KWD	140,000,000	0.3002	466,355,763	5.73%
Japan	1983-2004	JPY	59,384,292,000	139.0841	426,966,820	5.25%
France	1980-1995	FRF	2,578,425,000	6.2150	414,872,948	5.10%
Italy	1980-1989	USD	309,783,000	1.0000	327,022,703	4.02%
Italy	1996	ITL	26,600,000,000	1542.95		
Canada	1982-1995	CAD	141,607,000	1.2719	111,337,512	1.37%
Czechoslovakia	1983-1988	USD	104,675,000	1.0000	104,675,000	1.29%

Donor/Institution:	Years	Currency	Amount	Exchange rate FCU/USD*	USD**	Percentage of Donor Funds
Denmark	1982-1999	DKK	711,973,000	7.2529	98,164,358	1.21%
Bank BNP	2005	USD	90,746,000	1.0000	94,439,767	1.16%
Bank BNP	2005	EUR	2,970,000	0.8041		
Saudi Arabia	1990-1995	USD	78,720,000	1.0000	78,720,000	0.97%
Islamic Development Bank	1988-2002	USD	77,670,000	1.0000	77,670,000	0.95%
OPEC Fund	2004-2006	USD	61,430,000	1.0000	61,430,000	0.75%
Finland	1981-1990	FIM	238,843,000	4.8676	49,067,717	0.60%
Belgium	1982-1991	BEF	486,945,000	43.9729	11,073,752	0.14%
Germany (East)	1983	USD	2,039,000	1.0000	2,039,000	0.03%
Netherlands	1983	NLG	7,100,000	2.8541	2,487,649	0.03%
Sweden	1985-1989	SEK	8,921,000	6.9284	1,287,599	0.02%
Great Britain	1986	GBP	578,000	0.6822	847,259	0.01%
Switzerland	1983	CHF	2,422,000	2.0991	1,153,828	0.01%
UNDP	1982	USD	279,000	1.0000	279,000	0.00%

TOTAL

\$8,138,742,457

Source: EEHC data prepared by request (2006) and USAID reported assistance obligations.

* For periods where funds were disbursed over a number of years, the average USD exchange-rate value was compiled from various public sources (including IMF data).

** Approximate value based on average exchange rate during period of disbursement. Precise (annual) disbursement schedules for donor contributions listed here are not available.

3.2.2. Baseline of the Power Sector

In the early years of USAID's infrastructure program, the Government of Egypt viewed the expansion of the power system as a tool of social and economic development policy. At the time, little consideration was given to the financial sustainability or economic value of the services being provided. The delivery of reliable power was seen as an end in itself, and as a means to achieve broader economic and social objectives. The Government of Egypt drew on its own resources, as well as those of prominent international development agencies (such as USAID), to subsidize the cost of ongoing operations as well as capacity expansion. Tariffs were established by government decree at rates far below real economic costs.

USAID actively coordinated assistance to the development of the Egyptian power sector with activities of other international development agencies (such as the World Bank) and GOE counterparts. The Government of Egypt's program and priorities for power sector development were based on a 1974 study conducted by the Egyptian Ministry of Electricity⁴⁹ and associated load forecasts, augmented by a more rigorous assessment of load-growth conducted by Sanderson & Porter, Inc. (funded by USAID) to take account of historical disruptions caused by regional conflicts.

In 1975 and 1976, around the time of the inception of USAID's program of assistance to the Egyptian power sector, installed generation capacity was 3.9 gigawatts (GW). Hydroelectric capacity accounted for 2.4 GW of that total, with steam-turbine and gas-turbine plants generating the remaining 1.5 GW of power⁵⁰. At that time however, the true *available* capacity of Egypt's generating stations was significantly less, at just over two gigawatts,⁵¹ because of constraints on water availability at Egypt's largest hydroelectric plant (the High and Aswan dams in the south of the country); and the relative disrepair of Egypt's thermal plants due to a combination of plant age, inadequate maintenance, and damage caused during intermittent wars. Annual consumption per capita in 1975 was low - a mere 236 kWh. Low consumption was attributed in part to constraints on generating capacity, but mostly to the low number of connected customers and population covered by access to electricity (roughly 34 percent in 1981, the first year for which reliable data are available⁵²).

Summary of Baseline Indicators 1976

Installed Capacity	3947 MW
Peak Load	1766 MW
Electricity generated	10.8 TWh
Fuel consumption – thermal generating plants (gram of conditional fuel/kWh)	346 (1981) ⁵³
Annual power consumption per capita	236 kWh
# of connected customers	4.5 millions or 34% (1981) ⁵⁴
Number of Employees per GWh of power sold	317 persons (1976)

Sources: Project Paper for National Energy Control Center (263-0023) (ca. 1976), page 5 – EEA employee numbers; and World Bank World Development Indicators On-Line – aggregate annual consumption 1976 WDI-Online: https://publications.worldbank.org/ecommerce/catalog/product?item_id=631625.

Institutional Framework – Baseline (1975/76)

In 1976, the Government of Egypt established an Egyptian Electric Power Authority (EEA) as a means to introduce corporate responsibility and authority to the power industry. The EEA succeeded the much less autonomous General Egyptian Electric Corporation (GEEC) established in 1964 after nationalization under the Ministry of Electricity. It was distinct from the GEEC in its mandate to manage its own finances and budget, and to apply (albeit with final government approval) end-user tariffs that might

49 EEA Studies, Research and Projects Division, "Electric Power Needs in the Arab Republic of Egypt 1975-2000 and How to Meet Them."

50 1 GW equals 1,000 megawatts

51 Project Paper for National Energy Control Center 263-0023 (ca. 1976), page 6.

52 Calculated using World-Bank population data for 1981 and EEHC-reported data of number of *customer connections* (4.5 million) and average *persons* served per customer connection (3.5 persons per customer account).

53 EEHC reported data, 2006.

54 See note above.

allow it to operate on a more economically-sustainable basis. However, the EEA's willingness to exercise the broad authorities that its mandate afforded, however, was slow to materialize.

The EEA was formally separated into five independent vertically-integrated operating units, each with its own supply, transmission, distribution, and commercial services (billing and collection functions.) The EEA also operated its own design/engineering and construction units, to which it awarded the majority of EEA-commissioned work.

Physical Composition/Condition (1975/1976)

In 1976, the power system was divided into five interconnected zones: Upper Egypt, Cairo, Alexandria, Lower Egypt, and the Canal Zone. The Aswan and High Dam hydroelectric plants and a group of thermal plants near Cairo and Alexandria (the major load centers) represented the sector's major generation assets. In addition to these GOE-owned facilities, a number of industrial plants generated their own power. This capacity comprised approximately five percent of the country's overall total, including gas-turbine.

The physical condition of the generation assets in the country was less than favorable. The table below compares generation design capacity to available generating capacity.

Installed Generating Capacity 1975/1976

Plant Type	Plants	Design Capacity (in MW)	% of Total Design Capacity	Available Capacity (in MW)	% of Total Available Capacity
Hydro	2	2445	62	900	44
Thermal	10	1365	35	1025	50
Gas Turbine	5	137	3	121	6
Total	17	3947 MW	100%	2046 MW	100%

Source: *Project Paper for National Energy Control Center 263-0023 (ca. 1976), page 6*

The reasons for this reduced availability of design capacity (and over-reliance on thermal plants for base-load generation, where hydroelectric represents the lowest cost option), and the discrepancy in rated capacity and actual availability of the thermal plants are twofold:

- The irrigation needs of the country's agriculture sector and navigability of the Nile dictate the volume of discharge that can be released through the dams' turbines for power generation. Water management considerations traditionally trumped the power sector's economic considerations and prevented the hydro plants from achieving their full economic potential.
- The thermal plants in Egypt in the mid-1970s were relatively old and poorly maintained due, in part, to a lack of funds available for scheduled maintenance.

In 1976, Egypt's load profile or electricity demand was predominantly industrial (62%), followed by municipal and residential consumption (29%) and agriculture/irrigation (9%). Long-term load forecasts predicted rapid growth in peak demand (up to 2.6 GW in 1980, reaching 6.4 GW by 1990). Industrial load growth was attributable to the expansion of heavy industry, including iron and steel, fertilizer, ferro-silica, cement, aluminum, and petrochemical industries.

The transmission system in the mid-1970s consisted of 500, 220, and 132 kilovolt (kV) lines. The 500 kV lines formed the backbone of the system, bringing power from the hydroelectric plants in the south of the country to the load centers in the north. The 132 kV line paralleled the 500 kV line to deliver power along the Nile valley, with the 220 kV line transmitting the thermal power from Cairo and surrounding areas to

the rest of the grid. Distribution networks operated on voltage levels of 11, 6.6, and 3 kV. The entire system was in poor repair due to lack of maintenance, arising from a shortage of funding – much as was the case with the generating stations.

Financial Condition and Efficiency (1975/1976)

EEA's revenues were derived almost exclusively from the sale of electric power, where end-user tariffs were set by Government decision and the GOE used cross-subsidization as a tool of its social and economic development policy.⁵⁵ In the early 1970s, tariff levels were approximately \$0.019 per kWh. This low tariff was sustained in part by a non-accounting of the capital costs for power stations built using grant funding (e.g. the hydroelectric facilities in Upper Egypt). It was also sustained because the GOE provided reduced-cost fuel for power generation. Number 6 fuel oil was provided at less than one-fourth of world market prices (\$0.40 per GJ versus \$1.84 per GJ on world markets).⁵⁶ Assuming sufficiently high collection rates, EEA's revenues should have been adequate to cover its operating (recurring) costs.

By 1975/1976, EEA was losing money. While the precise cash-flow dynamics are not ascertainable, anecdotal evidence suggests that EEA was not charging all customers. This was due to inadequate billing and collection systems and to mandated "non-invoiced service provision", i.e. free power. Another contributing factor was EEA's inability to enforce collection from those customers who, presumably, *were* required to pay. EEA's receivables as of 31 December 1974 were approximately 100 percent of annual invoiced power sales.

3.2.3. Outputs And Outcomes at Program Level

USAID's program of support for the development of Egypt's power sector achieved successes at multiple levels. As compared to the baseline conditions in 1975, Egypt's power sector has been substantially transformed in terms of technical sophistication and capacity, as well as in terms of institutional structure. Since 1975, annual electric power consumption has grown by nearly 1300 percent. Per-capita consumption has kept close pace. The increased availability and reliability of electric power has fuelled Egypt's economic growth. The power industry's efficiency has increased dramatically. Important institutional changes have set the stage for further expansion of the sector, increased efficiency, and greater direct private-sector investment in this critical economic sector. While many opportunities exist for further transformation and many deficiencies in the physical and institutional infrastructures remain, the sector now provides reasonably efficient and reliable service to virtually the entire country – a dramatic improvement since USAID's utility assistance program began.

USAID's programs supported activities in all aspects the entire power sector, from construction of new generation facilities to reform of regulations on end-user connection fees, and virtually every aspect in between. USAID's early interventions focused almost exclusively on the injection of capital into the sector to provide for generation, network control, and transmission/distribution capacities, whereas Power Sector Support I and II gravitated towards fundamental issues of institutional framework and sector regulation.

USAID's support to generation included the construction of new facilities, as well as the overhaul and upgrading of existing facilities. In many instances, such as at the High Dam, USAID's interventions improved plant reliability and output and increased plant longevity to such an extent that the distinction between greenfield investment and rehabilitation is minimal. USAID's interventions also encouraged

⁵⁵ Cross-subsidization in this context refers to the provision of power service to one customer class at below-cost rates by charging other customer classes above-cost rates.

⁵⁶ Project Paper for Ismailia Thermal Power Plant 263-0009 (ca. 1976), page 14. The economic analysis of the Ismailia plant estimates \$0.035/kWh as the requisite long-run marginal cost tariff (page 21).

contributions from other donor agencies and commercial lenders such as the U.S. Ex-Im Bank's funding of an additional 150 MW unit at Abu Sultan.

USAID's support to the construction or rehabilitation to Egypt's generation capacity accounts directly and indirectly for roughly one-third of total capacity today.

USAID's Investments in Power Generation in Egypt 1975 – 2006⁵⁷

Site and Description	Capacity (in mw)
Shoubra El Kheima Thermal Power Plant - 4 x 315 MW capacity	1,260
Helwan/Talkha Gas Turbines – 120 MW at Helwan, 180 MW at Talkha	300
Talkha Combined Cycle Augmentation – addition of heat-recovery steam generators and 2 x 55 MW steam turbines	110
Abu Sultan (Ismailia) TPP - 3 x 150 MW units (a fourth was funded by the US Ex-Im Bank)	450
High Dam Rehabilitation - complete rehabilitation of facility, including blades of the 12 x 175 turbines	2,100
Cairo South- 150 MW combined-cycle gas turbine	150
Hurghada - rehabilitation of existing 350 MW thermal plant and relocation of retired gas turbines (85 MW)	435
El Kureimat - engineering support and equipment procurement for rehabilitation of 1200 MW thermal plant	1,200
TOTAL USAID CAPACITY CONTRIBUTION	6,005 MW or 32% of Total Installed Capacity (18,500 MW in 2005)

USAID's programs went on to fund the creation of network operation and control facilities for system dispatch and transmission, as well as upgrades to the high-voltage transmission systems themselves in order to improve system reliability and stability. USAID funded the creation and modernization of the National Energy Control Center (NECC), regional control centers at Alexandria and Cairo, the expansion of power-system microwave communication networks to the Sinai Peninsula and Suez Canal areas, and upgrades to high-voltage transmission lines. Particularly notable was the 500 kV line from Upper Egypt to load centers in Cairo and Alexandria as well as supplemental 220 kV lines to parallel the 500 kV lines to serve load along the Nile basin.

USAID's Funding of the National Energy Control Center

This was called by Eng. Hassan Mahmoud one of USAID's most significant contributions to the power sector. The communications equipment room was well maintained, with constant climate control at 16 Celsius. Racks of switching equipment in a back-room, behind a second set of closed doors, bore minimal USAID decals (clasped-hands), which were the only USAID markings observed.

- Site visit to Eng. Hassan Mahmoud, Director, National Energy Control Center - September 16, 2006

The creation of the NECC allowed system operators to collect data from the system's generation facilities and transmission substations to determine the most efficient and cost-effective modes of system operation while providing for system reliability and stability. The result was increased system efficiency and reliability. Annual system-wide fuel cost savings were to be realized through economic dispatch of generating units, taking into account transmission system capacities and load requirements. These fuel-cost savings grew as Egypt's generation capacity became increasingly loaded with thermal and gas-turbine generating plant consistent with the 9 to 10 percent annual demand growth. Anticipated annual fuel-cost savings in the first year after the NECC's creation

⁵⁷ Data compiled from USAID Project Assistance Completion Reports

was estimated at \$3.7 million.⁵⁸ The creation of the Cairo and Alexandria Regional Control Centers produced similar system benefits and facilitated more efficient and timely fault identification, isolation, and repair. The expansion of the microwave communication systems to the Sinai and Suez areas brought these sub-systems under the monitoring and control of the NECC.

The most significant transmission system upgrade took place on the 500 kV line transporting power from the High Dam in Upper Egypt to Cairo and beyond. The Soviet-installed circuit-breakers and relays on this line were replaced as part of the rehabilitation of the High Dam facility.

USAID funded the upgrade of entire distribution networks in the cities of Alexandria, Port Said, Ismailia, and Suez. The most significant of these distribution-network projects took place in Alexandria, which was the single largest rehabilitation and expansion project in the world at its time. The program funded the construction of seven warehouses for the local distribution network; an inventory control and work-order recording system; and plant and equipment for the installation and upgrade of substations at the 380 V to 66 kV voltage levels, including cabling, meters, protective relays, fault indicators, switches, and grounding devices. USAID also funded hands-on training on the use of test instruments, construction techniques, and network operations. A total of 784 person days of training took place.

Policy support and institutional transition and development received the least funding of all, but still managed to produce many noteworthy results. USAID's technical assistance (consulting services) developed the Egyptian power sector's capacity to perform economic analyses of system-planning options, created an energy-efficiency center to promote conservation, and supported the corporatization of the power sector in the form of the Egyptian Electricity Holding Company (EEHC). Most notable of the policy-reform achievements was the support for the creation of the Egyptian Electric Utility and Consumer Protection Regulatory Agency (Egypt ERA) and the development of that institution's capacity through material grants, technical assistance, and training.

More detailed descriptions of outputs under USAID's activities are included in the project-by-project descriptions in Appendix VI of this report.

3.2.4. Summary of Achievements

The Egyptian power-sector experienced rapid growth and wide-ranging reform in the three decades since USAID began its program of support in 1975. Installed generation capacity increased from 3,800 MW in 1975 to over 18,500 MW in 2005. Annual production has increased by 1400 percent, from 7.2 TWh in 1975 to over 101 TWh in 2005. At the same time, annual per-capita consumption has increased from 236 kWh to 1464 kWh.⁵⁹ Increased availability of electric power has had a profound effect on the national economy of Egypt, and has been key to the country's growth and improvements in standards of living GDP per capita, for example, increased by over 257 person (PPP, constant 2000 dollars).⁶⁰

Measures of access and availability, efficiency, reliability, and financial performance of the power sector have shown trends towards improvement over the period of USAID's support to the sector. Physical performance at the generation, transmission, and distribution levels gives no evidence of imminent and widespread failure of the power system. Physical performance indicators, as reported by the EEHC, exhibit trends towards improvement with normal fluctuations due to intermittent and rectifiable adverse events.

58 USAID National Energy Control Center Project Paper 263-0023 Economic Analysis, p. 27 (circa 1976).

59 Egyptian Electricity Holding Company Annual Report, 2004-2005

60 World Bank World Development Indicators Online.

Summary of Key Indicators 1975 and 2005⁶¹

	1975	2005
Installed Capacity (MW)	3,947	18,544
Peak Load (MW)	1,766	15,678
Electricity generated (TWh)	10.8	101
Fuel consumption – thermal generating plants (gram of conditional fuel/kWh)	346 (1981) *	228
Annual power consumption per capita (kWh)	236	1464
# of connected customers (million)	4.5 (28.5%) (1981 data)*	20.8 (99.4%)
% O&M Costs Recovered by Sector Revenue		99%**
Collection Rate (%) of Invoiced Power		72.9%
Number of Employees per GWh of power sold	317 persons (1976 data)	1.6 persons

*Note: EEH reported data 2006.

** Note: Percentage does not account for value of subsidized or unpaid fuel deliveries.

As seen in the water and wastewater sector, USAID's assistance program to the Egyptian power sector was late in introducing specific policy reform and industry restructuring objectives in project activities. When these aspects were introduced, the provision of capital for physical infrastructure investments was made conditional on the achievement of specified targets. Unfortunately, the targets appear to have been poorly defined. For instance, under Power Sector Support II, the conditionality matrix called for a regulatory body for power to be established as per international best practices. Specific benchmarks relating to a regulatory body's autonomy and authority, however, were not defined. What emerged was an institution that, while useful in many respects to the development of the power system, falls short by most standards.

Similar observations can be made with respect to tariff policy and sector subsidy. Structural inadequacies have now become entrenched. As pledged donor funding for capital investment diminishes, little leverage now exists at the disposal of foreign development agencies to persuade the Government of Egypt to enact further needed policy and industry reforms. Had these reforms been incorporated into USAID's program from the outset (in coordination with other donor institutions), the Egyptian power sector would almost certainly be more efficient today, and would not represent a drain on the Egyptian budget of \$3 billion per year (the value of the subsidized fuel delivered for power generation). USAID's funding for institutional and policy reform amounted to just \$34 million, as compared to the \$1,762 million allocated to construction of capital equipment.

It should, nonetheless, be recognized that USAID's program of assistance was initiated and executed during a turbulent period in the region, in the immediate wake of successive Arab-Israeli wars. The rationale for the program was primarily political, with immediate economic development and stability, and the ingratiating of the United States to the GOE being the foremost objectives.

61 Sources: Project Paper for National Energy Control Center (263-0023) (ca. 1976), page 5 – EEA employee numbers; and World Bank World Development Indicators On-Line – aggregate annual consumption 1976 (WDI-Online: https://publications.worldbank.org/ecommerce/catalog/product?item_id=631625); and EEHC annual report 2004/2005.

Power Sector: SpO 18 Assessment

Criticisms aside, the program has been largely successful. Benchmark indicators introduced at the inception of Special Objective 18, show achievements across the board and that conditions for sustainable development prevail. To review, the six benchmark indicators under SpO 18 are:

1. Cumulative number of people with improved power services
2. Percent of operation and maintenance costs covered by revenue in the power sector
3. Percent change (relative to baseline) in fault rate per 100 km of medium-voltage power lines
4. Percent of annual billings collected for electrical power sold
5. Ratio of number of employees in the power sector to GWh of electricity sold
6. Legal and regulatory framework development - achievement of benchmarks/milestones

Specific achievements against these six indicators are discussed below.

SO Indicator 18.b.1 – Cumulative number of people with improved power services

This new indicator, established in 2005, means the number of persons with access to power at their residence. 2005 data show that 99.4 percent of the Egyptian population⁶², or 69.5 million persons now can access power at home. **For all intents and purposes, universal access to power services has been achieved in Egypt⁶³.**

The continual availability of power service to residential customers does not seem in jeopardy, although continued growth in demand may necessitate scheduled, intermittent black-outs (load-shedding) if the EEHC is unable to continue to expand generation capacity. This likelihood does exist if EEHC's ability to raise capital for generation expansion is constrained. Therefore, while *reliability* of power service may be threatened, access to the grid itself should remain static.

Rating: Positive

SO Indicator 18.e – Percent of operation and maintenance costs covered by revenue in the power sector

Recent EEHC data indicate that, sector-wide, revenues have *never* reached 100 percent of O&M costs. In 2004 and 2005, revenues were 97 percent of O&M costs, while in 2005 and 2006, EEHC report revenues to be sufficient to cover 99 percent of O&M costs.

The meaning of data reported on this indicator warrants explanation. Sector-wide, the rate of collection for invoiced power (per authorized tariffs) amounted to 72.9 percent in 2004/2005, and 75.4 percent for 2005/2006. The bulk of the non-payment problem is attributed to Government of Egypt institutions. As such, the Government of Egypt has authorized a scheme whereby the revenue shortfall is compensated for by a commensurate reduction in the value of liabilities for fuel supplied to the EEHC's generating stations by the state-run Egyptian General Petroleum Authority. The liability of the distribution companies for delivered power is thus correspondingly reduced. It is thanks to this mechanism that the sector is able to report a near 100 percent cost-recovery rate, despite low collection levels and retail tariffs at the distribution level that are 96.2 percent of distribution companies' O&M costs.⁶⁴

62 Egypt Demographic and Health Survey, 2000 and 2005 <http://www.cspiro.org/pubs/>

63 It is likely that the 0.6 percent of the population not presently served lives in informal settlements or is otherwise transient.

64 EEHC reported figures for 2004/2005.

Rating: Neutral

Note: an increase in tariff levels allowing full cost-recovery will need to coincide with a strengthening of payment discipline in order to achieve satisfactory improvements in this indicator.

Indicator 18.1.b – Percent change (relative to baseline) in fault rate per 100 km of medium-voltage power lines

2005: Planned: -49 percent; Actual: -47.2 percent⁶⁵ *Not Achieved*

The target for reduced fault rates has not been fully achieved per the established schedule, but the indicator in itself, is not a sufficient indicator of system robustness and reliability. With peak load increasing at an average rate 6.1 percent from 2001 to 2005, the transmission network has recorded a reduction in losses - from 5.2 percent in 2001/2002 to 3.73 percent in 2005/2006, with only a modest (and statistically insignificant) decrease in circuit availability at the Very-High-Voltage and High-Voltage levels.

The BOOT Experience in the Power Sector

The EEHC considers the BOOT plants' development a successful experience, except for the currency risk to which the EEHC was exposed under the contracts. EEHC feels that the significance of this risk was not sufficiently highlighted by their foreign advisors (a criticism not directed at USAID's advisors – EEHC had hired their own consultants to advise on the development of the country's IPP infrastructure). The nearly 50% decline in the value of the Egyptian Pound between 2000 and 2003 increased the cost of purchased power to the EEHC, due to the preponderance of dollar-denominated debt supporting these projects. This risk might have been foreseen, given the long-standing pressure of the IMF and World Bank to float the Egyptian Pound from as far back as 1992. This sour experience ultimately prompted Egypt to retreat from its earlier strategy to develop as many as 15 BOOT plants to provide for the country's growing demand, and instead to revert to state funding (with support from donor institutions) for new investments.

- Site visit to Eng. Fawzia Abou Neima, EEHC Board Member Egyptian Electricity Holding Company, Ministry of Electricity and Energy (For Production, Transmission & Distribution Companies Affairs) - August 30, 2006

The Egyptian Electricity Transmission Company appears to have sufficient technical capacity to accommodate the installation, operation, and maintenance of the necessary plants to ensure system reliability. Continued reliability, achievement of future performance targets, and system sustainability will ultimately depend on 1) availability of sufficient capital for reinvestment, and 2) investment in the expansion of capacity as demand grows.

Rating: Positive**Indicator 18.2.c – Percent of annual billings collected for electrical power sold**

The sector-wide collection rate for 2005/2006 reported by the EEHC was 75.4 percent. This is consistent with collection rates of 69 to 75 percent over the past five years, with no consistent pattern upward or downward.

Percent of billings collected is useful to gauge financial sustainability of the power sector. As fiscal discipline is imposed throughout the sector, distribution companies will almost certainly find it difficult to manage their current liabilities for wholesale power sales and costs associated with operation and maintenance against a backdrop of reduced revenues. The transition from the state serving as financier of last resort to a structure where GOE entities themselves are directly responsible for paying for power consumption will need to be carefully constructed and managed.

Rating: Neutral

Note: full-cost recovery tariffs will likely have a negative consequences for this indicator.

65 EEHC reported data 2006.

Indicator 18.2.f – Ratio of number of employees in the power sector to GWh of electricity sold

In 2004/2005, the ratio of EEHC-held companies' employees to GWh power sold was 1.6; in 2005/2006, the EEHC reported a downward trend, to 1.5 persons per GWh sold.⁶⁶ The explanation for the trend towards reduction is the commissioning of new generating stations. 500 MW of new capacity was added in 2004/2005, and a 1500 MW increase is scheduled for completion in 2005/2006. The power plants introduce relatively little additional labor to this system – perhaps no more than 0.025 persons per GWh of additional capacity, based on an estimated 80 percent capacity availability and staff of 250.

Rating: Positive

Indicator 18.3.a - Cumulative number of legal and regulatory milestones attained

Legal and Regulatory Framework Overview

Three specific milestones were targeted, and all were achieved. They are as follows:

- Year 2000: A presidential decree was issued to refine the 1997 decree on the creation of a regulatory board, the Egyptian Electric Utility and Consumer Protection Agency (Egypt ERA).
- Year 2001: The Prime Minister, based on the recommendation of the Minister of Electricity and Energy, appointed the ERA board of directors, and the agency began to function as a real institution.
- Year 2002: The ERA's board issued licenses to regulated companies of the EEHC, which incorporated authorized tariffs. Six small size private sector electric utilities were also licensed in addition to the three large BOOT generating utilities.

In summary, the targets set out for the power-sector's regulatory framework under SpO 18 have been achieved.

Rating: Neutral

Note: important established milestones have been achieved, but problems persistent in the regulatory framework.

3.2.5. Lessons Learned

USAID's program of assistance to the Egyptian power sector took place over a very long and dynamic period, during which the political environment within the country and the region underwent marked changes. Over the same period, the power industry in OECD countries was transformed through sector restructuring and the creation of competitive markets for electric power.

From the outset, USAID programming focused almost exclusively on achieving immediate increases in availability of power for households and Egyptian industry. While programs were designed with consideration given to the unit-cost per marginal kWh of capacity delivered, calculations of the value of the additional capacity to the consumers and the economy were not analyzed, nor were such calculations possible, given the distortions within the tariff regime and the lack of demand-elasticity data. The rapid increase in the availability of power was an immediate objective, pursued as a means to stimulate economic growth, even if such growth were only sustained and supported through distortions and subsidies provided to and through the fuel-energy complex. In other words, industries where Egypt might otherwise have had no comparative advantage were stimulated through the provision of subsidized energy

66 EEHC reported data 2006.

inputs.⁶⁷ These subsidies have become institutionalized and systemic. They will account for some 15 percent of Egypt's state budget in 2007 – more than health and education combined.⁶⁸

In implementing its projects, USAID observed occasional difficulties in extracting the appropriate level of commitment from its counterparts. In some cases they were improperly consulted at the project design phase, in others expected commitments on specific performance targets or milestones were not well communicated. Projects are likely to be more successful where all stakeholders share the same expectations for project outcomes and beneficiaries have a clear understanding of their contribution to these outcomes. This was not always practiced in the power sector projects under evaluation.

In terms of contracting for specific projects, USAID and EEHC benefited from the adoption of a turn-key approach to the commissioning of particular works (e.g. turbine installation.) The lump-sum, turn-key approach transferred project risk to the project implementer, and removed the open-ended liability associated with cost-plus-fixed-fee approaches to contracting from USAID.

As for overall program design and emphasis, it appears that USAID took little advantage of the opportunity that existed early on in the program to inculcate an appreciation of modern power sector governance and institutional framework principles. Over the thirty-year life of the program, less than two percent of USAID's program assistance focused on policy and institutional reform – and this came relatively late in the life of the program. Considering the empirical evidence demonstrating the beneficial economic impacts of pricing efficiency in energy, sector reform efforts should have been pursued early on in the life of USAID's program. Had this taken place, the Egyptian power sector might today be truly self-sustainable, and might not rely on billions of dollars of subsidy each year that the state, through the General Petroleum Authority, continues to provide it.

3.2.6. Prospects For The Future

System Expansion

As the Egyptian economy continues to grow, electricity demand will continue to rise with it. The Egyptian Electricity Holding Company estimates that by 2012, peak load will reach 23.8 GW, requiring the addition of some seven gigawatts of capacity. The EEHC's new-capacity construction plan incorporates the construction of the bulk of this new capacity. The new capacity plan (thermal plants only) is summarized in the table below.

The EEHC's investment schedule for the period 2007-2012 provides for the construction of an additional 6 GW of capacity at an estimated cost of \$1.5 billion. Financing has reportedly been secured for some 2.9 GW of this capacity from various funding sources, including the World Bank, ADB, the European Investment Bank, as well as the Kuwaiti Fund and Arab Fund. It is worth noting that EEHC's costs estimates reveal a figure of \$250 per KW of installed capacity, which by any international standard is extremely low (by about fifty percent). In interviews with EEHC management, this low cost was highlighted as a shining achievement of the Egyptian sector, and was attributed to the efficiency of PGESCO's and EEHC's workforces and management.

67 The effects of energy price-distortions on firm behavior and on resultant welfare-losses are well documented and analyzed in detail for Egypt by Getachew and Sickles, *The Regulatory Environment, Relative Price Efficiency, and the Egyptian Private Manufacturing Sector – 1987/88-1995-96* (2003).

68 Rasromani, W. "The Question of Subsidies," *The Daily Star – Egypt* (5 June 2006).
<http://www.dailystaregypt.com/article.aspx?ArticleID=1779>

EEC Thermal Power Plant Projects 2007- 2012

Stations	The installed capacity (M.W)	Type of generation	Expected costs (USD in millions)		Donors/ Lenders	Date of funding availability	Starting date month/year
			Local Currency Costs	Foreign Exchange Costs			
EL-Kureimat (3)	1x750	Combined cycle	98	46	ADB	2006	Simple cycle 7/2008 Combined cycle 8/2009
Tebbin	2x350	Steam	170	69	World Bank	2006	3/2010
Nubaria (3)	1x750	Combined cycle	103	43	Financing overabundant (Nubaria 1, 2) Arab fund EIB	2006	Simple cycle 7/2008 Combined cycle 7/2009
Cairo West	2x350	Stem	138	46	OPEC Fund Arab Fund Kuwait Fund	2006	10/2010
EL-Atf	1x750	Combined cycle	103	43	Arab Fund Kuwait Fund EIB	2007	Simple cycle 5/2009 Combined cycle 6/2010
Sidi Krir	1x750	Combined cycle	114	47	EIB	2007	Simple cycle 5/2009 Combined cycle 6/2010
Abu Kir	2x350	Stem	173	61	Arab Fund Kuwait Fund Islamic Development Bank	2008	6/2011
Oyoun Mousa	2x350	Stem	170	59	Arab Fund Kuwait Fund Islamic Development Bank	2009	4/2012
Sharm EL-Sheikh	1x375	Combined cycle	57	28	Arab Fund Kuwait Fund	2010	Simple cycle 4/2011 Combined cycle 5/2012
TOTAL	6175 MW		1126	441			
TOTAL (USD million)			1,567				

Source: EEHC reported data provided by request (2006)

Note: Projects in shaded fields denote the existence of secured finance, and the rest of projects are partially secured with commitment from the Arab Fund and Kuwait Fund.

As this table clearly demonstrates, the opportunities for foreign equipment manufacturers and specialized construction firms in Egypt's capacity expansion program are significant. The use of combined-cycle technology, where U.S. firms such as General Electric have competitive product offerings, should not go unnoticed. The ability of U.S. equipment and construction firms to take advantage of the opportunities represented by Egypt's capacity expansion program may be limited, however, by what some have described as the less-than-transparent contractor selection process within EEHC and the GOE.

Legal, Regulatory, and Institutional Environment

The current legal and regulatory environment governing Egypt's power sector stands in stark contrast to what it was ten years ago. The creation of the Egyptian Electric Utility and Consumer Protection Agency, the functional unbundling of generation, transmission, and distribution under the Egyptian Electricity Holding Company, and the opening of the market to private power producers are significant milestones on the path to greater efficiency of the Egyptian power industry.

Notwithstanding the positive achievements of the past decade, measures taken thus far should still be considered first steps in a process of continual improvement. As noted above, the regulatory regime is still rudimentary, economic (price) signals within the sector are not rational, and market opening has yet to be achieved. The prospect of integration with the UCTE and access to the European power market should drive the agenda forward. The advantages of further reform in the legal and regulatory environment would offer benefits in and of themselves: greater efficiency through competition and lower-cost private capital, to name two. Integration with UCTE would offer the additional advantage of allowing generating plants to operate at a higher capacity-utilization factor as peak-loads (across time zones) would be extended. This would be a significant source of additional revenue and would make the Egyptian industry more profitable. UCTE integration and access to the sizable European power markets would, however, require additional reforms in the legal and regulatory environment, such as those outlined in the Athens treaty on South-East Europe integration (see regulatory benchmarking standards at www.seerecon.org for a description of these requirements).

USAID Assistance to Establish the Egyptian Electric Utility and Consumer Protection Regulatory Agency

USAID funded the initial capital required to initiate the Agency and USAID's consultants provided assistance and training on contractual frameworks, licensing, benchmarking, cost-of-service models, and tariff models.

USAID also provided funding (through a USEA cooperative agreement) for twinning relationship with the Massachusetts Public Utility Corporation – this relationship ended in 2005, and interaction between the two agencies has ceased. One visit to Massachusetts and one visit to Budapest (ERRA) were made by Egyptian regulatory personnel, and three visits by Massachusetts PUC representatives to Cairo. Agency staff are now fully trained and the agency possesses significant capacity.

- Site visit to Electric Utility & Consumer Protection Agency, Eng. Hisham Mohamed Saleh, Licensing and Tariff Affairs and Eng. El Sayed Mansour, Information Systems – September 18, 2006

The EEHC and GOE are aware that USAID will no longer provide investment capital for the expansion of the Egyptian power system and the introduction of new technology. Accordingly, the EEHC is looking to other donor agencies, IFIs, and commercial and quasi-commercial lending institutions as a source for the capital it requires. Looking to the future, USAID does maintain comparative advantages vis-à-vis technical assistance. It can provide assistance in the areas of institutional restructuring such as pre-privatization industry reforms and efficiency improvements and industry-to-industry exchanges; as well as legal and regulatory reform (capacity-building within regulatory agencies, legislative drafting, market design and monitoring, and professional exchanges). USAID may consider offering such assistance (whose cost is relatively low) if requested by the Government of Egypt. To the extent IFIs such as the World Bank or African Development Bank extend credit to the EEHC for its expansion program, such credits may be made conditional on further reforms, and may well create the demand for USAID-supported technical assistance.

3.3. Telecommunications Sector

3.3.1. Background

USAID invested more than \$604 million in Egypt's telecommunications sector between 1978 and 2006. USAID construction assistance led to the installation of 840,875 lines or 8.1% of all new telephone lines

in Egypt during that period⁶⁹, strengthened the institutional capacity of Telecom Egypt, and improved and expanded telecommunications networks in Cairo, Alexandria, and Port Said. Developing an efficient telecommunications sector has been important to Egypt's ability to increase trade and investment by attracting business travelers and tourists who more readily visited and invested, partly because they knew they could now "connect back home."

USAID/Egypt's Telecommunications Projects 1978-2006

Number	Project Title and Target	Years	Funding (US \$)
263-0054	Telecom I - electronic switching system (ESS) in Zamalek (Cairo).	1978-1983	40,000,000
263-0075	Telecom II - electronic switching system (ESS) in Maadi, Heliopolis, and Bab El Louk areas of Cairo.	1979-1985	80,000,000
263-0117	Telecom III - electronic switching system (ESS) in the Auto, Ibrahimia, and Gleem in Alexandria. A contract amendment to Telecom III focused on the New Maadi, Heliopolis II, and Demerdash (Abassia) ESS.	1979-1989	121,063,000
263-0177	Telecom IV - 80,000 new lines to four new locales; remote switching modules, host modules, OSP and HVAC; centralized operations and maintenance center launches; consulting assistance for procurement and installation; staff-power development; and the initial development of a centralized operations and maintenance center.	1988-1996	81,676,000
263-0223	Telecom V - construction; institutional development, and legal and regulatory reform, including 355,875 lines installed; a new quality of service (QOS) focus; and the building of a network operations center; ATM Project.	1993-2006	281,900,000
Total:			604,639,000

3.3.2. Baseline of the Telecommunications Sector

Prior to 1978, Egypt's telecommunications system was completely unreliable and unable to meet the day-to-day requirements of subscribers or the growing public demand for telephone service.⁷⁰ Apparently, the country had made few if any investments in modernizing the network in over ten years.

In the urban areas of Cairo and Alexandria, teledensity was extremely low. In 1976, only 13 persons per 1000 had a telephone and only 39 percent of their calls made were successfully completed.⁷¹ Telephone service was erratic within neighborhoods, from city to city, and internationally.

Inefficient economic patterns ensued. If a person successfully completed a conversation, they would often keep the line unutilized but "open" for future conversations by simply setting the handset on their desk. Some international firms seeking an operations base in the Middle East were reluctant to establish offices in Egypt since the telecommunications situation was so inadequate and costly (in terms of its

69 Sustainability of USAID-Financed Utility infrastructure Activities in Egypt (Report No. 6-263-05-001-S), October 2004

70 USAID Technical Report No. 19, 2 – "In the mid-1970s, Egypt's telecommunications system was small compared with the number of potential users; it was estimated that Egypt enjoyed fewer than 1 telephone line per 100 households".

71 Telecom Egypt and MCIT annual reports; CAPMAS (Central Agency for Public Mobilization and Statistics)

inefficiencies). At one company in Cairo, only an average of six calls could be completed per hour during the workday on each of its lines; and this was only achieved by having a dedicated staff person to constantly dial (e.g. repeat dialing) to obtain the desired connection. A USAID transportation study reported that 30 percent of the road traffic in Cairo was due to inadequate telephone service as telephone system was so unreliable that Cairo businesses were forced to use thousands of couriers to deliver messages.⁷² As a result, enormous financial, economic, and social costs ensued.

In 1978, when USAID launched its funding in the Egyptian telecommunications industry, there were 374,000 telephone lines in the country, which translates to 9.42 telephone lines per 1,000 people.

Program Design and Targeted Beneficiaries

Faced with an aging analog infrastructure, the Government of Egypt saw an opportunity to increase the Egyptian population's standard and quality of living by modernizing its telecommunications system. In 1977, USAID financed an in-depth telecommunications sector study⁷³, which is credited with spurring the Egyptian Government's launch of an ambitious twenty-year, \$20 billion program to rehabilitate and modernize Egypt's telecommunications network. In 1978, USAID authorized funding for the first of three telecommunications infrastructure projects that would address key aspects of the modernization program. The USAID-financed assistance was part of a multinational effort to upgrade telecommunications in Egypt. The total expansion was estimated in 1978 to cost \$1.4 to \$2.5 billion over thirty years and would include other donors such as the German Bundesbank, the World Bank, the French Treasury, and the Japanese Overseas Cooperation Fund.

The major infrastructure problems to be addressed by Telecom I, II, and III were to support and strengthen the ability of the Arab Republic of Egypt National Telecommunications Organization (ARENTO) to more efficiently manage and operate the Egyptian telecommunications system, and to improve service to customers. The combination of technical assistance (institutional development/training), and telecommunications and other equipment (construction/network development) would ideally assist ARENTO, improve a portion of the telecommunications networks in Cairo and Alexandria, and enhance the transmission links between the two metropolitan areas. The target beneficiaries for Telecom I, II, and III were current and new telephone subscribers in Cairo and Alexandria. It was expected that actual beneficiaries would be even greater given the multiplier effects of telephone service and the significant economic and social benefits it can impart.

The USAID program's primary goal was to provide an efficient telecommunications system capable of supporting Egypt's social and economic growth. If the projects were successful, teledensity would increase, while new lines would penetrate the country on a decentralized basis and provide new services to those citizens who had not before had access.

3.3.3. Outputs And Outcomes at Program Level

USAID was able to provide early-stage support for the phenomenal growth of the telecommunications sector in Egypt. USAID provided telecommunications assistance for construction, institutional improvements, training, and sector and regulatory reforms. At the start of USAID assistance in 1978, the Egyptian telecommunications network was completely unreliable with call completion ratios in Cairo and Alexandria of just 39 percent. Since then, teledensity in Egypt has increased by almost 1600 percent - from 9.42 telephone lines per 1,000 people in 1978 to 150 lines per 1,000 persons in 2006. More recently, the availability and use of mobile phones and the Internet have now connected Egypt to the world as never before.

72 USAID Technical Report No. 19, page 2.

73 USAID Feasibility Studies Grant Nos. 263-11-995-113 and 263-11-995-025.

With support from USAID, Telecom Egypt migrated the network to digital technologies, improving and expanding telecommunications networks in Cairo, Alexandria, and other cities. Hundreds of thousands of new telephone lines were installed, serving more than four million Egyptians, even in the poorest and more decentralized areas. Absolute network and overall sector growth has blossomed, providing individuals, institutions, and the international trading community with vastly-improved tools to interact, communicate, and transact. The growth in telephone lines has allowed massive accelerations of productivity, investment, and access to information. The influence on financial, economic, and social development has been equally dramatic.

The introduction and widespread adoption of mobile phones - reaching 15.5 million in seven years - showcases the latent demand and available spending power for communications, if reliable and good quality services are provided. Presently, 21.74 per 100 individuals or an amazing 21.74 percent of the Egyptian population has a mobile phone. Personal computers and Internet usage rates have also shown huge growth rates. Internet use jumped from a user rate of less than 1 per 1000 to 77 per 1000, a 120-fold increase. While USAID did not provide any direct project assistance to the development of the mobile phone network in Egypt (mobile phone expansion was supported mostly through private sector capital) this expansion was indirectly facilitated through USAID's support of ICT sector reform, liberalization, and institutional capacity building, which helped make the ICT sector more attractive sector for investment.

USAID Telecom Assistance in Manshiet Nasser
Manshiet Nasser, a settlement on the outskirts of Cairo, is highly urbanized and has lower than average literacy rates. This means that the use of written communications is difficult for this population segment, and access to verbal (telephonic) communications would be particularly beneficial as a potential development tool.
Before USAID assistance, Manshiet Nasser lacked a local telephone exchange. Today it has 160 telephone lines per 1,000 people, exceeding even the Cairo Governorate average of a 120 per 1,000. Despite its literacy challenges, Manshiet Nasser can now claim to have an infrastructure baseline to support modern methods for commercial, economic, and social development.

Description	1978	1989	1996	2006	Attributable to USAID's Intervention Telecom I-IV (1996)	Attributable to USAID's Intervention Telecom V (2006)
	Starting USAID Assistance	End of Telecom III	End of Telecom IV	End of Telecom V		
Telephone Lines	374,000	1,394,276	3,024,947	10,700,000	485,000	355,875
Telephone Lines per 1,000 people	9.42	27.45	50.99	150		
Mobile Phone	NA	3,619	25,207	15,500,000		
Mobile/1,000 People	NA	0.07	0.43	217.4		
Internet Users	NA	NA	40,000	5,500,000		
Internet/1000 People	NA	NA	0.67	77.1		
Personal Computers (PC)	NA	NA	350,000	2,980,000		
PCs per 1000 People	NA	NA	5.9	41.8		

Source: MCIT Monthly Record of Achievements – November 2006; Central Agency for Public Mobilization & Statistics (CAPMAS) Year Book (1952 – 1983), Page 16, 1984; World Bank Database Statistics

At the start of USAID telecom assistance, USAID provided \$242 million for the Telecom I, II, and III programs. The immediate goal was to improve the quality of service, network revenues, and overall network management. These USAID projects:

- Replaced eight obsolete rotary systems in Cairo and Alexandria with electronic systems;
- Provided other telecommunications and related equipment needed in Alexandria to ensure that telephone exchanges would be dust-free and temperature and humidity controlled due to the sensitivity of the equipment;
- Provided U.S. technical assistance for institutional strengthening activities in the areas of fundamental planning, finance and administration, organizational structure, tariff rates, computer systems, and applications; and
- Provided U.S. technical assistance to design, procure, and supervise the installation of the equipment and to provide on-the-job construction supervision training.

In 1988, USAID funded a \$40 million Telecom IV program consisting of the installation of 60,000 lines within two new digital telephone exchanges, and related outside plant (connections to subscriber premises) in the Bab-El-Khalk and Pyramids West areas of Cairo. Transmission facilities to connect these exchanges to the Cairo national and international telephone system and relevant training completed the contract. A contract amendment increased the network installation to 70,000 lines and the related outside plant network for the El Kalaa and Al Marioteyah areas of Cairo. It added 20,000 DSS lines for Heliopolis; heating, ventilation, and air conditioning (HVAC) for Al Marioteyah and associated exchanges; and an outside plant (OSP) at Mokattam. A second amendment doubled the original contract value to \$82 million and included an additional 20,000 lines for Giza, Ramsis, Opera, and the Pyramids as well as the training of engineers and technicians in the operation and maintenance of that equipment. Consulting services for a Cost of Services Study and an Operations and Maintenance Study were also added.

In 1993, 15 years of construction assistance from USAID to the Egyptian telecommunications sector had provided the foundation for USAID's \$282 million Telecom V program, which sought policy and institutional reforms as well as continued infrastructure development (commodities and equipment). Outside Plant Facilities I and II contracts added local network facilities to 12 different exchanges in Cairo, Alexandria, and Port Said. Digital switching system (DSS) contracts resulted in the installation of 380,000 digital lines in Cairo (Ramsis, Nozha II, Manshiet Nasser, El Sherouk I, El Obour I, Mukattam II, Tagaammoa, El Sherouk II, El Obour II, 10th Ramadan City, and 6th October City), Alexandria (El Haremein, El Ibrahimia, Carmouz), and Port Said. Technology transfer activities complemented the construction with in-country and off-shore classroom training for 112 Telecom Egypt engineers. The USAID-funded Network Operation Center (NOC) project improved Egypt's ability to manage its entire national telecommunications system, and workshops and training sessions were conducted for 153 upper management and working-level staff of Telecom Egypt, with intensive training provided to the NOC operational staff. The Telecommunications Sector Support Project provided additional training for 35 more trainees, focusing on legal and regulatory reforms, management and organizational reforms, planning and operation services, and improving Telecom Egypt's financial performance.

By the end of FY 2006, USAID assistance in the telecommunications sector has directly improved telephone access for over 4.2 million Egyptians.⁷⁴ The improvement and expansion of telecommunications networks in Cairo, Alexandria, and Port Said have been important to Egypt's ability to increase trade and investment. USAID's \$604 million investment in telecommunications has directly supported the institutional strengthening of Telecom Egypt, the incumbent telecommunications provider

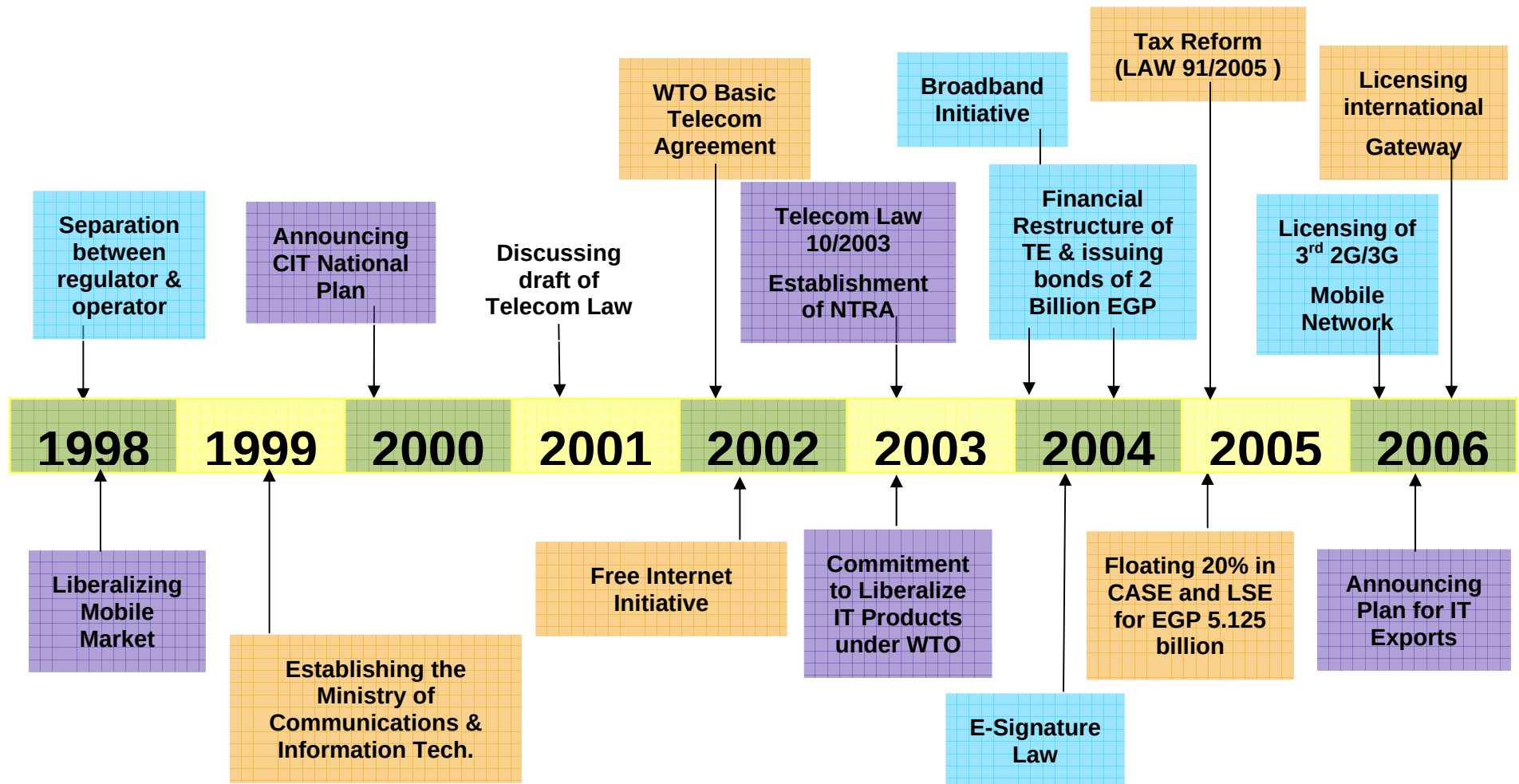
74 An average family size in Egypt is 5 persons; assuming that family members or staff would share a line, 840,875 additional lines would benefit 4.2 million Egyptians. This is a conservative estimate of beneficiaries.

in Egypt, which by the end of 2005 was the Middle East's largest provider of fixed-line services, with more than 10.4 million customers in Egypt.

Legal and Regulatory assistance for Egypt's telecommunications sector, as supported by the Telecom V project, has allowed new technologies and services to be offered to Egypt's citizens, in addition to the capital investments that arrived from countries such as China, Sweden, Germany, and the United States. Key reform milestones are as follows:

- The separation of the regulator and operator (1998)
- Establishment of the new Ministry of Communications and Information Technology (1999)
- Egypt's signature (commitment) to the WTO Basic Telecom Agreement (2002)
- The establishment of the National Telecommunications Regulatory Agency (2003)
- The financial restructuring of Telecom Egypt and issuing of bonds of 2B EGP (2004)
- The floating of 20 percent of Telecom Egypt's stock and generation of 5.1B EGP (2005)
- Licensing of third 2G/3G Mobile Network (2006)

Key Milestones of Egypt's Telecommunications (ICT) Reform



3.3.4. Summary of Achievements

The five telecommunications projects have led to improvements across the telecom spectrum. USAID assistance is responsible for the installation of more than 840,875 telephone lines or 8.1 percent of all new telephone lines; the institutional strengthening of Telecom Egypt; the development of a modern regulatory and policy regime for the sector; and the improvement and expansion of telecommunications networks first in Cairo, Alexandria, and Port Said and then in the entire country via a final Asynchronous Transfer Mode (ATM) network expansion. A modern and state-of-the-art network operations center (NOC) funded by USAID is not only ensuring that network management and components are running smoothly, it is providing real-time and historical data that is being used for future network planning and management.

USAID's \$604 million investment in Egypt's telecommunications sector was an absolute success. It generated immense technical, financial, economic, social, and multiplier benefits for the country, as well as for all individuals and business involved with Egypt (through tourism, trade and related international activities). It is estimated that between 1978 and 2005, \$10.5 billion⁷⁵ was invested overall in the telecom sector. USAID's investment of \$604 million equals 5.8% of that total.

The amazing line growth in Egypt for which USAID deserves partial credit has now been joined by wireless networks and the corresponding and dramatic increases in Internet usage. Subscriber waiting lists dropped from one million to 200,000 in the two years from 2000 to 2002. Over the twenty-year period from 1981 to 2001, teledensity increased from 1.2 percent to 10.2 percent. The number of international circuits increased from 160 to 10,573, and the number of countries with automatic access to Egypt increased from 29 in 1981 to 234 in 2000. According to a USAID/Egypt 2002/2003 status report, developing the telecommunications sector has been important to Egypt's ability to increase trade and investment. Telecommunications reform and expansion have undoubtedly contributed to the strong growth in Egypt's GDP per capita⁷⁶.

USAID supported massive and modern construction of Egypt's wireline network with state-of-the-art analog and digital switches, and supported related investments in the transmission, outside plant, network management, planning, and engineering functions to maintain a well managed network. Through a complementary focus on institutional and human resource development, USAID investments and efforts have helped to build the organization (Telecom Egypt) which sustains the network.

USAID's third and final support pillar for the sector was the needed sector reforms and policy instruments to support this modern telecommunications infrastructure. USAID's support of the studies and drafting of laws and organizational restructurings were difficult (yet necessary) tools that helped Egypt to become a lead player in the region. Helping to create an independent regulator was a pivotal point in this process, along with supporting Telecom Egypt's financial and organizational restructuring and partial privatization.

USAID's Investment in the El Kalaa Exchange and Communication (COM) Center

The equipment was co-located on the same floor and overall, facility conditions were clean, maintained, organized, and operational. The USAID-financed equipment was carefully contained in an area relatively free of dust. Inside this area, temperature controls were in place, along with HVAC systems.

This COM center services Lucent equipment; equipment documentation was easily available and redundant systems were in place for operational, diagnostic, and reporting equipment. The COM manager appeared highly educated and familiar with these individual areas of equipment and data, and along with the managers at Telecom Egypt's offices, was extremely pleased with the Lucent equipment. USAID emblems were clearly displayed on all equipment. It appears that this USAID investment will continue to be maintained and serviced well, ensuring that it will provide numerous financial, economic, and social benefits for at least its expected life cycle.

- Site visit to El Kalaa Exchange and Communication (COM) center by Di Landau, September 10, 2006

75 MCIT Statistics, Taha Shindy

76 Studies have shown that telecommunications expansion does have an impact on GDP growth.

The statistical and financial indicators describing 30 years of telecom sector improvements paint a more complete picture.

- An unreliable network of 353,000 lines grew to become a reliable network of 10.7 million lines.
- A country with no mobile phones grew to have 15.5 million mobile users in seven years. Users walk and drive while they talk, creating numerous economic and social benefits along the way. Private sector investment built this secondary infrastructure and consumers and businesses support it through their purchase of the services and their payment of their (computer generated) bills.
- In a country where affording a computer seemed inconceivable in the early 1980s, 3 million people had PCs by 2006, and more than 5.5 million are using the Internet to learn, transact, and participate in the global economy.
- As a direct and quantifiable result of USAID's investments in the Telecom I, II, III, and IV projects, more than 1180 million EGP in revenues were created for ARENTO.
- An unprofitable incumbent carrier (ARENTO) was reformed to become a profitable and diversified communications business, with differentiated global investments, subsidiaries, a listing on three international stock exchanges, a board of directors, and a system of management and operations that are accountable to the public. The financial restructuring and issuing of Telecom Egypt bonds in 2004 generated over 2 billion EGP in financial and economic benefits for the country.

Telecommunications Sector: SpO 18 Assessment

Achievements have been documented across the board, and conditions for sustainable development prevail. The five benchmarks indicators under USAID's Special Objective 18 are as follows:

1. Cumulative number of people with improved telecommunications service
2. Percent of operation and maintenance costs covered by revenue in the telecommunications sector
3. Percent of annual billings collected for telecommunications services sold
4. Percent change (relative to baseline) in annual revenue per telephone line
5. Legal and regulatory framework development - achievement of benchmarks/milestones

Specific achievements against these five indicators are discussed below

SO Indicator 18.b – Cumulative number of people with new or improved telecommunications service

Relative to the cumulative number of people with new or improved telecommunications services and the percent increases (relative to baseline) in teledensity:

- the public switched telephone network (PSTN) which is also referred to as the wireline network increased from 353,000 to 10,700,000 lines
- the teledensity increased from 9.42 phones per 1000 people in 1978 to 150 phones per 1000 people in 2006 - a 1600 percent increase
- mobile phone availability and usage increased from zero to 15.5 million users with an even higher mobile teledensity of 217.4 per 1000 people.

Rating: Positive

SO Indicator 18.d – Percent of operation and maintenance costs covered by revenue in the telecommunications sector

Relative to the percent of operation and maintenance costs covered by revenue in the telecommunications sector, the following data supports a *moderately positive* rating. The *moderate* rating was applied because:

- there was a clear decline in the 2000-2003 period; and
- data was not available in the earlier period of the USAID projects. During those years, ARENTO was less efficient and organizationally bloated; the organization was identified as unprofitable, and it was probable that their operation and maintenance costs were *not* covered by revenue, particularly because numerous accounts were in arrears and billing systems were unreliable.

While data is not available for all years, USAID documents indicate that telecommunications sector revenues have exceeded operations and maintenance cost targets in more recent years. The following chart shows the percentage of operations and maintenance costs (excluding capital replacement) covered by revenue for the years 1999-2004:

Portion of O&M Costs Covered by Revenues 1999-2004⁷⁷

Year	Percent of O&M Costs Covered by Revenues
1999	149
2000	138
2001	139
2002	130
2003	115
2004	133

Looking at the downward trend experienced from 2000 through 2003, it appears that one probable cause was a planned expansion of services at the time when the worldwide economy experienced a severe downturn. Individuals, particularly new or lower income users, would most quickly react to faltering economic times and tough financial times by reducing their calling and/or overall bill payments, which probably led to the declining percentages that have just recently started to reverse themselves. Other causes for the decline could have been the sinking value of the Egyptian pound and the increased cost of imported goods, combined with the decision to maintain a constant fee for local services.

Because the overall impact was slow, but growth occurred in the past 10 years, the rating is *moderately positive*.

Rating: Positive

SO Indicator 18.2.d – Percent of annual billings collected for telecommunications services sold

The data to assess the “percent of annual billings collected for telecommunications services sold” was not available until Telecom Egypt became public. The migration of ARENTO from an unprofitable and ineffective network operator into a semi-privatized entity that could invest in numerous enterprises and launch subsidiaries, speaks to its improved financial position. Numerous references within this report identify how collectables improved, because of increases in tariffs, subscriber accounts, and network usage; as well as improved billing/payment management systems at Telecom Egypt.

⁷⁷ FY 2004 Performance Monitoring Report for FY 2004

When Telecom Egypt opened its books to the public, it became possible to review their balance sheet to determine their current assets, including “trade and notes receivable”. In 2005, Telecom Egypt had EGP 2,559,673 in trade and notes receivable, which was *less* than its 2004 amount of 2,617,099.⁷⁸ This is a positive indicator for the organization. More importantly, in 2005, Telecom Egypt had an excess EGP 722,715 of current assets over current liabilities, while in 2004; the organization had a *deficit* of EGP 711,985 of current assets over current liabilities. As a result of all these circumstances, and the challenges a developing country organization faces in attending to the detail required to obtain an increased percentage of annual billings collected, the rating is therefore *positive and major*.

Rating: Positive

SO Indicator 18.2.e – Percent change (relative to baseline) in annual revenue per telephone line

While data is not available for all years, the percent change (relative to baseline) in annual revenue per telephone line was very positive according to USAID documents.

Telecommunications tariff benefits derive from three primary sources: telephone subscriptions, completed calls, and installation charges. Call rates are further subdivided into local, national, and international subcategories. By taking the total revenue and dividing it by the number of total system lines, average revenue per line can be obtained. This average revenue can then be multiplied by the number of lines introduced by the USAID financed projects to determine the total revenue that USAID projects added to ARENTO’s bottom line. Using this methodology, it appears that 667.3 million EGP in revenues can be attributed to Telecommunications I, II, and III improvements.

Telephone Revenues						
Year	Subscriptions	Telephone Calls			Installation	Total (million EGP)
		Local	National	International		
1983/1984	1.9	.9	.6	4.2	4.4	12.0
1984/1985	9.1	3.5	2.0	15.9	17.0	47.4
1985/1986	13.7	4.1	3.5	21.6	3.7	46.5
1986/1987	14.6	7.4	5.4	28.9	2.7	59.1
1987/1988	14.6	7.4	8.5	14.8	0	45.3
1988/1989	14.7	8.0	15.6	63.2	2.0	103.5
1989/1990	14.7	8.0	17.2	68.7	--	108.6
1990/1991	14.7	8.0	20.3	71.4	--	114.5
1991/1992	15.9	8.0	23.2	84.2	--	<u>130.4</u>
						667.3 EGP

Using this methodology, it can be estimated that total revenues attributable to Telecommunications IV were EGP 512.5 million.

Year	Subscriptions	Telephone Calls under Telecom IV*			Installation	Total (million EGP)
		Local	National	International		
1991/1992	2.4	2.7	8.0	13.8	14.9	41.8
1992/1993	4.2	4.5	13.6	23.4	10.4	56.1
1993/1994	5.6	6.1	18.3	31.4	8.7	70.1

78 Telecom Egypt Annual Report, 2005, page 32.

Year	Subscriptions	Telephone Calls under Telecom IV*			Installation	Total (million EGP)
		Local	National	International		
1994/1995	7.9	8.6	25.8	44.2	13.9	108.4
1995/1996	10.1	11	33	57	13.9	125.0
1996/1997	10.1	11	33	57	--	<u>111.1</u>
						512.5 EGP

* Benefits based on 1991/1992 prices.

As noted, virtually all indicators (local, national, and international calling and installation fees,) show a positive percentage increase in revenues. In many cases, these revenues doubled or tripled within a ten-year cycle. For these reasons, the rating assigned to this indicator is *positive and major*.

Rating: Positive

SO Indicator 18.3.a – Cumulative number of legal and regulatory milestones attained

A National Telecommunications Regulatory Agency was established in 2003. This accelerated sector restructuring has led to numerous investments by international firms such as Vodafone and MobilNil.

Rating: Positive

3.3.5. Lessons Learned

Lessons from USAID's telecommunications assistance echo lessons from other sectors, and add a few of its own. These lessons learned resolve primarily around creating effective partnerships, balancing hardware and human resource-related needs both in design and implementation, and the willingness to persist in activities that take longer than expected. These lessons, and their implications for future programming, are elaborated and discussed in turn in this section.

- Hardware and engineering-related activities have faster implementation timelines than management and institutionally based activities.
- Contract consolidations lead to improved contractor management and purchasing efficiencies.
- The consultant or contracted organization needs sufficient time to invest in building trust among project partners. Good working relationships are a critical condition for success.
 - There is a natural *learning* curve when organizations meet and work together. USAID needs to build paid time into projects that allows this process to take place among all parties within project timelines. This necessary process - the human element which might have accelerated the work team's outputs later – was not given due consideration in ambitious technical network expansion plans.
 - USAID had a tendency to expect institutional change to occur on a quicker timetable than is sometimes possible.
- While the funding aspects for training programs may have been in place, institutional strengthening programs required human resource outlays that were not always available in the host organization. In acknowledging the scarcities of trained and appropriate labor for certain positions that can sometimes accompany work in a developing country, USAID may need to provide staff to cover certain functions so local managers can attend training. For future programs, USAID may wish to:
 - Implement “train-the-trainer” programs so technology transfer can occur and local expertise and educational capabilities can be developed.

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- Translate written materials into Arabic wherever possible; a process that has become far less costly with the arrival of modern software and Internet-based tools. Additionally, USAID should invest in digitally recording the training program with translation. This way local staff can watch and listen to the translated program via pod cast (or other available video formats), and take notes in their native language at virtually no additional cost to the USAID program. Material customization and cross-cultural gaps take time and decentralized efforts to bridge.
 - Involve the client organization in the project design and plans for implementation.
 - Too frequently, Telecom Egypt was presented with projects *fait accompli*, involving a series of project goals that they may not have understood or had the institutional resources to pursue.
 - Understand the benefits of dynamic and multiple approaches to effective organizational and sector reform.
 - While USAID invested great resources and effort to develop a regulatory function and help Telecom Egypt develop marketing resources and future-oriented financing functions, reform became rooted only when real-world pressures came to bear. For example:
 - A marketing department was created only when it became apparent that the company could not survive without one.
 - Regulation was only seriously addressed when a regulator was needed to oversee the sector in a multiple-operator environment.
 - Financial change took place only after the registration in the capital market brought unprecedented scrutiny of the financial results of the company.
 - Consultants can be most effective when they work in an environment where other change agents reinforce similar reforms. As in retail marketing, it often takes three “senders” of messages via different media for a customer to take action and “buy” a select product or service.
 - The consulting mindset and methodology that designed consultancies for the client, rather than with the client was an unfortunate trend observed during the implementation of activities under Telecom I through Telecom V. Solutions were created without a corresponding organizational input to the process, and therefore set unrealistic expectations about how quickly an organization could absorb concepts for implementation, i.e. the diffusion and absorption timeframe were underestimated.
 - There seemed to be great energy and spirit in proposing new initiatives, but a commitment to the continuing support that such initiatives would require was often lacking. For example, the human resource and staff development requirements of local entities were sometimes “put on the back burner,” in contrast to USAID’s and the local entities’ (or GOE or the Ministry’s) desire to aggressively grow the network.

3.3.6. Prospects For The Future

With a fast-growing telecommunications sector now firmly established in Egypt, opportunities for continued expansion are strong. Telecom Egypt has the experience and positioning to become a strong service provider, competing in the global market. The telecommunications market has been identified as a favorable environment for private investment. Continued institutional strengthening and regulatory reform can help realize (or derail) these opportunities.

The U.S. Department of Commerce has identified Egypt’s telecommunications market as one of the most attractive in the region⁷⁹, with opportunities for fiber and copper optic cables, central office switches,

79 www.buyusa.gov/egypt/en/

cellular stations, data communications satellite, and microwave communications equipment. Prime sales opportunities exist in the wireless networks and solutions, particularly for Wi-Fi, Wi-Max, Voice over Internet Protocol (VoIP), CDMA, DSL, GSM solutions and applications, call centers, and billing solutions. Estimates for the 2006 market show a total market of over \$4.3 billion⁸⁰ with the import market estimated at \$1.7 billion of that opportunity. At the end of 2005, Telecom Egypt's monopoly of the fixed line market ended. This policy change provided the needed opening that would permit this opportunity to become an export reality. As evidence of that market, a signing ceremony was held between the Ministry of Communications and Information Technology, Lucent, Telecom Egypt, and Lucent's business partner in Egypt, TeleTech, at the conclusion of the American Chamber of Commerce (of Egypt) luncheon in New York in June 2006.

Egypt is implementing diverse forms of funding for the combined telecommunications and information sector. MCIT Minister Kamel noted that Telecom Egypt's support for the Universal Service Fund allowed the ministry to lower DSL and broadband rates by 40 percent in June and to subsidize lower prices in rural areas, helping to increase Internet penetration and usage.⁸¹ The Universal Service Fund is one of three top initiatives aimed at increasing broadband usage in Egypt. Partnerships with several multinationals (Microsoft, IBM, and Cisco) have led to the establishment of research and development centers in Egypt that aim to foster innovation in data mining, wireless technologies, and mobile services.

As they have done in Algeria, Telecom Egypt is now poised to become a strong services competitor to U.S. firms in markets around the world. Egypt's telecommunications sector has already attracted private investment, as evidenced by Vodafone, MobilNil, and the new Third Generation (3G) license's investors in the sector. Numerous U.S. investors have interests in components of the network business, including cable, engineering, and consulting firms.

There does not appear to be a specific plan by the Government of Egypt to mobilize non-donor resources to replace capital and expand services; rather Egypt's telecommunications sector has migrated from "aid to trade" and relies on the open market. Private and public sector organizations are investing in the market/sector, thereby generating research and development and network solutions needed to bring Egyptian citizens a modern telecommunications network and service delivery. Competition in the sector is also attracting financing institutions such as the IFC, international venture capitalists, and banks that see opportunity in Egypt.

One possible area of continued USAID assistance is with the National Telecommunications Regulatory Authority (NRTA), especially as industry issues are increasingly complex and require technological savvy. The financial, economic, and social implications of regulation for the nation and its citizens are considerable. For example, as of September 2006, Mobilnil, a Second Generation (2G) mobile carrier, was asked by NRTA to stop offering enhanced data services, such as streaming video on EDGE technology. The regulator suggested that Mobilnil apply for a 3G license for this service at a cost of US \$580 million (a fee that is almost equal to what that USAID has put into Egypt's telecom sector over a 30 year cycle). Mobilnil has been in talks with the Government, noting that EDGE is an enhanced version of GPRS, a second-generation (2G) technology that does not require further licensing. It is unclear if the regulator did not understand this technological subtlety at the time of the 2G license auction, or if new

80 U.S. Department of Commerce Country Commercial Guide for Egypt

(http://www.buyusainfo.net/docs/x_7342224.pdf). Taking the latest available figures for the market for telecommunications equipment and services for 2004 of US \$3B and applying the identified market growth rate, which was 20% from 2002 – 2004, led to a total market opportunity in 2006 of \$4.32B (which we rounded off to \$4.3B).

81 "Investment in Egypt: The IT and Telecom Sector as a Model" Speech by H.E. Tarek Kamel, Minister of Communications and Information Technology at a New York luncheon, hosted by the American Chamber of Commerce in Egypt, June 22, 2006 http://www.amcham.org.eg/operation/events/events06/ny_mcit/mcit.asp

capabilities have developed in the time period between the 2G and 3G licensing auctions. The situation speaks to the need for state-of-the-art support for the NTRA, especially as millions of dollars (and Egyptian pounds) are at stake. A continuation of the regulatory assistance received under Telecom V is therefore strongly recommended. If continued, assistance may be constrained by the NRTA's limited absorptive capacity that has resulted from high staff turnover and leadership changes.

Overall, the prospects for the Egyptian telecommunications sector are bright. Telecom Egypt is showing positive financial returns and private sector players are increasing. Capital and funding are coming from numerous sources, diversifying capital risk. At the same time, increased competition may lead to reduced profit margins. It will be important for new and established competitors to carefully read the market and individuals' spending capacities and willingness to purchase network and value added services. The traditional revenue and service model is changing. Where before the "network" (e.g., subscriber line) provided the revenue and profits for a telecommunications firm; now the line is increasingly being "given away" (e.g. provided at or below cost) and revenue generated by services purchased by the customer. With this modern telecommunications pricing and marketing model, quality management and the market will increasingly dictate the relative levels of cost recovery. The regulator's "cost recovery models" from previous decades no longer apply.

Effective business management in Egypt's dynamic and competitive telecommunications sector requires that organizations use their resources wisely. They must invest in their human resources, research and development, alliances, innovative products and services, and other techniques that broaden a firm's product and service portfolio. It is this capacity that will increase their ability to land and maintain customer accounts. "Churn", the ratio of customers who change providers, will become a new metric for Egypt's telecommunications industry just as quality customer service became a required business metric ten years ago. Another critical issue facing Egypt will be its ability to maintain a modern and cutting-edge regulatory infrastructure. In other developed nations, bids for licenses have sometimes far outweighed the returns a vendor can realistically expect to recoup from the market.

As far as bill collection and other accounting measures are concerned, the situation should only improve as software systems, integrated billing and telecommunications switches, and other advanced features of modern networks provide specific and demonstrable network usage to customers. The Network Operations Center will certainly help Telecom Egypt to study traffic and related network parameters and guide network purchases and installations in a way that serves the public's current needs. Advanced communication networks can also anticipate or help to steer population movements towards specific desired locations, stimulating the development of neighborhoods, innovation clusters (like the Smart Village), and other distinct population centers.

ترجمة الملخص
المتعلق بتقييم إنجازات الوكالة الأمريكية للتنمية الدولية
في إطار دعم وتنمية المرافق العامة بجمهورية مصر العربية خلال
الثلاثون عاماً الماضية.

هذا التقييم يهدف إلى التعرف على الإنجازات العظيمة لبرنامج الوكالة الأمريكية للتنمية الدولية في إطار دعم وتنمية المرافق العامة بجمهورية مصر العربية خلال الثلاثون عاماً الماضية. والتي بلغ حجم إستثماراتها 5 و7 مليار دولار أمريكي بقطاعات المياه / الصرف الصحي، والكهرباء، والاتصالات منذ عام 1975. وقد إشتملت الأهداف الرئيسية لهذا التقييم على: (أ) تحديد نتائج الإستثمارات في مشروعات البنية التحتية. و (ب) التعرف على الدروس المستفادة عند تنفيذ مشروعات مماثلة مستقبلاً. بالإضافة إلى ذلك، أتاح هذا التقييم فرصة أن يكون لدينا تصوراً شاملاً عن مدى الإستمرارية المالية والطبيعية المستقبلية لهذه القطاعات في أداء دورها بكفاءة وذلك في حالة توقف الدعم المتوفر لها حالياً من الجهات المانحة. بمناقشة كل قطاع على حدة، وأن هذا التقرير يوثق حالة المرافق قبل وبعد تنفيذ البرنامج، ويحلل الإتجاهات، ويأخذ في الإعتبار المؤشرات المحققة بالنسبة لما هو مستهدف منها، ويحدد الدروس المستفادة، ويقترح التوصيات، ويناقش إمكانياتها وإحتمالات ربحيتها المستقبلية.

2/1 الخلفية التاريخية المصاحبة للأحداث

في منتصف السبعينيات، قامت الوكالة الأمريكية للتنمية الدولية بتشكيل برنامج استثمار واسع لدعم الحكومة المصرية في تطوير وتنمية الخطة الإستراتيجية الإقتصادية والإجتماعية بها. وقد غطى هذا البرنامج الحضري البنية التحتية بقطاعات المياه / الصرف الصحي، والكهرباء، والاتصالات. وكان هدف الحكومة المصرية الرئيسي هو توسعة وتعزيز المرافق العامة. أضافت إتفاقية برنامج الوكالة الأمريكية للتنمية الدولية العديد من برمجيات الأولويات الأخرى المتمثلة في: الدعم المؤسسي، وتنظيم الهيئة التشريعية، والإصلاحات وإعادة الهيكلة بالثلاث قطاعات، بهدف خلق بيئة جاذبة لإستثمارات القطاع الخاص. فممنذ بداية البرنامج عام 1975، قامت الوكالة الأمريكية للتنمية الدولية بمصر بإستثمار ما قيمته 5 و7 مليار دولار أمريكي وذلك بالنسب التالية: (3 و3 مليار) لتوسعة وتحديث قطاعات المياه / الصرف الصحي، و (8 و1 مليار) للطاقة، و (4 و6 مليون) للاتصالات 82. وكنتيجة لذلك، إستفادت قطاعات المرافق المصرية - عنها في أى قطر على الإطلاق - من أحد أكبر إستثمارات الوكالة الأمريكية للتنمية الدولية.

القطاع	سنوات مساندة الوكالة الأمريكية للتنمية الدولية	القيمة بالدولار الأمريكي	نسبة القطاع بالمقارنة مع كافة القطاعات
المياه / الصرف الصحي	1977 - 2006	3 و290 و080 و000	58 %
الطاقة	1975 - 2006	1 و796 و101 و000	32 %
الاتصالات	1978 - 2006	604 و639 و000	10 %
كافة القطاعات	1975 - 2006	5 و690 و820 و000	100 %

82 المعلومات مستقاه من مستندات متعددة بمشروع الوكالة الأمريكية للتنمية الدولية.

إن آفاق المشاركة بين كل من الحكومة المصرية والوكالة الأمريكية للتنمية الدولية لتحسين قطاعات المرافق العامة على مدار ثلاثون عاماً لـ ذو تاريخ طويل من العمل التعاوني بقطاع المرافق. فالمرافق العامة ذات الإعتماذية العالفة تعتبر أحد أكثر العوامل الحاسمة اللازمة لدعم النمو الإقتصادى والإستجابة للإحتياجات الأساسية للمواطن. وبالنظر عبر المؤشرات التنموية يمكننا إستنتاج أن قطاع أعمال المنفعة العامة المدمج قد إستفاد منه إجتماعياً وإقتصادياً معظم التعداد السكانى 83. إذاً، فالتحسينات (شاملة صناعة حسن الضيافة) التى تم تقديمها بواسطة الوكالة الأمريكية للتنمية الدولية قد مهدت الطريق لتعزيز دور القطاع الخاص ولزيادة التنمية التجارية والصناعية وللتحسن الملموس بإحصائيات الصحة العامة فى مصر.

إذاً يمكننا القول أن مساعدات الوكالة الأمريكية للتنمية الدولية بمصر قد جاءت فى المرحلة المناسبة. ففى منتصف السبعينيات، كانت مصر آنذاك تحاول أن تسترد عافيتها من جراء الحروب المتعاقبة فيما بين العرب وإسرائيل، وكانت تعاني من الإنخفاض فى مستوى الإقتصاد المصرى. فمنذ منتصف الستينيات وحتى بداية السبعينيات أصبحت نسبة إجمالى الناتج المحلى أقل من 1 % . فمصر منذ عام 1960 وحتى عام 1973 كانت واقعة تحت تأثير موجة ملحوظة من التأميم، وخاصة البنوك وشركات التأمين، والمشاريع الصناعية. والمعروفة بعهد مركزية التخطيط، لأن الدستور المصرى آنذاك كان يأخذ بالإشتراكية كأساس منهجى للتنمية الإقتصادية. فالمجهودات نحو الإنطلاق تجاه الأهداف القومية مثل: مجانية التعليم والرعاية الصحية، وتوفير فرص عمل، ورفع الأجور، والمرض وزيادة المعاشات، كل ذلك نجم عنه وجود كيان بيروقراطى مركزى ضخم مما ساعد على إبطاء المقولة للتجديد والإستقلالية.

وبنهاية السبعينيات كانت مصر بلد بيروقراطى كما كانت تعتمد وبكثافة على التحويلات الأجنبية والقروض. وأدت كل من سياسات ضمان توفير فرص عمل (التعيينات) ودعم الأسعار إلى إنبهارات إقتصادية حادة وواسعة النطاق. المنظمات مثل: المصرف العالمى، والوكالة الأمريكية للتنمية الدولية - مدركين مدى تزايد الصعوبات - تدخلت من أجل إنجاح سياسة الخصخصة، وإلغاء الدعم، وتشجيع الإستثمار الأجنبى، وتحرير التجارة الخارجية. قبلت الحكومة المصرية العديد من التوصيات الدولية وبرامج القروض، وكان عليها أن تعيد البناء الواسع النطاق بالإقتصاد من أجل تحفيز الإنتاج والإعتماد على الذات وذلك على الصعيد المحلى. فالقيادة فى ذاك الوقت تميزت بالإتجاه نحو تحرير إدارة الإقتصاد. وإبان هذه المرحلة التحولية قامت الوكالة الأمريكية للتنمية الدولية بالتدخل للمساعدة.

بدأ النمو الإقتصادى لتوه ينتعش مع بداية إنطلاقة البرنامج الإستثمارى للوكالة الأمريكية للتنمية الدولية. ففى ذلك الوقت، كان العجز بميزان المدفوعات مرتفع جداً، ولم يكن هنالك متنوع فى الموازنة للقيام بإستثمار رؤوس الأموال فى قطاعات المرافق العامة. ففى بداية برنامج مساندة الوكالة الأمريكية للتنمية الدولية فى قطاعات الطاقة والإتصالات والمياه والصرف الصحى كانت حالة الخدمات محدودة وكان لا يمكن الإعتماد عليها، فأنظمة المياه / الصرف الصحى كانت تواجه أحمال تربو على ضعفى سعتها التصميمية. وكان سكان كل من القاهرة والإسكندرية يعانون من الأوبئة الناجمة عن الطفح المستمر للصرف الصحى ومن النقص فى الإمداد بمياه الشرب. كما كانت المناطق الساحلية كالإسكندرية ومدن القناة ملوثة بكثافة بسبب الصرف الخاطى لمياه الصرف الصحى، كما هو الحال بالعديد من الترع والأنهار. وفى عام 1981 كان فقط 34 % من المصريين مستفيدين من الكهرباء 84. كما كان معدل الخطوط التليفونية 13 خط تلفونى لكل 1000 فرد بالقاهرة أو الإسكندرية 85.

وبعد مضى ثلاثون عاماً، أصبح نسبة 22 مليون مصرى يستفيدون وبشكل مباشر من تحسين نوعية الخدمات فى مرافق الإمداد بمياه الشرب وبالصرف الصحى المدعومة من الوكالة الأمريكية للتنمية الدولية. كما إستفاد 2 و4 مليون نسمة وبشكل مباشر من

83 هنالك 22 مليون مستفيد مباشر من مشروع مساندة الوكالة الأمريكية للتنمية الدولية بمجال مرفق المياه / الصرف الصحى، وأيضاً 2 و4 مليون بمجال الإتصالات. أى أن كافة المصريين قد إستفادوا بشكل مباشر أو غير مباشر من مشروع مساندة الوكالة الأمريكية للتنمية الدولية بمجال الطاقة، حيث وفى عام 2005 أصبح ما يزيد على ما نسبته 99 % من التعداد السكانى بمصر يمكنهم الحصول على والوثوق بشبكة الطاقة الكهربائية، وبالرغم من أن هذا النمو لم يكن فقط هو النتيجة المباشرة للبرنامج إلا أن نوعية الإمداد بالطاقة وثباتها قد أثرت فعلياً وبشكل إيجابى فى كل مكان بمصر وذلك بسبب تدخلات الوكالة الأمريكية للتنمية الدولية بمنظومة الطاقة.

84 معلومات نقلاً عن الشركة القابضة لكهرباء مصر - عام 2006.

85 التقرير الفنى رقم 19 للوكالة الأمريكية للتنمية الدولية.

التحسينات بقطاع الاتصالات. وفي عام 2005، أصبح بمقدور 99 % من تعداد السكان الحصول على والوثوق بشبكة الطاقة الكهربائية على امتداد رقعتهما، فإمداد مصر بالطاقة قد تأثر وبشكل إيجابي بما طرأ عليه نتيجة لإنتهاج برنامج الوكالة الأمريكية للتنمية الدولية.

3/1 ملخص الإنجازات

إن مساعدات الوكالة الأمريكية للتنمية الدولية لمصر بقطاعات المياه / الصرف الصحي، والطاقة، والاتصالات ليمثل أحد أكبر نجاحات الوكالة وذلك على مستوى العالم. فمنذ عام 1975 وحتى عام 2006 قامت الحكومة الأمريكية بالمساهمة بحوالي 5.7 مليار دولار - أى ما يعادل أكثر من 20 % من كافة حجم المساعدات لمصر - فهذا الإستثمار لم يسهم فقط فى تحسين الخدمات بقطاعات الكهرباء، والمياه / الصرف الصحي، والاتصالات، وإنما أدى أيضاً إلى تحسن الصحة العامة والنمو الإقتصادى المبهر.

فبالنسبة لقطاع المياه / الصرف الصحي ومنذ عام 1977، بلغت جملة الإستثمارات فى 13 مشروع خاص بالمياه ما قيمته 3.3 مليار دولار أمريكى. ففي السنوات الأولى من عمر البرنامج كان على قمة الأولويات إنشاءات البنية التحتية بالصرف الصحى لتقليص طفح مياه الصرف الصحي الناجم عن العجز فى منشآت الصرف بكل من محافظتى القاهرة والإسكندرية. وفى نفس هذه الفترة تمت عملية إحلال أو إعادة تأهيل ما هو تالف من البنية التحتية الخاصة بقطاع المياه / الصرف الصحي بالمدن التى تضررت من جراء الحرب على طول خط قناة السويس. وفى منتصف التسعينيات، تحولت بؤرة إهتمام البرنامج إلى المناطق الحضرية الأصغر بمناطق الدلتا، وجنوب سيناء، ومصر العليا والوسطى. وفى أواخر الثمانينات تم التركيز على تنمية بناء القدرات المؤسسية والإصلاحات التنظيمية والتشريعية لقطاع المياه والصرف الصحي.

وبحلول نهاية العام المالى 2006، أصبح بإمكان ما يربو على 22 مليون نسمة أن يحظوا بما طرأ من توسع على تحسين نوعية الخدمات الناجمة عن دعم الوكالة الأمريكية للتنمية الدولية بمصر 86. وككل، فإن مشاريع الوكالة الأمريكية للتنمية الدولية لتطوير البنية التحتية بمرافق المياه والصرف الصحي قد تم التوسع بها ليستفيد منها ثلث التعداد السكانى بمصر وذلك نتيجة لما طرأ من إستقرار على الصرف الصحي والإمداد بالمياه، مما كان له عظيم الأثر على تحسن الصحة العامة والبيئة 87. واليوم، أصبحت معدلات الوفيات فى مصر خُمس ما كانت عليه فى السبعينيات ، أى أنها إنخفضت من 145 حالة وفاة عن كل ألف شخص لتصبح 26 و4 حالة وفاة عن كل ألف شخص عام 88 و2004. فالتحسينات الخدمية التى طرأت على خدمات المياه والصرف الصحي قد ساهمت أيضاً وبشكل مباشر فى ازدهار مجالات السياحة، والتجارة، والإستثمار.

وفى قطاع الطاقة، فقد بلغت إستثمارات مساعدات الوكالة الأمريكية للتنمية الدولية لتطوير قطاع الطاقة ما مجموعه 1.98 مليار دولار أمريكى وذلك فى أكثر من 13 مشروع. أى بمعدل 22 % من مجموع المساعدات الأجنبية لقطاع الطاقة. حيث أصبح قطاع الطاقة الآن قادراً على أن يمد - فعلياً - القطر المصرى بكامله بخدمات كاملة وبكفاءة معقولة يمكن الإعتماد عليها، مما يعد تطوراً هائلاً فيما إذا قارناه بما كان الحال عليه عند إبتداء برنامج مساندة الوكالة الأمريكية للتنمية الدولية عام 1975. وهذا فى حد ذاته يؤكد على أن إستثمارات الوكالة الأمريكية للتنمية الدولية كانت فعلياً فى صالح كافة المصريين. وفيما يتعلق بدعم الوكالة الأمريكية للتنمية الدولية لإنشاء أو إعادة تأهيل محطات التوليد فقد أسهم بشكل مباشر وغير مباشر فى حوالى ثلث مجموع سعة التوليد الحالية (أى ما يعادل 6 و005 مما مجموعه 500 و18 ميجا وات عام 2005). فخلال عام 2005، أصبح بمقدور ما يربو على 99 % من التعداد السكانى بمصر الدخول على شبكة الطاقة الكهربائية والإعتماد عليها 89.

86 تقارير ووثائق توضح الأهداف الأساسية الـ 18 للمشروع.

87 22 مليون نسمة كمستفيد مباشر من أصل جملة التعداد السكانى البالغ 71 مليون نسمة.

88 22 مؤشرات التنمية العالمية والبنك الدولى، <http://publications.worldbank.org/subscriptions/WDI>

89 الدراسات والتقارير الصحية والإحصائية بمصر منذ عام 2000 وحتى عام 2005. <http://www.cspro.org/pubs/>

والآن، أصبحت كافة المجتمعات التي يربو قاطنوها على 1000 نسمة متصلين بالشبكة الكهربائية 90. ويمكننا القول بأن النمو في إستهلاك وإنتاج الكهرباء يعزى إلى الإستثمارات المصرية وإلى الجهات المانحة الأجنبية في مجالات الإنتاج، والنقل، والتوزيع.

فبرنامج دعم الوكالة الأمريكية للتنمية الدولية حقق نجاحات على أصعدة متعددة لتطوير قطاع الطاقة. فعند المقارنة بحالة القطاع عام 1975، نجد أن قطاع الطاقة المصري فعلياً قد تحول تحولاً ملحوظاً في مجال أحدث التقنيات الفنية والقدرات المؤسسية. فمنذ أن بدأ دعم الوكالة الأمريكية للتنمية الدولية عام 1975 في الإستثمار بقطاع الطاقة، زاد المعدل السنوي لإنتاج الطاقة الكهربائية إلى عشرة أضعاف، بينما زاد معدل الإستهلاك بنسبة 600 بالمائة لكل ألف فرد 91. كما وقد أصبح من الملحوظ أن إسهامات إستثمارات الوكالة الأمريكية للتنمية الدولية بقطاع الطاقة قد تجاوزت مبلغ مكوناتها الإنفرادية. فعلى سبيل المثال لا الحصر، وأثناء قيام الوكالة الأمريكية للتنمية الدولية بإعادة تأهيل وتحديث السد العالي بأسوان - ومع توليفة القياسات المأخوذة عبر القطاع ككل - قامت بتصحيح الخطأ الواقع بالتصميم الأصلي مع الإبقاء على سعة التوليد الموجودة بالخط كما هي. مما كان له جل الأثر على النمو المذهل بالقطاع. وأصبح توفر الطاقة الكهربائية التي يمكن الإعتماد عليها بمثابة الوقود لنمو مصر الإقتصادي. كما زادت - وبشكل ملحوظ - كفاءة صناعة الطاقة، كما أن حدوث تغييرات مؤسسية هامة مهدت الطريق لتوسعات إضافية بالقطاع. ومن المتوقع أن يزيد إجتذاب إستثمار القطاع الخاص بالقطاع نتيجة لزيادة الكفاءة بهذا القطاع الإقتصادي الحيوى. وهناك فرص لا تزال قائمة لحدوث تحسينات أخرى في المجالات الطبيعية والمؤسسية للبنية التحتية حيث توجد بعض أوجه القصور التي تهدد كيان النجاحات الماضية.

وفي قطاع الاتصالات، فإن جملة الإستثمارات بلغت 604 مليون دولار تم إستثمارها في خمسة مشاريع. وكان الهدف المباشر منها هو إتاحة نظام إتصالات يعمل بكفاءة لدعم النمو الإقتصادي والإجتماعى في مصر. وفي عام 1978 تم البدء في أول مشروع، أما المشروع الخامس والأخير فقد تم الإنتهاء منه عام 2006.

فالمؤشرات المتعارف عليها جغرافياً عن النمو الإيجابى مثل زيادة عدد مستخدمى الخطوط الهاتفية حسب المكان الجغرافى و/أو الزيادة بشكل عام في كثافة الخطوط الهاتفية أظهرت تحسناً ملموساً. حيث نمت كثافة خطوط الإتصالات بمصر بمعدل بلغت نسبته المئوية 1600 حيث إرتفعت من 942 خط تليفونى لكل 1000 شخص عام 1978 لتصبح 150 خط تليفونى لكل 1000 شخص عام 922006. كما زاد عدد الخطوط التليفونية من 374 و000 عام 1978 حتى وصل إلى 7 و10 مليون عام 932006. وارتفعت نسبة الرضا لدى المشترك التجارى، والخاص، والعام بشكل ملحوظ يمكن قياسه من خلال قلة قوائم الإنتظار لتركيب خطوط هاتفية جديدة وقلة نسبة الأعطال لكل خط هاتفى 94.

وبحلول نهاية العام المالى 2006، كانت الوكالة الأمريكية للتنمية الدولية المسؤولة عن التحسن الملموس المتمثل في زيادة أعداد المستفيدين من الإتصالات لأكثر من 2 و4 مليون مواطن 95. وأيضاً بالنسبة للسياح ورجال الأعمال المسافرين الذين تزايدت أعدادهم ونمت إستثماراتهم جزئياً، لأنه أصبح الآن بمقدورهم وبسهولة "الإتصال بمواطنهم". إن إستثمار الوكالة الأمريكية للتنمية الدولية لأكثر من 604 مليون دولار أمريكى أدى إلى تركيب أكثر من 840 و875 خط هاتفى (تقريباً ما

90 معلومات نقلت عن الشركة القابضة لكهرباء مصر عام 2006.

91 المعلومات ومؤشرات التنمية العالمية عن المصرف الدولى والشركة القابضة لكهرباء مصر (ش ق ك م).

92 دليل إنجازات عام 2006 بوزارة الإتصالات وتقنية المعلومات، الوكالة المركزية للإحصاءات العامة والتعبئة عام 1984 - كتاب عام (1952 - 1983)، صفحة رقم 16.

93 أنظر الملحوظة بعاليه.

94 بناءً على تقنية المعلومات العالمية بمصر عن : المؤشرات المرسله للإتحاد الدولى للإتصالات ونوعية الخدمات بالأعوام التالية 2003، 2004، 2005 فقد تقلصت قوائم الإنتظار بصدد تركيب خطوط هاتفية رئيسية بما نسبته 50 و0 عام 2004 لتصبح 10 و0 عام 2006.

95 رقم مبنى على حجم متوسط حجم العائلة بمصر - والمكون من خمسة أفراد - مفترضين أن كافة أفراد العائلة يتشاركون في خط الهاتف. فالخطوط الهاتفية الإضافية البالغة 840 و875 التى تم تركيبها تساوى نسبة التحسن فى التزود بالخدمة لـ 2 و4 مليون مصرى. هذا بدوره بشكل تقدير معتدل وذلك من وجهة نظر القائمين على عملية الإتصالات.

نسبته 8 و 1 % من مجموع الخطوط الهاتفية الجديدة) 96. وقد تم الدعم المؤسسي للشركة المصرية للاتصالات وتوسيع وتحسين شبكات الاتصالات بكل من محافظات القاهرة، والإسكندرية، وبور سعيد، والمتضمن من خلال تحويل التقنية بمثل مشروعات: النظام النهائي للتحويل اللا تزامنى المعروف بالـ (ATM) ومشروع المركز الحديث لتشغيل الشبكة المعروف بالـ (NOC). وقد كان لتطوير قطاع الاتصالات وما يزال جُل الأثر على قدرة مصر فى زيادة التجارة والإستثمار 97.

4/1 النتائج الإجمالية

منذ منتصف السبعينيات، تلقت مصر أحد أضخم إستثمارات الوكالة الأمريكية للتنمية الدولية أى ما يربو على 5 و 7 مليار دولار تم إستثمارها فى البنية التحتية لتوسعة وتحديث مرافق المياه / الصرف الصحى، والطاقة، والاتصالات. وأثبتت هذه القطاعات الثلاثة على أنها عوامل فعالة بالنسبة للإصلاح الإقتصادى 98. وإنتهى تقرير منظمة الصحة العالمية عام 2004 إلى أنه إذا تم إستثمار ما قيمته 1 دولار فى تحسين الإمداد بالمياه وتعزيز الصحة العامة ومنع تفشى الأمراض فإنه من شأنه أن يعود بعائد إقتصادى قيمته 3 دولارات أو أكثر حسب المنطقة 99.

إن نتائج البرنامج المدعومة بمستندات التقييم والموجودة بهذه الدراسة، تتحدث عن نفسها. فبرنامج مساندة الإنشاء التابع للوكالة الأمريكية للتنمية الدولية نتج عنه - بشكل مباشر وغير مباشر - ثلث مجموع سعة الطاقة الكهربائية المولدة، فالיום تم توصيل الطاقة لأكثر من 99 % من الأسر المصرية، بينما ومنذ 25 عاماً مضت كان بإمكان - فقط - ما نسبته 34 % من الأسر الحصول على الكهرباء. وقد أسهمت تدخلات الوكالة الأمريكية للتنمية الدولية فى أن يحصل أكثر من ثلث تعداد سكان مصر على إحتياجاتهم من الإمداد بالمياه والصرف الصحى، كما أدت إلى تحسن مؤشرات الأداء الرئيسية بقطاع المياه والصرف الصحى. فعلى سبيل المثال، تمت تغطية تكاليف التشغيل والصيانة بنسبة 90 % (دون حساب الإهلاك)، وإنخفضت كمية المياه المهدرة مما نسبته 49 بالمائة عام 1999 إلى 43 بالمائة عام 2004. وارتفعت كثافة الهواتف فى مصر من 9 هواتف لكل ألف شخص عام 1999 إلى 150 هاتف لكل 1000 شخص عام 2005. فما نسبته 8 و 1 % من هذه الزيادة معزو وبشكل مباشر لمساندة الوكالة الأمريكية للتنمية الدولية.

وبوجه عام فقد تم إنتقاء المشاريع بعناية معولن فى ذلك على إستراتيجية الوكالة الأمريكية للتنمية الدولية لتطوير القطر المصرى، وفى تحديد الحكومة المصرية للأولويات والحاجات الماسة للشعب المصرى الذى عانى طويلاً للحصول على حاجاته الأساسية فى العالم الحديث. وتم تحديد الإطار الزمنى للمساعدات بعناية، ولكى تُصبح مشروعات الطاقة والمياه / الصرف الصحى جاهزة للتشغيل ولأن الطلب على تحسين الخدمات يتنامى وبسرعة كبيرة، تم البدء فيها مبكراً لأنها عادة ما تستغرق من 3 حتى 5 أعوام أو أكثر. الدعم المؤسسى لأجهزة التنظيم جاء متأخراً نوعاً، وكان من الممكن تطوير إدارة الأصول التجارية المستحدثة. وبشكل عام، فإن المشروعات تم الإشراف عليها بشكل جيد، كما تحسنت نسبة مستويات أداء الخدمات ونوعية الأصول وذلك من خلال التدخلات التى قامت بها الوكالة الأمريكية للتنمية الدولية.

وقد تحسنت إدارة المرافق بشكل منقطع النظير وذلك من خلال التغييرات الإدارية بمجالس الإدارات ذات الصلة. وللتناغم مع أهداف البرنامج، فإن كل من الشركة القابضة للمياه / الصرف الصحى والشركة القابضة للكهرباء قد بدأتا فى تغطية تكاليف

96 تقرير رقم 001-05-263-6 س صادر بتاريخ أكتوبر عام 2004، عن حالة أنشطة البنية التحتية والمرافق العامة بمصر والتمويل برعاية الوكالة الأمريكية للتنمية الدولية.

97 طبقاً لتقرير الحالة عامى 2002 - 2003 الصادر عن مصر / الوكالة الأمريكية للتنمية الدولية.

98 البنك الدولى "سياسات التنمية المقارنة لإنشاء الأسواق"، بحث مقدم من أستاذ بالبنك الدولى فى مارس عام 2001.

99 أنظر "أسعار وفوائد الإمداد بالمياه فى تحسين الصحة العامة ومنع تفشى الأمراض على المستوى العالمى" عام 2004 (تقييم صادر عن)

Guy Hutton and Laurence Haller,

https://www.who.int/water_sanitation_health/wsh0404/en/index.html

100 تقرير عن مراقبة الأداء للهدف الرئيسى الـ 18 بالعام المالى 2004.

التشغيل والصيانة. كما أن إستثمارات الوكالة الأمريكية للتنمية الدولية قد وفرت المناخ المناسب للتخصيص ولإستثمار القطاع الخاص. وكانت أبرز النجاحات فى قطاعى الإتصالات والطاقة، أما قطاع المياه فكان متأخراً عن سالفه.

وللإتجاه للأمام، فإن العديد من التحديات تطرح نفسها على الساحة، بما فى ذلك:

- الدعم الهائل والغير مباشر من الحكومة المصرية لهذه القطاعات قد أدى إلى ترك هذه الإحتياجات على الموازنة الحالية للدولة، بينما تأخر الحافز الناجم عن إسترداد التكاليف بكامل القطاع .
- التعريفة المنخفضة للمياه فى القاهرة فشلت فى تغطية تكاليف التشغيل والصيانة وتكلفة رأس المال.
- الوظائف التنظيمية بجهاز التنظيم وحماية المستهلك تفتقر إلى التقوية والتعريف الإضافى بها خاصة فى قطاعى الطاقة والمياه، حتى تصبح قادرة وبشكل أفضل على تقديم تغطية مناسبة لتكلفة التشغيل وخدمة الدين (تكلفة الخدمة).
- الإبقاء على كيان مرافق المياه / الصرف الصحى يعتبر مهدد نتيجة لأنظمة الصيانة والتشغيل المتضاربة.

5/1 الدروس المستفادة

الدروس المستفادة من إستثمارات الوكالة الأمريكية للتنمية الدولية أوضحت مدى الإفتقار إلى: المرونة الكافية والتخطيط الواقعى، وإلى التزود بالأدوات اللازمة لتنفيذ المشروع بسلاسة، وإلى الدور الحساس للتطوير المؤسسى ومدى تأثيره على تطوير البنية التحتية.

1/5/1 الدروس المستفادة: تنفيذ المشروع

بقطاع المياه والصرف الصحى، فإنه من الضرورة أن تقوم وبوضوح: بتنفيذ وتأسيس قواعد وأدوار فاعلة ودافعة وتحديد المسؤوليات لفريق العمل بالمشروع، وأن تقوم بتوصيل هذه القواعد إلى كافة متخذى القرارات المؤثرين. وقد بدى جلياً أن جميع أجهزة التنفيذ تحتاج لأن يكون لديها القدرة على إدارة تنفيذ العقود، وأن يكون لديها الرغبة لتقوم بإدارة المشروع. الدروس: أن يتم وبوضوح تحديد الأدوار والمسؤوليات بين المشاركين. كما أن الإسهام النوعى والإلتزامات المالية من طرف الوكالات المنفذة تمثل إضافة هامة للمشروع.

من خلال خبرات إستثمارات الوكالة الأمريكية للتنمية الدولية بمجال الإتصالات فى مراحل التنفيذ 1، 2، 3 (التي تم دمجها معاً لتحقيقها)، أدركنا أن دمج العقد يؤدي إلى تحسين الكفاءات الشرائية والإدارية لدى المقاول، كما أن الإضافات فى المرحلة رقم 4 من العقد الخاص بالإتصالات قد حققت - من خلال تعديلان - التالى للمشروع: حيث أصبح من الواضح أن تصنيع المواد يجب أن يتم تعديلها وفقاً لطلب العميل، وأنه يجب تجاوز تحديات الفجوات الثقافية التى تستغرق وقتاً لحلها. كما أننا يجب أن نأخذ ذلك فى الإعتبار عند القيام بتصميم الجدول الخاص بالمشروع. وعلاوة على ذلك، فإن الحكمة تقتضى القيام بتكوين لجنة تختص بفض النزاعات عند بداية أى مشروع أى قبل وقوع الأزمة. الدروس: دمج العقد قد يؤدي إلى تحسين إدارة المقاول وكفاءاته الشرائية. كما أنه يخلق آلية يمكنها التعامل مع المشاكل التى قد يتعرض لها المشروع وذلك قبل وقوعها.

بينما كانت الوكالة الأمريكية للتنمية الدولية ومنذ عام 1976 حتى عام 2006 تعمل بكفاءة منقطعة النظير في خمسة مشروعات: لتسهيل وتطوير شبكة الاتصالات وبناء القدرة المؤسسية، والإصلاح التام للقطاع وتشريعاته. إستفدنا إبان ذلك من ثلاثة دروس رئيسية يمكنها أن تساهم في المجهودات المستقبلية لقطاع الاتصالات وتكنولوجيا المعلومات والشبكات والحاسب الآلى والأقمار الصناعية وأنظمة البث المصرية المعروفة بالـ (ICT). أولها: أنه ومن خلال مراجعتنا لكافة التقارير، بدى أن الفكر الراسخ والميثادولوجية الإستشارية نجم عنها إستشارات تم تصميمها للعميل بدلاً من مع العميل. وفى المستقبل، قد يكون من الأسهل والأكثر فعالية إدارياً أن يعمل كل من الإستشارى والعميل معاً فى تشكيل وإدارة المشروع وذلك من خلال تحديد: أهداف المشروع، ونطاق العمل به، والجدول الزمنية ونتائج العمل. وهذا يقتضى ضمناً مشاركة كل من القيادات العليا وسلطة إتخاذ القرار بكل من الوكالة الأمريكية للتنمية الدولية والعميل فى تصميم وإدارة التشغيل. **الدرس: الخدمات الإستشارية الناجحة يتم تطويرها مع العميل، وليس للعميل. فترتيبات العمل التعاونى تعد جوهرية.**

كما وأنه من الأهمية بمكان، أن نعمل على تعاقب كافة أنشطة العمل التى تشتمل على العميل أو المنظمات الأخرى الغير تابعة للعميل، فهذا من شأنه أن يؤثر على قدرة تنفيذ أنشطة المشروع (وعلى سبيل المثال: الحصول على تصريح من هيئة محلية للسماح بدخول مبنى بغرض رفع كفاءة أجهزة الاتصالات). فمن خلال حصر الهيئات ذات العلاقة أثناء فترة المشروع تبين: أن وقت العاملين يمكن الإستفادة منه بشكل أفضل، وكذا الحال بالنسبة لتحسين كفاءات مصادر التشغيل. **الدرس: أن تعرف ما يتطلبه إنجاز أنشطة المشروع، وبالتالي ترتيب تعاقب العمل.**

وأخيراً، عدم وجود الإهتمام الكافى لتذليل عقبات العاملين وذلك من قبل هيئات العميل. فعند خلق أهداف المشروع فإنه لبيحتم على فريق تصميم المشروع بالوكالة الأمريكية للتنمية الدولية أن يضعوا فى إعتبارهم كافة الإلتزامات والتنظيمات الإدارية وأن يكونوا واقعيين فى تفهمهم لمدى إمكانية قيام العميل المحلى بدعم مبادرة الوكالة الأمريكية للتنمية الدولية. إعادة جدولة الجداول الزمنية للإستشاريون سينجم عنها نتائج أفضل، حتى وإن عنى ذلك: أن يتم تمديد الوقت المتاح لمشروع الوكالة الأمريكية للتنمية الدولية. **الدرس: إعداد خطط واقعية تأخذ فى إعتبارها الإلتزامات الحالية، وتقييم القدرة المحلية بكفاءة، وترك مساحة للمناورة.**

2/5/1 الدروس المستفادة: تطوير البنية التحتية والتطوير المؤسسى

بالأخذ فى الإعتبار الحالة السيئة التى كانت قائمة بنهاية السبعينيات، فقد أكدت على أهمية التركيز المبكر على تطوير أنشطة البنية التحتية بمرفق المياه والصرف الصحى (بشكل صحيح)، وكان ذلك بغرض زيادة ضغط المياه وإزالة طفح الصرف الصحى بالأحياء المجاورة، وذلك عن طريق إعادة تأهيل الأنظمة القائمة والتوسع فى أعمال الشبكات الخاصة بالمياه وبالصرف الصحى. فأتثناء العشر سنوات الأولى من عمر المشروع ركزت أنشطة الوكالة الأمريكية للتنمية الدولية وبشكل أساسى على المكونات الطبيعية للبنية التحتية. وعلى الجانب الآخر، كانت مرافق التنظيم والتشغيل تعاني من إهمال شديد. تم الإنتهاء من إنشاء مرافق خدمية تكلفت مئات الملايين من الدولارات وبدأ العمل بها، مع عدم إعطاء الإهتمام الكافى لأعمال التشغيل والصيانة. فى آخر الأمر، تم الإلتفات إلى الصيانة والتشغيل والمتطلبات التدريبية بالمرافق، ولكن القيود المالية والحكومية كانت وبشكل كبير تهدد كيان البنية التحتية. لذا نمت الحاجة لإنشاء جهاز يعمل على تنظيم المرفق وحماية المستهلك بغرض: سن قانون يصيغ مكونات التعريفية المناسبة والرسوم المقدرة وجعله جزء من التكوينات الحكومية. ومع بداية وبمنتصف التسعينيات وخلال ذروة أنشطة برامج الدعم المؤسسى الممولة بواسطة الوكالة الأمريكية للتنمية الدولية، نتيجة غياب إعادة الهيكلة كان السبب فى تقليل مدى فعالية البرنامج. ومرت أكثر من خمسة وعشرون عاماً قبل أن توافق الحكومة المصرية على تشكيل تلك الأجهزة التنظيمية قانونياً. آنذاك، كانت تقريباً كافة الدعومات المباشرة من الوكالة الأمريكية للتنمية الدولية لهيئات المرافق قد إنتهت. هذا الخطأ الغير مقصود ساهم فى عدم فاعلية أجزاء كثيرة غير متصلة بالبرنامج والذى تم تحقيقه خلال الثلاثون عاماً الماضية. **الدرس: الإصلاحات التنظيمية والتشغيلية لمن الأهمية بمكان على صعيد إنجاح المشاريع الخاصة بالبنية التحتية، مثلها مثل التوسع وإعادة التأهيل.**

فإذا كانت حالة البنية التحتية - قطاع المياه والصرف الصحي - الحالية شهادة بأن تطوير البنية التحتية يستلزم التدخل مع التطوير المؤسسى لأن يصبح فعالاً وبشكل كامل بما من شأنه أن يزيد من قيمة الشيء، فإنه لحقيقى أن التطوير المؤسسى يستغرق وقت أيضاً فعادة تتطلب برامج الدعم المؤسسى سنوات متواصلة من العمل والجهد. فإذا إنتهت المساندة قبل إعادة التشكيل المؤسسى بشكل كامل، فسيزيد ذلك من مخاطر الإرتداد لظروف ما قبل المساندة. وربما أن أهم درس تعلمناه مفاده أن إحرار التقدم على صعيد التطوير المؤسسى يمثل نسبة مئوية ضئيلة لدى الأفراد العاملين بالمرفق. لذا فإن برنامج التقوية المؤسسية وإعادة هيكلة القطاع يجب أن يتم تصميمها بيقظة من ناحية الوقت الكامل اللازم إلى أن يتم غرسها فى أذهانهم. **الدرس: أن الإصلاحات التشغيلية والمؤسسية تستغرق وقت وتتطلب مجهود متواصل، فإطالة الجداول الزمنية يمكن أن يساهم فى "ترسيخ" مفهوم الإصلاح.**

ويجب أن نلاحظ أن برنامج المساندة الخاص بالوكالة الأمريكية للتنمية الدولية تم البدء به وتنفيذه خلال الفترة المضطربة بالمنطقة. فمنطقة البرنامج كانت أساساً سياسية، وكانت الأهداف الرئيسية للولايات المتحدة تجاه الحكومة المصرية تتمثل فى النمو الإقتصادى الفورى ودعم الإستقرار. بغض النظر عن أن، أقصى نقد يمكن لبرنامج الوكالة الأمريكية للتنمية الدولية أن يوجهه لقطاع الطاقة المصرى هو التأخير فى إدخال برامج إعادة الهيكلة وأهداف إعادة تشكيل الصناعة إلى أنشطة المشروع. فعند تقديم هذه الأهداف، وعندما تم توفير رأس المال ليتم إستثماره فى تكوين البنية التحتية، كان ذلك مرهوناً بما يحدث من إنجازات، حيث وغالباً ما كانت الإنجازات غير محددة بشكل جيد. كما أن الإخفاق فى توجيه مصر بعيداً عن إستخدام قطاع الطاقة كأداة لسياسة إجتماعية وإقتصادية ووسيلة توفير الدعم المالى الغير كفؤ للصناعة والإستهلاك المنزلى قد ترك أثراً إقتصادياً سلبياً أضر بالإقتصاد وإستنزافه من ميزانية الدولة. فالإعانات المالية للطاقة يُعتقد أنها تمثل ما مقداره 15 بالمائة من ميزانية الدولة لعام 2007، أى أكثر من قيمة الإنفاقات على قطاعى التعليم والرعاية الصحية مجتمعان. **الدرس: تعديل إصلاح السياسات وأهداف إعادة الهيكلة الصناعية لا يمكن وببساطة تقديمها بشكل متأخر فى فترة البرنامج. فالمشاريع يجب أن تحدد وتتضح أهدافها وبشكل كاف من أجل التغلب على مصاعب العمل - بدلاً من تعزيزها - لأن التشويشات الإقتصادية كانت ناجمة عن سياسة ضعيفة.**

6/1 التوصيات:

التوصيات المستقبلية بالنسبة لقطاع المياه / الصرف الصحى بمصر هى كالتالى:

1- أن التوسع فى سعة المرافق الحالية وزيادة القدرات الخدمية لمرفق المياه والصرف الصحى للشعب المصرى بالكامل يجب أن يتواصل وأن يُصبح على رأس الأولويات بالنسبة لكل من حكومتى مصر والولايات المتحدة. لذا، فإننا نوصى بأن تستمر الوكالة الأمريكية للتنمية الدولية فى دعمها للقطاع. وعلى سبيل المثال، فالوكالة الأمريكية للتنمية الدولية تواصل تقديم بعض المساندة فيما يتعلق بمصافى خفض الرمال بالمناطق الريفية فى محافظات عديدة، ولكن الإحتياجات الأخرى من قطاع المياه لا تزال باقية. لذا، فإنه بإمكان كل من حكومة مصر والوكالة الأمريكية للتنمية الدولية أن يمدوا أجل المساندة الفنية اللازمة.

2- يجب القيام بعمل تقييمى للأولويات التى يجب أن تواصلها الوكالة الأمريكية للتنمية الدولية فيما يتعلق بمساندتها لمرفق المياه / الصرف الصحى، كما يجب القيام بعمل تقدير للتكلفة المحتملة لبرنامج الدعم. فعلى الرغم من أن الإصلاح المؤسسى ووقت التشغيل الإضافى سوف بل يجب أن يُعزى إليه العديد من هذه النتائج المتعلقة بالمساندة. إلا أنه سيكون من المفيد تقييم الإحتياجات وتحديد التكاليف لبرنامج إستكمال المساندة.

3- أيضاً، أن يتم دعم وتقوية المجهودات المبذولة الخاصة بالدعم، وسيكون من الأهمية بمكان بالنسبة للمرافق القائمة حالياً، وأن تتظافر المجهودات الجارية للوصول إلى الأداء الأمثل. وهاتان هما الخطوتان الهامتان بهذا الاتجاه: أن تقوم الشركة القابضة بالإشراف على مؤشرات الأداء (المالية، والتشغيلية، وكفاءة التدفق، وخدمة العملاء) وأن تكون أجهزة الإشراف متوافقة مع الأداء. بينما البرامج الأخرى التي تحتاج إلى الدعم هي: مراقبة الجودة، ونظم المعلومات، وأنظمة إدارة الصيانة. آخذين في الاعتبار أن كافة التدريبات، وإصدار الشهادات للفنيين والمديرين، والإختبارات المعملية، وأنظمة إدارة الصيانة التي تتم على مستوى المنشأة يجب أن تبدأ وتنتهي واضعاً في الاعتبار معدل أداء هذه المنشأة. فهذا النظام القاعدى للأداء لديه الإمكانيات لأن يتم تطبيقه عن طريق الشركة القابضة بوصفها الأداة لمراقبة مدى الإذعان وكأداة لمقارنة المرافق. كما أن القيادة المشتركة بالشركة القابضة والشركات الأخرى التابعة وقبل أن يتم استخدام مثل هذا النظام بفعالية، يجب أن يعثقوا فكرة الأداء الأمثل وخدمة العملاء كفكر لا حيدة عنه. مثل هذا التغيير سيستغرق بعض الوقت كي يصبح المبدأ الركائزى وإلى أن يثبت ويترسخ. ومن القاعدة إلى القمة، فإن كافة العاملين بالجهاز يجب أن يقتنعوا بأنهم متواجدون لخدمة المستهلك. فإذا ما تمت إدارة المرافق بفعالية وبكفاءة وبغرض حماية الإستثمارات العامة، فإن ذلك سيؤدى إلى قناعة المستهلك لأن يدفع قيمة مالية أكبر وذلك نظير حصوله على الخدمات.

التوصيات المستقبلية بالنسبة لقطاع الطاقة المصرى هي كالتالى:

1- بالنسبة للوكالة الأمريكية للتنمية الدولية والوكالات التنموية والمؤسسات المانحة الأخرى فإن أسلوب حوارهم المستقبلى مع الحكومة المصرية لتطوير قطاع الطاقة - وجهاً لوجه - يجب أن تركز على تقليص التشويش الإقتصادى الكائن بالقطاع. مع التركيز على خلق نظام سائد يكون أكثر قوة ولديه وضوح هدف ومستقل بذاته كجهاز لإدارة الطاقة، وللتقليل المباشر وغير المباشر للدعم الحكومى فى سياسة التعريفة والإمداد بالوقود، وعلى تقديم القطاع الخاص للتنافس لتشغيل منظومة (التوليد، والتوزيع) وتوفير وسائل الإنشاء والخدمات الإضافية الأخرى.

2- أما فيما يتعلق بالمشاركة المستقبلية فى قطاع الطاقة، فإننا نوصى بأن يتم تقييم ومتابعة الأولويات منذ البداية أى بمجرد أن يتم التشكيل، فالنظام ومؤسساته يصعب تحويلهم. هذا بالإضافة إلى أن الظرف الإشتراطى لتلقى المعونة يجب أن يتم إبلاغه للطرف الآخر بشكل أفضل. لأن الطرف الآخر (المتمثل فى البلد المضيف) إذا لم يدرك تماماً جدول أعمال الإصلاح وكونه شريك مشترك فى التنمية، فغالباً ما ينجم عن ذلك نقص فى الملكية ببرنامج إعادة الهيكلة والتي بدورها قد تؤدى إلى مقاومة سلبية وإلى إنتهاج منهاج معاكس.

3- فعلى الرغم من أن الوكالة الأمريكية للتنمية الدولية ليس لديها خطط أنية لتقديم منح رأسمالية إلى الحكومة المصرية بغرض إستثمارها فى هيكل البنية التحتية بقطاع الطاقة. إلا أن الوكالة الأمريكية للتنمية الدولية تحتفظ بأفضلية نسبية فى مجابهة توفير المساندة الفنية. لأن إعادة الهيكلة المؤسسية (إصلاح الصناعة فى مرحلة ما قبل الخصخصة، ورفع الكفاءة، وصناعة التبادل السلعى) والإصلاح التشريعى والتنظيمى (بناء القدرات بأجهزة التنظيم، وصياغة المسودة الخاصة بالإصلاحات التشريعية، وتصميم ومراقبة حركة السوق، والتبادل المهني) كلها تدخل ضمن إطار المساندة الفنية. وعلاوة على ذلك، فالمساندة الفنية يمكن تقديمها وذلك نظير تكلفة منخفضة. فإذا كانت مؤسسات التمويل الدولية مثل: البنك الدولى أو بنك التنمية الإفريقى سيمنحون سلفة إئتمانية للشركة القابضة لكهرباء مصر من أجل برنامجها التوسعى. فإن المتطلبات الإشتراطية لإحداث إصلاح إضافى من شأنها خلق طلب مستقبلى واعد بالنسبة للمساندة الفنية.

التوصيات المستقبلية بالنسبة لقطاع الإتصالات فى مصر هي كالتالى:

1- نوصى باستمرار المساندة، لأن أسئلة الصناعة تصبح أكثر تعقيداً من أى وقت مضى وجديرة بالاعتبار، وذلك فى إطار الإملاءات الحالية الضخمة للموردين الأمريكيين مثلما هو الحال بالنسبة للإقتصاد والعملاء المصريين. وبالإضافة إلى ذلك، فهناك سؤال إستراتيجى يجب أخذه فى الاعتبار عن: أية مؤسسة حكومية أمريكية لديها الموارد والرؤى للسوق لتفعيل استثمار الاتصالات الهائلة نيابة عن الجيل التالى من الموردين الأمريكيين والمنتهجين الإقليميين. فقد دأبت الوكالة الأمريكية للتنمية الدولية على تطوير علاقات العمل الجيدة مع الحكومة المصرية. فكيف يتم تفعيل ذلك والإرتقاء به لخدمة المصالح التجارية الأمريكية بالمنطقة؟

2- أهداف المشروع، ومجالات العمل، والجدول الزمني، والتسليمات ستستفيد من التطوير المشترك فيما بين الوكالة الأمريكية للتنمية الدولية ومنظمة العمل. فالإدارة العليا وصانعو القرار فى كل من الوكالة الأمريكية للتنمية الدولية ومنظمة العمل يجب أن يشتركوا فى تصميم وإنجاز المشروع.

3- وعند بداية المشروع، يجب على إستشاريوا الوكالة الأمريكية للتنمية الدولية أن يعملوا جنباً إلى جنب مع منظمة العمل لكى يقومان بتحديد المنظمات والهيئات و / أو أنشطة المشروع. حيث يجب على إستشارى الوكالة الأمريكية للتنمية الدولية أن يعمل مع منظمة العمل لتصبح تلك المنظمات الغير تابعة للعمل مشتركة فى وضع الجدول الزمني ومهمة التخطيط الخاصة بالمشروع، وأن يعمل على توفير الأساليب العصرية المتنامية. إن هذه النوعية من مشاريع الاتصالات المتنامية من شأنها إحداث فائدة أكثر فاعلية من جراء التشغيل، وتوظيف موارد بشرية، والمساعدة فى تدريس أسباب إبطاءات المشروع.

4- وعلى الرغم من أن الوكالة الأمريكية للتنمية الدولية قد يكون لديها الطموح فى تحديد أهدافها وعدم تجاوز المواعيد الأخيرة لإنجاز العمل، فإن التقييم الواقعى للموارد البشرية المتاحة فى الأسواق الناشئة ومجال التطوير سيؤدى بدوره إلى إتخاذ جداول زمنية أكثر واقعية والتي يمكن تحقيقها من خلال كافة الأطراف المشتركة.

وبالتفكير فى المستقبل فإن كل من قطاعى الاتصالات والطاقة - حالياً - يعتبران قطاعان جاذبان لإستثمارات القطاع الخاص وكلاهما ينتظره مستقبل إستثمارى باهر وواعد. أما فيما يتعلق بالمساندة المالية والفنية فى إطار الدعم المؤسسى والحكم المشترك وإعادة تشكيل العمالة، فجميعها لا تزال كافة القطاعات تفتقر إليها. كما أن بعض المجالات بمرافق المياه والصرف الصحى تحتاج الآن إلى إستثمارات حاسمة، وذلك حتى يمكنها أن تتفادى مستقبلاً تكاليف الإحلال الباهظة. إذاً، فالرؤى المستقبلية لديها كلا الخيارات والتخوفات بالنسبة لهذه القطاعات فى مصر.

7/1 الرؤى المستقبلية

أن قطاع المياه والصرف الصحى المصرى لديه الآن المقومات الأساسية للقيام بالإصلاحات التنظيمية والهيكلية والسياسية والتي ستعيد تشكيله ووضعه. كما أن أنشطة الوكالة الأمريكية للتنمية الدولية لتعزيز الأنشطة المؤسسية قد أحرز تقدماً ملموساً تجاه القدرة المالية فيما بين الشركات التابعة، وخاصة خلال العشر سنوات الماضية. وكان التقدم متمثلاً فى الأمران التالىين: زيادة العائد الناتج من التعريف، والإستفادة من تطبيق التخطيط المالى ونظم الإدارة.

وأن التحسن الكبير فى تحسين وتوسيع البنية التحتية بمرافق المياه والصرف الصحى قد تم تصميمه وإنشاؤه وتشغيله. فالتقنيات المستخدمة كانت ملائمة مثلما هو الحال فى الإنشاء، فمعظم الحالات تعتبر مثالية. كما أن كيان البنية التحتية السليم سوف يستمر بالخدمة لحماية ما دون الحد الأقصى من التشغيل والصيانة.

كما وأن إنشاء الشركة القابضة وجهاز تنظيم المرفق ليقدمان أمل كبير بالنسبة لقطاع المياه والصرف الصحي. فالفرصة الآن سانحة لإجراء إصلاح تدريجي كامل بالمرافق الإدارية - بدءاً من الإدارة الوسطى فاعلياً - ليعكسوا نشاطهم على الأداء وخدمة العملاء. ومع ذلك، توجد سحابة قاتمة تؤثر على تلك الإنجازات، أحدها يتمثل في المخاوف من الحفاظ على هذه الاستثمارات الضخمة، هذا فيما يتعلق بكل من الوضع المالي والبقاء لتلك المنافع.

ومن المؤكد أن الحفاظ على منشآت البنية الأساسية بقطاع المياه والصرف الصحي يتدهور ببطء. فقد تم وضع إسترداد النفقات تحت المجهر لأكثر من عشرة سنوات وذلك بعد تجاهل حالة منشآت المرافق. وعلاوة على ذلك، فإن هناك جزء أساسي من إحتياجات الإمداد بالمياه والصرف الصحي للمناطق الريفية لم يتم على إمتداد أرض مصر. كما وأن هناك شريحة هامة من السكان تقتصر إلى توسعة وتحسين الخدمات التي يقدمها مرفق المياه والصرف الصحي. وتوجد دلالات على أن حكومة جمهورية مصر العربية تعزو تلك الإحتياجات إلى خطتها الجديدة وذلك حتى تتمكن من تخصيص ما قيمته حوالى 20 مليار جنيهاً مصرياً للقيام بتطوير أنظمة المياه والصرف الصحي بالنسبة للمناطق الريفية الفقيرة بإمتداد نهر النيل.

فالشركة القابضة لكهرباء مصر تستنتج أن ذروة الأعمال بحلول عام 2012 ستصل إلى 8 و 23 جيجاوات. مما سيتطلب إضافة قدرة بسعة تبلغ سبعة جيجاوات. لذا فإن خطة الشركة القابضة لكهرباء مصر للقيام بالتوسعة الجديدة تستلزم إنشاء هذا الحمل الكبير ليتحمل السعة الجديدة. وبالفعل تم تأمين الدعم المادى ولو جزئياً بالنسبة لمعظم الإنشاءات المزمع إقامتها. لذا فإن الفرص تعتبر كبيرة بالنسبة لمصنعوا المعدات الأجانب وأيضاً بالنسبة لشركات الإنشاء المتخصصة فى مصر.

فعلى سبيل المثال، وبالنسبة لتقنية الدورة المدمجة فإن الشركات الأمريكية مثل "جينيرال إلكتريك" لديها عروض إنتاج تنافسية. ومثل هذه الفرص يجب ألا يتم إغفالها.

فالقيادات بقطاع الكهرباء المصرى يتطلعون إلى آفاق التوسع فى توصيل خدمات الشبكة إلى خارج حدود مصر، وتزامن ذلك مع الترابط الحالى المعروف بنظام الـ (UCTE) كجزء من دائرة تبادل الطاقة بحوض البحر الأبيض المتوسط. كما وأن التوسع فى الترابط الإقليمى مع دول حوض البحر الأبيض المتوسط وإكتشافات الغاز الطبيعى الهامة بالبحر والبر يجب أن تدعم فرص توسع الإستثمار بمصر وذلك فيما يتعلق بسعة الطاقة.

كما وأن نمو قطاع الاتصالات بالهواتف المحمولة فى مصر يعتبر بمثابة إنفجار. فبمجرد حدوث إرتفاع فى نسبة الدخل فإن الطلب على خدمات الهواتف المحمولة والحصول على البيانات المركزة مثل الفيديو، والخدمات التعليمية، وخدمات التوصيل المركزة الأخرى فى هذا المجال سيستتبعها حدوث ثراء مادى لفئة ما من الشعب. فالمستهلكون بالتبعية سيحتاجون إلى أن يتم توصيلهم لاسلكياً ومرئياً أينما يكونون، وأينما يعملون، وأينما يلعبون، وأينما يتعلمون وذلك عبر خدمات الاتصالات المحمولة لديهم. وهناك أمر هام يواجه مصر متمثلاً فى قدرتها على الحفاظ على البنية التحتية لجهاز الاتصالات وتكنولوجيا المعلومات والشبكات والحاسب الآلى والأقمار الصناعية وأنظمة البث المعروفة بالـ (ICT) وجهاز حماية البيئة وذلك نظراً لمدى حساسيتهم فى إستيعاب الطلب على الخدمات التكنولوجية. إن الجيل الجديد من أعمال الشبكة المعروف بالـ (NGN) قد تم تصميمهم حسب الإحتياجات الحديثة من التكنولوجيا المتطورة.

وقد ترغب الوكالة الأمريكية للتنمية الدولية فى أن تقوم بدعم قطاع الاتصالات المتمثل فى جهاز الدعم والمتعاملون بهذه الصناعة. كما أن أنشطة الإستثمار والتعاون ودعم التعليم يجب أن يمتد إليها العاملون بهذه الصناعة، وكذا الحال فيما يتعلق بالصيحة الجديدة من الخدمات، كما أن البحث وأنشطة التنمية قد تساهم فى وضع هذه الصناعة كجزء من النمو المستقبلى. وأن زيادة التنافس فى الحصول على خدمات الاتصالات المتطورة الأرضية أو المحمولة ستنتطلب إستصدار قوانين وبصيرة نافذة وإستراتيجية فى جدول زمنى. مما قد يساهم فى الحفاظ على مجال مستوى التعامل بالنسبة للمتنافسين فى هذا المضمار. والتأكيد على أن المستهلكون سيتلقون خدمات إتصالات ذات جودة عالية دونما إنقطاع يمكن تقديمها لهم. إن مثل هذا الدعم سيساعد

العامل بهذا القطاع الحيوى على أن يقدم خدماته ليس فقط ككونه حكم مؤسسى عند حدوث المنازعات، ولكنه سيقوم أيضاً بلعب دور القيادة الرشيدة وتقديم مستويات التكنولوجيا المتقدمة ليضمن فى المستقبل نمو شبكة إتصالات متوازنة فى مصر.

APPENDIX II: LIST OF CONTACTS AND SITE VISITS

20 officials were interviewed and 6 sites visited in the water and wastewater sector

10 officials interviewed and 3 sites visited in the power sector

10 officials interviewed and 3 sites visited in the telecommunications sector

Water and Wastewater Sector

Name/Organization	Date
David Osgood, COP, CH2MHill, Water and Wastewater Sector Policy Reform Project	August 30, 2006
Prof. Dr. Abdel Kawi Khalifa, Chairman, Holding Company for Water and Wastewater	August 30, 2006
Eng. Amr Ahmed Wahsh, Executive Director, Regulatory Agency for Water & Wastewater and Consumer Protection	August 31, 2006
Eng. Mohamed El Alfy, Assistant Minister, Ministry of Housing, Utilities and Urban Development	August 31, 2006
Eng. Farid Sewelam, Consultant to the Alexandria Wastewater Company	September 3, 2006
Eng. Mohamed Baghat, Chairman, Alexandria Wastewater Company	September 3, 2006
Dr. Helaly Helaly, General Manager, Industrial Sludge & Wastewater Reuse Alexandria Wastewater Company	September 3, 2006
Eng. Nadia Abdou, Chairperson, Alexandria Water Company	September 3, 2006
Eng. Moenes Youannis, SpO 18 Team Member and CTO of 263-0270 USAID/Egypt	September 4, 2006
Eng. Mohamed Abdel Rahman, Chairman; Eng. Mohamed Hanafy; Eng. Abdel Kadr Hamdy Greater Cairo Wastewater Company	September 5, 2006
Eng. Hassan Khalid Fadel, Chairman, Cairo & Alexandria Potable Water and Wastewater Projects (CWPWO)	September 5, 2006
Eng. Mamdouh Raslan, Deputy Chairman, Financial and Administrative Affairs, Holding Company for Water and Wastewater	September 5, 2006
Eng. Mahmoud Abu Khalaf, Head of Projects Sector; Eng. Adel Ahmed Ramadan, Head of Technical Sector, Cairo Water Company	September 6, 2006
Eng. Mohamed Abdel Zaher, Chairman, Cairo Water Company	September 6, 2006
Facility and Contact Person	Date
West Treatment Plant and Mechanical Dewatering Facility, Alexandria Wastewater Company; Eng. Ahmed Torky, Manager	September 2, 2006
East Treatment Plant; Central Laboratory; Training Center, Alexandria Wastewater Company; Dr. Nariman Soheil, General Manager	September 2, 2006
Zenein Wastewater Treatment Plant; Training Center; Laboratory, Greater Cairo Wastewater Company; Eng. Abdel Mohsen, Manager	September 5, 2006

Power Sector

Name/Organization	Date
Eng. Fawzia Abou Neima, EEHC Board Member Egyptian Electricity Holding Company, Ministry of Electricity and Energy (For Production, Transmission & Distribution Companies Affairs)	August 30 2006

Name/Organization	Date
Eng. Hamed Emara Kassem, First Undersecretary of State Ministry of Electricity & Energy	August 30 2006
Dr. Samer ElHaw, Executive Director (former) Energy Conservation and Environment Project	September 10 2006
Vince Condrath, General Manger, Worley-Parsons Egypt, Power Sector Support Group Alberto Orengo, Worley-Parsons Egypt, Power Sector Support Group	September 11 2006
Dr. Mohamed Awad, Chairman, Egypt Electricity Holding Company	September 16 2006
Eng. Hassan Mahmoud, Director, National Energy Control Center	September 16 2006
Facility and Contact Person	Date
Cairo North Power Station, Aly Hassan Ibrahim, Head Sector Engineer Cairo Generation Company, Eng. Ahmed Emam	September 16 2006
Electric Utility & Consumer Protection Agency Eng. Hisham Mohamed Saleh, Licensing and Tariff Affairs Eng. El Sayed Mansour, Information Systems	September 18 2006

Telecommunications Sector

Name/Organization	Date
Engineer Dawlat Abdel Hamid El Badawy, Vice Chairman for Project Planning, Telecom Egypt (Ramsis)	September 4, 2006
Eng/Osman Hassan Osman, General Manager for Follow Up, Telecom Egypt	September 4, 2006
Tarek Ismail, Sector Sales Manager, SAKHR Software	September 4, 2006
Mark Vander Zwiap, Chief of Party/USAID Contractor, Telecommunications Sector Support Program (TSSP), General Dynamics	September 5, 2006
Marcelle Ishak Bishai, Sector Chief of Switching Planning, Telecom Egypt	September 10, 2006
Engineer Nawal Mostafa, Amer/S.C. Switching O&M for Greater Cairo, Sinai & Canal Area, Telecom Egypt	September 10, 2006
Herbert A. Feldt. P.E., Senior Engineer/PSD/WW, Project Team Leader, USAID	September 2006
Facility and Contact Person	Date
5ESS, Al Kaala, Adel Hamed, Director	September 10, 2006
Network Operations Center (NOC), Telecom Egypt Adel Hosny Mahdy, Director	September 10, 2006
Egypt Smart Village, Taha Shindy, MCIT	September 11, 2006

APPENDIX III: WORK PROGRAM

This evaluation was carried out by a team of experts; five from Emerging Markets Group (EMG), and five from EMG's Egyptian partner, Progress 2. The EMG team spent three weeks in Egypt (from August 27 through September 18, 2006) with the Progress 2 team and collected base data through documentation review, as well as several site visits and interviews with key stakeholders.

Evaluation Team Members:

Team Leader: Tejinder Minhas

Water Sector Team: George Kinias and Mahmoud Morsi

Power Sector Team: Michael Trainor and Mohamed El Sobki

Telecommunications Sector Team: Di Landau, Taha Shindy, and Hatem Younis

Project Managers: Jonathan Ward (Home Office) and Mohsen Alashmoni (Local Office)

WEEK 1: (August 22-August 26)

Meeting of EMG team (Washington, DC) with USAID officials

Identify and source reference documents

Local Experts (Progress 2): source and catalog documents and references and prepare sector overviews.

WEEK 2: (August 27- September 01)

EMG team arrives in Cairo

Introductory meeting with USAID officials

Document Review

Identify potential interviews and site visits

WEEK 3: (September 02- September 08)

Begin project interviews and site visits

Continue document review

Submit project work program

Submit tentative List of Interviews and Site Visits

WEEK 4: (September 09-September 15)

Continue document review, interviews and site visits

Workshop Presentation for USAID (September 14)

WEEK 5: (September 16-September 22)

Feed-back from USAID

Continue information gathering

EMG team departs Egypt (September 18-19)

Preparation of Draft Evaluation Report

WEEK 6: (September 24-September 29)

Draft Evaluation Report preparation

Submitted Draft Evaluation Report (outline)

WEEKS 7 through 10: (October 02 through October 27)

Received USAID feed-back

Submitted Draft Evaluation Report

APPENDIX IV: BIBLIOGRAPHY

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Power Sector

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Summary data (specially prepared) on:

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- Performance Indicators 2001-2006 (physical)
- Performance Indicators 2001-2006 (financial)
- Performance Indicators 1999-2006 (financial and institutional)
- EEHC Balance Sheet, Cash-Flow, Income Statements FY 2004/2005
- Annual investments 2001-2006 (generation, transmission, distribution)
- Renewable investment plan 2007-2012
- Foreign donor assistance in Power Sector - Summary 1981-2006
- EEHC data on USAID-sponsored technical assistance to sector 1976-1988
- EEHC data on USAID-sponsored PSS-I
- EEHC data on USAID-sponsored PSS-II
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 - Egypt Post
 - IT Clubs
 - Egypt's Smart Villages
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APPENDIX V: WATER/WASTEWATER SECTOR - PROJECT BY PROJECT ANALYSIS

Greater Cairo Water Company

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0038	Cairo Water I	1977-1989	97,265	To rehabilitate and expand the Rod El Faraq Water Treatment Plant, and install 40,000 house-service connections with means of disposing of the generated wastewater.
263-0193	Cairo Water II	1988-1998	144,840	To rehabilitate and expand water transmission and distribution facilities in Central Cairo and strengthen the institutional capabilities of the General Organization for Greater Cairo Water Supply.

Review of Problem

The Cairo water system was founded in 1865 by a private company. The system expanded during the French and British colonial periods and was nationalized in 1957. Prior to USAID's infrastructure interventions, the system consisted of twelve filtration plants treating 2.8 million m³ of water per day and distributing it to eight service areas by 3200 km of pipelines. It was designed, however, to handle less than one-half of the demand of the City, and despite adequate levels of water production, water shortages existed in many areas of the city. The problem of a shortfall in water production was exacerbated by poor maintenance of the old distribution system that caused frequent water failures and excessive losses from leakage. In addition to the basic infrastructure inadequacies, the utility organization, the General Organization for Greater Cairo Water Supply (GOGCWS), faced serious institutional weaknesses. Its organizational structure and operational systems needed upgrading to meet the demands of the growing population in Greater Cairo.

Health

The epidemiological linkages between the diseases in a community and the level of sanitation prevalent in the area have been well documented. Numerous reports, commissioned by USAID, World Bank, WHO and other UN agencies, have discussed the worldwide impacts of inadequate or impure water supplies and unsanitary sewage disposal practices on public health.¹⁰²

In Egypt, extensive research into waterborne diseases has been conducted by the Naval Medical Research Unit and the Ministry of Health¹⁰³. These studies indicate that diseases, such as cholera and typhoid fever, are communicated to the general Egyptian population through contact with improperly treated water or by unsanitary disposal of sewage.

Water-related diseases such as infectious hepatitis, typhoid, paratyphoid, as well as dysentery were widespread and increasing throughout Egypt.¹⁰⁴ The cause and effect relationship between inadequate

102 Water and Wastewater Sector Assessment, May 1983, USAID; Water and Wastewater Sector Study, January 1993, The World Bank; and Project Paper, Cairo Sewerage II Project, Sept. 1984

103 Cairo Water and Wastewater Economic Benefit Assessment, April 1996

104 Water and Wastewater Sector Assessment, May 1983, USAID

water supply and wastewater treatment and public health problems could not be clearly demonstrated in Egypt on the basis of increasing evidence of diseases reported. Drawing on evidence documenting the direct relationship between poor sanitary conditions and waterborne diseases, it is safe to assume that public health in Egypt was severely affected by deplorable water and wastewater conditions.

Economic and Social Considerations

The Nile River divides greater Cairo and its water system into two major subsystems. The largest subsystem is on the east bank of the Nile and serves the urban population within the governorates of Cairo and Kalyoubia. The second subsystem is on the west bank of the Nile and serves the Giza governorate. The population characteristics as well as the water connection rates within greater Cairo and the three governorates as of the 1976 census were as follows:¹⁰⁵

- The 1976 population was approximately eight million.
- Thirty six percent of buildings in the greater Cairo were not connected to the water network, with the Giza governorate having the worse connection rate - 47 percent without a connection.
- Almost three million people within greater Cairo may have been without a connection to the water network in 1976.
- The average household size was 4.4 persons.

Households without an in-home connection to the water network obtained water from a network connection outside the home, from shallow wells, or from canals. Public taps were provided as part of the network design. A small fee was sometimes charged at a public tap. These taps were typically very crowded and that meant time waiting in queues and muddy conditions from spilled water. Shallow wells were typically available on the urban fringes. Water from these wells had an unpleasant taste, thus, limiting its uses which did not include cooking. Agricultural canals were available in outlying and newly developed areas, however, they often became the repositories for both solid and liquid wastes. Water from both taps and wells was transported from the source to the homes, with female household members often bearing the primary responsibility for these physically and psychologically demanding chores. On average, women carried one to two containers to the source, each weighing more than 20 kg, for twenty minutes. Typically, several trips to the water source were necessary each day. This meant that women may have spent more than two hours per day getting water and as much as seventy minutes per day carrying a container weighing more than 20 kilograms.¹⁰⁶

Facilities and Level of Service¹⁰⁷

Citywide, less than ten percent of the pipes were of adequate diameter; furthermore, sixty percent were installed before 1971, and twelve percent before 1948. The forty-year-old mains had a history of severe leakage and rupture, and even newer steel pipelines suffered severe corrosion due to stray electrical current from the tramways.¹⁰⁸

The poor physical condition of the transmission mains and distribution lines necessitated operating the system at pressure below the required levels to minimize rupture and leakage. Consequently, the

105 Water and Wastewater Sector Assessment, May 1983, USAID

106 Cairo Water and Wastewater Economic Benefit Assessment, April 1996

107 Cairo Water and Wastewater Economic Benefit Assessment, April 1996; Water and Wastewater Sector Assessment, May 1983, USAID

108 USAID Project Paper, Cairo Water

treatment plant discharge was capped at seventy-five percent of its design pressure, and during peak demand periods, actual operating pressures fell to less than one-third of design pressure.¹⁰⁹

The pressure and interruption problems presented by the deterioration of the transmission and distribution system were exacerbated by the inadequacy of the water reservoirs. Plant reservoirs commonly held less than two hours' production at average rates. This led to loss of pressure during hours of peak demand and insufficient water for firefighting purposes. Low water pressure also created conflicts between neighbors in a building. It was common for pressure to be so low that opening one household's tap would mean no service to another household. Households also stored water during off peak hours. Storage containers ranged from plastic jerry-cans and bathtubs to rooftop tanks. These network conditions resulted in water being available at inconvenient times and at reduced quality, as water stored in open containers was subject to various forms of contamination from birds, mice and other disease-carrying vermin.

Also, leakage and waste surveys showed that a large percentage of all water produced was not beneficially consumed. It either leaked from the distribution system or was wasted by users. Surveys had shown that the total wastage was approximately 50 percent of water produced. To the average consumer in the central Cairo service area, the result of the inadequacy of the distribution system was insufficient end-of-pipe pressure and frequent interruption of service.

Institutional Capacity

These institutional weaknesses of the Cairo water utility exacerbated the inadequacies of the infrastructure, adversely impacted the quality of water produced and delivered, and threatened the sustainability of service. Specific institutional weaknesses identified by the USAID Project Paper for Cairo Water¹¹⁰ were:

- Inadequate revenue-generation capability;
- Antiquated organizational and salary structure;
- Under-trained cadre of workers;
- Absence of effective system-wide preventative maintenance; and
- Insufficient exposure to well-managed, like-sized utilities.

These institutional weaknesses imperiled the substantial capital investments made by USAID under the CWS I Project. In addition, from the consumer's perspective, it led to increasingly severe problems of water availability and quality to more than three million residents in the greater Cairo service area.

Assessment of Problem Resolution

The imbalance between the network capacity and the needs of the Cairo residents led to extensive discussions between the GOE and international funding agencies beginning in the late 1970s. The first substantive outcome was a system-wide analysis and master plan proposal for network investments. The plan identified existing engineering and institutional deficiencies. It proposed significant capital improvements to allow the network to meet water needs in Cairo. The plan served as the technical foundation for negotiations between the GOE and individual funding agencies.

USAID responded with the authorization of the Cairo Water Supply I and II projects. The Cairo Water Supply I Project (263-0038) would begin addressing Cairo's water supply problems by rehabilitating and expanding the capacity of Cairo's major water filtration plant at Rod El Farag. The existing plant had a

109 Ibid.

110 Ibid.

design capacity of 300,000 cmd. The project was designed to add sufficient facilities to increase capacity to 750,000 cmd—peak capacity of 850,000 cmd. These improvements were operational in 1987.

The central zone of Cairo requires 63 meters of pressure to provide regular service to users. Before CW I, operating pressures were routinely 21 meters or less during peak demand periods. With the additional capacity provided by CW I, water pressure within the Rod El Farag service area was maintained at about 48 meters. Further increases were not possible due to the deteriorated condition of the water transmission network. Without improvements in the distribution network, additional pressure presented too great a risk of network failures and loss of water through broken lines. With this limitation, the treatment plant operated at an average output of 650,000 cmd, or 85 percent of its post-investment rated capacity of 750,000 cmd.

The second phase of USAID investments was Cairo Water II (CW II), which improved the distribution network, increased storage capacity, and supported water services in the Rod El Farag service area. Cairo Water Supply II allowed the newly increased capacity of Rod El Farag to be fully operational by rehabilitating and/or replacing old distribution lines so that water could be delivered to approximately 2 million residents and 3 million workers. In addition, this project comprehensively upgraded the institutional capacity of the water authority to increase its efficiency, operation and maintenance capability, and revenue collection and accounting abilities.

The assessment that follows has focused on the problems identified in USAID's Project Paper, as well as the goals and expected outcomes presented in the Project Paper, Grant Agreement (and its amendments), and the several contracts issued by USAID. A summary of the problem resolution follows.

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries' needs:

To adequately serve the needs of its customers, a water utility must produce and distribute a sufficient quantity of safe potable water. The issue of production was addressed by the Cairo Water Supply I Project (USAID Project No. 263-0038), which rehabilitated and expanded the Rod El Farag treatment plant, responsible for approximately thirty percent of the water produced and serving central Cairo. The poor condition of the water-distribution infrastructure, however, prevented the plant from being operated at full capacity, and the system lacked the storage capacity to make good the shortfalls during times of peak demand. To alleviate this problem, the project provided pipelines to transmit about 200,000 m³/day of potable water from the El-Fostat water treatment plant south of Cairo, to the central Rod El-Farag water distribution system. The program also constructed four reservoirs, with a capacity of 30,000 m³ each, to store water during the low demand period and discharge water into the system at peak demand. Finally, 28 km of distribution pipelines were constructed in Shoubra, Sharabia, and Mansheyet Nasr.

The result of this infrastructure development work is that approximately three million residents in central Cairo and the residents of Shoubra, Sharabia, and Mansheyet Nasr now have access to water of proper pressure and significantly-increased availability.

Sub-criterion 1.a is, therefore, satisfactorily met.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

The planning, design and construction of CW I and CW II are a good example of proper resolution of an infrastructure problem. The assessment of the water supply problem in Cairo and the priorities given to its resolution were appropriate and conducted within international norms and standards. The decision to increase the capacity of treatment facilities first and thus increase the availability of water to million of

residents who were depending on public taps and wells as their supply of water was both technically and socially sound.

Overall, the infrastructure development component of the project was a successful program and one worth emulating. American E/A consulting firms using the highest engineering standards designed the system, and its construction quality and practices were exemplary. A key reason for this success was that the roles of the Owner, Engineer, and Contractor were clearly understood and respected by all parties. Additionally, there was strict adherence to the contract documents and FIDIC guidelines. Another reason for the uncommon success of the program was the flexibility demonstrated by GOGCWS and USAID in modifying the design documents based on actual conditions that might not have been envisioned in the early conceptual stages of the program.

The cooperation, support, and active participation of GOGCWS are noteworthy and merit special attention and recognition. GOGCWS did not merely administer a “USAID grant”. From the very beginning, it took “ownership” of the program, and this was reflected in the successful execution of the program and the several “value-added” items that materialized.

Sub-criterion 1.b is, therefore, satisfactorily met.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

There were three Grant amendments and design modifications that enhanced the construction and institutional components of the project. The major highlights and achievements of this sub-criterion of CWS II are:

- “Value Engineering” principles were successfully applied to the construction management program, resulting in substantial cost savings, which were reinvested in additional infrastructure components. Specifically, the Transmission Mains Contract was completed approximately \$6 million below the original tender price. As a result of these savings, GOGCWS added 5.4 km of new 1000 mm pipeline and 16 reinforced valve structures in the Ahmed Helmi extension.
- An Alternative Dispute Resolution approach (Claims Appeal Board) was successfully applied to resolve several major disputes during the construction program. All three contracts were closed without dispute and delays. Given the problems that other USAID-funded infrastructure projects faced in Egypt, this was a significant achievement.

Sub-criterion 1.c is, therefore, satisfactorily met.

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments

All elements of the Design, Construction Management, and Construction Contracts have been completed. The rehabilitation and expansion of the Rod El Farag Water Treatment Plant, and the installation of 40,000 house-service connections with means of disposing of the generated wastewater in CW I, have been completed.

The Infrastructure Development Component of CW II provided over 50 km of transmission and distribution pipelines, four 30,000 m³ reservoirs, and two pump stations, permitting almost a 50 percent increase in water pressure in central Cairo and decreasing service interruptions.

The Institutional Strengthening component has been completed. Considerable commodities procurement (about \$10 million) has been implemented. This procurement was part of the institutional strengthening program but outside of the contract as a host-country procurement, with the institutional contractor being a Procurement Services Agent (PSA). A training center at Embaba was provided. The development, and

most importantly, the operation of the training center has been one of the major achievements of the institutional program and a tribute to GOGCWS and the contractor.

The rehabilitation and furnishing of the Central Laboratory has been completed. In fact the design layout, equipment, and supplies provided for the Central Laboratory are exemplary and represent a state-of-the-art technology in chemical and biological capabilities. Another major achievement has been the sustainable operation of the Central Laboratory as a research and monitoring facility. It provides its services not only to the Greater Cairo Water Company facilities, but to several other GOE organizations and private enterprises. It is very well equipped, organized, and managed, and staffed with competent and dedicated staff. Like the training center, it is a place of “purposeful activity”, and it recovers a portion of its expenses by providing services to fee-paying, outside clients.

A Master Plan Update, a computerized inventory program, and training of GOGCWS staff in a variety of technical subjects have been successfully completed. A high-production Computerized Mapping and Inventory Center applying Geographic Information System (GIS) software was developed and placed in operation. This along with the central laboratory and the training center were some of the major achievements of the project.

Sub-Criterion 2.a is, therefore, satisfactorily met.

Sub-Criterion 2.b—Problem Resolution:

The problems related to the infrastructure deficiencies of the water system of the Greater Cairo, as addressed in the USAID Project Papers and Grant Agreements, have been successfully resolved as indicated in the conclusion of Sub-Criterion 1.a. by increasing the access of an estimated three million residents to water service of improved reliability, sustainability and quality

The problem resolution in the institutional component of the project, however, has met expectations with mixed results. The primary reasons for this were the existence of external barriers that were beyond the control of the institutional contractor and GOGCWS.¹¹¹

While there were important achievements made by the GOGCWS during the presence of the USAID contractor, key elements of the institutional capacity improvements became weak or inactive after the departure of the contractor. More details of this deficiency are presented in the Outputs and Sustainability sections that follow.

Sub-Criterion 2.b is, therefore, satisfactorily met in terms of the infrastructure problem resolution, but only marginally met in terms of the institutional deficiencies.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

A number of social, economic, and health benefits are produced by the expanded availability of potable water that are easy to identify but difficult to measure. One of the most obvious is the health benefits. Under its Water and Sanitation for Health (WASH) Project, USAID reviewed 144 studies that sought to quantify the relation between improved water sanitation and health morbidity. The report concluded:

In summary, broad, demonstrable health impacts affecting all age groups in most of the developing world can be expected from improvements in water supply and

111 This assessment of the problem resolution of the institutional issues is based both on the findings of the PACR and those from a recent evaluation conducted for the purpose of writing this report. Although this most recent assessment was not a comprehensive one, it provides useful update on the current status of institutional sustainability of the Cairo water company.

sanitation...improvements in one or more components of water supply and sanitation can substantially reduce rates of disease morbidity and severity for diarrhea.

Moreover, in Egypt, extensive research into the waterborne diseases has been conducted by the Naval Medical Research Unit and the Ministry of Health. These studies indicate that diseases, such as cholera and typhoid fever, are communicated to the general Egyptian population through contact with improperly treated water or by unsanitary disposal of sewage.

Water-related diseases such as infectious hepatitis, typhoid, paratyphoid, as well as dysentery were widespread and increasing throughout Egypt.¹¹² And although the direct cause and effect relationship between inadequate water supply and wastewater treatment and public health problems could not be clearly quantified in the service areas of CW I and CW II, improving the availability and quality of water to almost three million persons is certainly significant.

Sub-Criterion 3.a is, therefore, substantively met.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

Rod El Farag water treatment facility produces about 23 percent of Greater Cairo's potable water. The service area includes much of central Cairo, where many businesses, tourist hotels, and embassies are located. The increase in pressure caused by the plant, together with benefits from other project investments, such as the training and maintenance programs, have spillover benefits for the whole water supply and distribution system of the utility. Moreover, there were additional consumer benefits related to water quality and health benefits, and convenience associated with increased pressure and time savings, especially for the female beneficiaries.

There were, however, more direct economic benefits that have resulted from improved health that have been measured in other USAID projects in Egypt but were not done so for the CW I and CW II projects. Based on the other studies, one can argue that the same benefits have materialized in Cairo as well, albeit at different degrees. The three categories that economic benefits will accrue during the life of the project are: (a) health care expenditures saved; (b) averted wage losses due to illness; and (c) child deaths prevented.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

GOGCWS, with the assistance of the contractor, developed eighteen performance indicators. A Performance Management Office was established and Performance Management Reports were produced and made available to the empowered managers. Fourteen Performance Improvement Programs (PIPs) were developed. As a result of this effort, there were several, significant tangible improvements:

- The improvement of skills and knowledge of the “empowered managers” through the management development training program.
- The reduction of costs in chemical inputs in five pilot water treatment plants, accounting to savings of up to twenty-five percent.
- The establishment of the Customer Services Center at Helwan that improved collection rates and cash flow.

The Contractor accurately recognized that customer service is the “fundamental purpose of the utility” that should drive the rest of its functions and activities. GOGCWS planned to have twelve Customer Services Centers (CSC) that would be part of the PIP pilot programs. The implementation of these centers was addressed in the strategic action plan. A pilot CSC was established, however, in Helwan and it

112 Project Paper, Cairo Sewerage II Project, Sept. 1984

proved to be a tremendous success. More CSCs have been established with the more recent and advanced one operating in Nasser City.

Financial Viability: Although the utility failed to increase tariffs because of external political reasons, there were several internal achievements that improved the financial viability of the organization, mainly by reducing operating costs. The cost savings in the use of chemicals have been addressed previously. Also, the increase in the rate of collections at the Helwan CSC has been a very encouraging sign. Finally, the Contractor assisted GOGCWS in raising EGP 2.2 million through the sale of scrap metal. These were achievements that are significant to the sustainability of any utility organization, especially one that is facing tough obstacles in increasing its tariff revenue. What makes these achievements noteworthy is that they focused on controlling costs and, therefore, improving the financial viability of the organization without politically-sensitive tariff increases.

Effective System-wide Preventive Maintenance Program: The assessment of the resolution of this problem is difficult to make within the limitations of this evaluation. The utility has a system-wide preventive maintenance program, mostly manually operated, with the potential to become automated by means of increased training and completion of the computer networking. Although the effectiveness of such a system was difficult to measure, the maintenance practices could certainly be improved.

Sub-Criterion 3.c is, therefore, considered substantively met.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

The institutional development programs initiated by the contractor during the life of the project were essential to the sustainability of a utility organization and were substantively accomplished, as presented in Sub-Criterion 3.b. After the completion of the project, however, and the departure of the US contractor, key elements of these programs regressed or, at best, remained static. Two of these elements were the Performance Management Office (PMO) and the Customer Service Centers (CSC) - the bright stars of the institutional strengthening program. It was not until the major reorganization of the sector and the formation of the Holding Company for Water that these programs were revived. Additional Customer Services Centers with improved customer care features have been built and placed in operation - a much needed and long overdue service for the customers of the system. The PMO, although revived, it remains understaffed and under-equipped for a water utility serving almost seventeen million beneficiaries. Moreover, there are no formal mechanisms developed that link the performance deficiencies to training needs, and the training effectiveness to organizational performance improvements. The important thing is that the PMO is functioning again and is currently instrumental in the transitioning of the utility from a governmental organization to a company.

Another successful component of the institutional development program was the Computerized Mapping and Inventory Center. This also shows signs of aging and neglect. There is an urgent need to update and expand the capabilities of the Center - both in terms of equipment and staffing. Only 2-3 of the original staff remains and the computers and software are fast reaching obsolescence.

The PMO, the CSC, and the mapping and inventory center are three important elements of institutional capacity that are used here as key indicators to assess the institutional sustainability of the utility. It shows that the management has not internalized yet the significance of performance management and customer care tools. It merely goes along with external recommendations or directives until that external intervention ceases to be a priority, and then it returns to its usual mode - business as usual. This is a discouraging observation and it is hoped that this will gradually change under the management of the Holding Company, which has been set up to operate in a commercial, cost recovery manner.

Sub-Criterion 4.a is, therefore, likely achieved.

Sub-Criterion 4.b—Physical Facility Sustainability:

Although the two largest water utilities in Egypt, Cairo Water Company and Alexandria Water Company, do a better job overall in operating and maintaining their systems, they too are inflicted with the same systemic problems that are deeply rooted in the management practices of almost every public agency or company in Egypt, thus, making physical sustainability the Achilles' heel of the water and wastewater sector. Moreover, the growing demand for expansion of treatment and network facilities in areas recently included in the service area of the Greater Cairo Water Company along with the need for rehabilitation of the existing system will stress even more an already struggling organization. These conditions and the challenges they pose to the sustainability of the utility make us give the Cairo Water Company just a passing grade in this important category.

Sub-Criterion 4.b is, therefore, just likely achieved.

Sub-Criterion 4.c—Financial Sustainability:

Although there were cost reductions because of improved operational efficiencies, and revenue increases because of improved bill collection, the tariff increase for Cairo has been insufficient to meet the financial needs of the utility organization. Cairo is very probably the holder of the “lowest water tariff” award among the largest metropolitan areas in the world. The resistance to further tariff increases borders on irrationality. Collection rate, even though significantly improved recently, remains at about 90 percent and unaccounted for water is exceedingly high at almost 30 percent. Thus, insufficient revenue generation remains a central issue of institutional financial sustainability that will require bold interventions to be resolved.

The decision by the GOE to remove the capital improvements expenditure from the cost to operate is a positive one as a short-term solution which will help to address the challenges that population increase, urbanization, and increase in the service area of the Greater Cairo Water Company will bring. Also on the positive side, the Holding Company plans within the next two years to reduce the workforce and allow market forces to dictate rate increases.

The issue of insufficient revenue generation is a large dark cloud that hangs over the financial sustainability of the Cairo water and wastewater utilities. More than two decades of intense efforts by USAID and other donors have produced only moderate improvements. There are many voices in the GOE that advocate that water is a social and health benefit that should be provided to the public at no or very little cost. Given all these conditions we are not very optimistic about the prospects of financial independence in the two Cairo utilities.

Sub-Criterion 4.c is, therefore, not likely achieved.

Greater Cairo Water Company: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	3	3
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	3	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	3	
Effectiveness	Project accomplishments	4	3.5
	Problem resolution	3	
Outcomes	Impacts (positive or negative) on health and environment.	3	3

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
	Economic and social impact on beneficiaries	3	
	Impact on the financial and operational performance of the utility	3	
Sustainability	Institutional sustainability	3	2.67
	Physical facilities sustainability	3	
	Financial sustainability	2	
Overall			3.04

Rating Scale

Scale	Relevance, Effectiveness	Outcomes	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Greater Cairo Wastewater Company

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0091	Cairo Sewerage I	1978-1988	128,275	To rehabilitate and expand the wastewater collection system and design system expansion projects.
263-0173	Cairo Sewerage II	1984-1998	727,985	To improve, expand and develop sustainable wastewater collection, treatment and disposal facilities on the West Bank of Cairo, and ensure proper management of the system.

Review of Problem

Prior to 1980, the wastewater collection and treatment system of Greater Cairo had suffered from the effects of age, misuse, lack of maintenance, and design deficiencies. This resulted in surcharging of the sewers and interceptors, as well as pump stations, and treatment plant failures. Raw sewage flooded the streets and ground floor dwellings; and the drains receiving effluent wastewater from the treatment plants were septic for their entire length. These conditions created serious public health and environmental problems and significant barriers to prosperity and economic growth in general.

To alleviate this problem, the Government of Egypt (GOE) sought international aid. As a result, the international donor community was mobilized and a comprehensive and massive infrastructure development project, the Greater Cairo Wastewater Project, was initiated.

Health and Environment

Despite the fact that Cairo enjoyed one of the best water supplies in the Middle East, its environmental health and sanitation problems were among the worst. Specific waterborne diseases are usually the best indicators of the level of sanitation in the living environment. Health department statistics for 1974 showed a clear association between adequate wastewater management and the incidence of cholera. Shoubra El Khiema, one of the least sewered districts in Cairo, had a very high incidence rate of 538 per 100,000 which reflected the inadequacy of wastewater removal due to sewer blockage and insufficient flow capacities. The national average was 16.5 per 100,000 and the average for Cairo was twice the national average. In Egypt, 46 percent of the infant and child mortality was due to diarrhea. The incidence rate of typhoid and paratyphoid in Cairo was 99 per 100,000, almost three times of the national average. The health problems in Cairo related to the unsanitary conditions of the living environment were exacerbated by an overcrowded population. Cairo is one of the most densely populated major metropolitan areas in the world.¹¹³

While the gross inadequacies of the collection system posed a serious threat to the health and safety of the residents of Cairo, the deficiencies of the wastewater treatment facilities caused environmental damage of huge proportions. Other than a small amount of the wastewater received by the treatment plants that was used for irrigation, the remaining wastewater was discharged, practically untreated, into irrigation drains. The water in these drains was barely aerobic, had the appearance of raw sewage and smelled offensively, with large quantities of waste floating on the surface.

This practice of discharging poorly treated primary effluent to the main agricultural drains was a deliberate and desperate act by the GOE during the mid-1960s to relieve the increased wastewater flows removed from the city as capacity was not available in the existing treatment plants at Gabal El Asfar and Abu Rawash.

Economic and Social Considerations

Most upper and upper-middle class neighborhoods in Cairo were sufficiently, although erratically, served by the water and wastewater systems. The lower classes and the poor, however, often lived in areas which did not have access to household sewerage connections. In addition to the serious threats to public health posed by these conditions, they created significant barriers to prosperity and economic growth in general.

As part of a study commissioned by USAID in 1996¹¹⁴ to determine the benefits of the wastewater projects, residents of Cairo were asked to recall pre-project sewage conditions in their neighborhoods. These interviews provided some of the best descriptions of flooding conditions and the economic and social costs sewage flooding imposes on households.

Households most commonly complained of the local environmental conditions associated with sewage flooding. They spoke of foul odors, flies and mosquitoes, diseases, dirty streets, and the need to place stepping stones and planks in the streets to cross areas flooded by sewage. Mud and potholes from sewage impeded traffic. The dirt and mud also made difficult to keep children clean and healthy when they played outdoors. Residents attributed diseases such as eye infections, diarrheal fever, and rheumatism to contact with sewage in the environment. In addition, sewage may have polluted potable water sources.

113 Project Paper, Cairo Sewerage, September 1978 and Project Paper, Cairo Sewerage II Project, Sept. 1984

114 Cairo Water and Wastewater Economic Benefit Assessment, April 1996

Sewage overflows and flooding were not confined to the streets. Half of the residents interviewed said that their homes or businesses had been damaged by sewage. At times, flooding would force the residents of ground floors apartments to abandon their homes. Flooding also affected business activity. Half of the shop owners interviewed said they had closed their shops because of sewage flooding. Losses due to damaged merchandise were also a problem. Residents would also incur costs when they would attempt to clean overflowing sewers themselves.

In the areas of the city where there were no wastewater collection system, the situation was worse than in those with the overloaded sewers. Vault overflows were common. The overflows caused odors and streets that were routinely damp and puddled. The pump trucks removed wastewater from one area, but disposed of it in another. Residents paid relatively high fees for vault evacuation and waste disposal. Households were forced to live with daily inconveniences that included odors, flooded streets, interrupted travel and commerce, and soiling of buildings, clothes and children. Moreover, households probably experienced adverse health effects that had monetary and time costs. These costs included vault evacuation fees, cleaning and repair costs, replacement of damaged property and merchandise, lost sales, and the losses associated with ill health, disease and death.

Facilities and Level of Service

The first elements of the wastewater network were constructed in 1914. The original system consisted of a collection system and treatment plant designed to serve a population of one million. Rapid deterioration of the original collector required the construction of a second one and a pumping station in 1929. By this time, the Giza governorate on the Nile's west bank was growing and in need of sewerage services. In the late 1930s, a separate collection system, pumping station and treatment plant were constructed to serve a portion of the residents of Giza. The wastewater network, however, failed to keep pace with the rapid urban development. By the 1960s, the network was severely overloaded, especially on the east bank. This led to a period of rapid construction in the mid-1960s. By the mid-1970s, the wastewater collection and treatment system was only large enough to provide sewer connections for 45 percent of the buildings in greater Cairo - which meant that about four million people were without sewer service in 1976. Technical reports showed that the network was seriously inadequate for even this level of connection.

The existing facilities were completely inadequate to handle the volume of wastewater generated by Cairo's eight million residents. Sewage frequently flooded the streets from surcharged sewers and raw sewage canals or ditches traversed many parts of the City. Additionally, the collection and conveyance system had fallen into a bad state of disrepair and was impacting the environment of the entire city. Treatment facilities, where they existed, were grossly overloaded so that no meaningful treatment was provided for the approximately 1.2 million cubic meters per day of wastewater generated. Wastewater flows from the East Bank were discharged into the Belbase Drain and then to Lake Marsalla. Those from the West Bank were discharged to the Rosetta branch of the Nile, the water supply for the city of Alexandria. Finally, there were large areas of the city which were not sewered, or their inhabitants not connected to the system. The living conditions in these areas, usually the poorest and most heavily populated areas, were intolerable by any standard.

Improper operating practices of the collection system were resulting in the build-up in the collectors of large deposits of sand and silt. The capacity of the collectors was, thus, reduced from thirty to fifty percent of design capacity.

In 1980 about 2.0 million people in Cairo were not served by a central collection system. Large areas without sewers included Khalifa Kism in South Cairo, Embaba and Boulac el Dakrour in West Cairo and Shoubra el Kheima in North Cairo. In these areas wastewater was discharged into vaults (septic tanks) or trenches and then collected in most cases by private disposal services. Trenches were often discharging into open drains and, in some locations, night soil and sewage wastes were deposited into streets, manholes or irrigation canals. The balance of the population or 5.7 million was served by a central

collection system. The system was functional, but it was constantly surcharged and many areas were subject to almost continuous flooding. There was an urgent need for rehabilitation and expansion of the wastewater collection system.¹¹⁵

Institutional Capacity

The Cairo Sewerage Project was the largest capital project in Egypt funded by USAID and represents 26 percent of USAID's infrastructure investment in the Water and Wastewater Sector and 15 percent of all investment made in the three sectors. Moreover, it faced immense design and construction challenges as it aimed at resolving severe health and environmental problems in one of the most populous and densely populated cities in the world.

This type and magnitude of planning, design, and construction required an effective and efficient wastewater utility that would function as the owner of this huge capital investment. The institutional capacity of the wastewater utility of Greater Cairo was no better, however, than the condition of its physical structures. There were significant deficiencies in its management and operation and maintenance practices. Generally, the Cairo General Organization for Sanitary Drainage (CGOSD) suffered from the same problems that faced all public sector operations in Egypt. It was overstaffed in some areas, understaffed in others, and had low employee morale due primarily to low wages, unpleasant work environment, and poor public image. The organization was highly centralized with very little decision-making authority below the Chairman and Deputy Chairman.

Moreover, there was a need for a well managed, modern, and properly equipped and staffed organization, responsible for the execution of these projects. To that end, in 1981 the Organization for the Execution of the Greater Cairo Wastewater Project was created by a decree of the Ministry of Reconstruction and the State for Housing and Land Reclamation. This agency became known in the international donor community as the Cairo Wastewater Organization (CWO).

The responsibilities of CWO, in brief, were to prepare the necessary plans for the expansion and improvement of the wastewater collection and treatment systems for Greater Cairo and to implement the approved projects. To that end, CWO would prepare tender documents, tender, award, contract, hold tenders and negotiations (with foreign as well as local bidders), and supervise the execution of contracts.

Finally, the design, construction, and construction management capabilities of Egyptian engineering consulting, and construction companies, in the water and wastewater sector, were severely limited in the early eighties. Because of that, an indirect objective of the USAID infrastructure development program was to assist in the development and strengthening of the technical capabilities of such companies.

Assessment of Problem Resolution

The condition of the wastewater network in Cairo in the 1970s led to discussions between CGOSD and foreign aid donors. The discussions included both short term rehabilitation projects to prevent additional system failures as well as long-term investments to meet the needs of a growing city. An initial planning document was completed in 1977 that provided the foundation for a coordinated, multinational investment strategy aimed at rehabilitating and expanding Cairo's wastewater infrastructure. The USAID wastewater investments were to be coordinated by AMBRIC, a consortium of British and American contractors.

The first phase of USAID investments began in 1979 and was called Cairo Sewerage I (CSI). The USAID funding during CSI included planning, engineering design, personnel training, and capital investments. The capital investments were targeted at rehabilitating and expanding the wastewater transmission

115 Project Paper, Cairo Sewerage II Project, September 1984.

network and wastewater treatment capacity. These included rehabilitation of 53 pumping station and associated infrastructure and the rehabilitation of 39 ejector stations.

A second phase of USAID investments was initiated in 1984. These were called Cairo Sewerage II (CSII) and were focused on improving the wastewater system on the west bank of the Nile. CSII investments included projects to improve and expand wastewater conveyance and treatment infrastructure, projects to extend sewers into the developing areas without sewers, and training activities to improve the management of the system. These included the construction of 11 new pumping stations and rehabilitation of the Zenein wastewater treatment plant. CSII also funded projects in Giza aimed at providing sewer services to unsewered areas. The projects installed sewers and connected all buildings to the collection system, and constructed culverts to support the new household connections. The projects also covered open drains and canals.

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries’ needs:

The Cairo Sewerage Projects (I & II) were the USAID and GOE’s response to alleviating these conditions. Phase I of the infrastructure interventions focused on the rehabilitation and expansion of the existing wastewater collection system. These rehabilitations included repairs to most pump stations, including ejector, subsidiary and major stations. They also included the supply and installation of force mains and extensive renovations, including new sewers, in a number of areas where flooding is most severe.

While the rehabilitation components of the projects represented immediate improvements to the system, the system needed longer-term improvements to cope with increased flows resulting from population growth and to accommodate increased flows as a result of providing service to unsewered areas. Phase II was, thus, designed to improve, expand and assure proper management of the wastewater collection and treatment systems on Cairo’s West Bank. It included the rehabilitation of the Zenein and construction of Abu Rawash wastewater treatment plants, the construction of pump stations, an expanded collection system, the Abu Rawash effluent drain, and part of the desert sludge disposal facility.

These improvements significantly increased the access to adequate wastewater disposal of Cairo’s West Bank population and improved their health and environment. Overall, USAID’s interventions assured the completion of a whole system, from household connections to final treatment, adequate for both effluent and sludge disposal.

Sub-Criterion 1.a is, therefore, substantively met.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

The planning, design and construction of CSI and CSII are good examples of proper resolution to an infrastructure problem. The assessment of the wastewater collection, conveyance and treatment problems in Cairo and the priorities given to its resolution were appropriate and conducted within international norms and standards. The decision to rehabilitate and expand the wastewater collection and conveyance systems and provide relief from sewage flooding to millions of residents was both technically and socially sound. Moreover, the rehabilitation of the Zenein wastewater treatment facility was equally a sound decision for improving substantively the environmental conditions in greater Cairo, on the west bank of the Nile.

The CS II Project was much more than a design and construction project aimed at improving public health and the environment by expanding and improving the Greater Cairo wastewater system infrastructure. The Project pioneered engineering, construction, and construction management practices

in Egypt. It significantly contributed to developing an in-country expertise (individual skills and knowledge, and company expertise) in administering contracts, design, and construction. Especially in the construction management area, it greatly enhanced the understanding and application of International Federation of Consulting Engineers (FIDIC) and claims resolution practices, by means of technology transfer to the Egyptian wastewater private sector.

Sub-Criterion 1.b is, therefore, very satisfactorily met.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

Both Cairo Sewerage I and II used Grant amendments and design modifications to improve the usefulness of the project components or expand technical assistance services in response to changes on the ground. In 1978 the CS I included \$25 million, mostly for the rehabilitation of the wastewater collection system. Soon it was realized that level of funding was insufficient to alleviate the deficiencies of the collection system. In 1981 there was a major grant amendment for \$104 million to complete the rehabilitation and provide the design of system expansion projects.

There were nine amendments made to the Grant Agreement of CS II that amended the Project Description and the authorized funding of the Grant. The Project Paper was formally amended twice to include the design/build construction of the Abu Rawash primary wastewater treatment plant, a Fixed Amount Reimbursement Agreement (FARA) program to finance sewers and house connections, and institutional support to CGOSD.

In conformance with USAID's sector strategy, USAID continued to assist the urban population of Egypt in gaining greater access to reliable wastewater services. In the early 1990s, however, USAID's approach to the wastewater sector shifted from construction to sustainability. As most of the Cairo Sewerage II Project facilities were turned over to GOE, it became clear that CGOSD could not operate and maintain the present or any future infrastructure without addressing the underlying constraints of autonomy, accountability, and cost recovery. The Project Purpose of the CS II Project remained the same: to expand and develop sustainable wastewater collection, treatment and disposal facilities on the West Bank of Cairo. Whereas the achievement of financial viability was a previous end-of-project status indicator, Project Paper Supplement No. 3 enhanced the definition of "sustainable" by replacing financial viability with the broader goal of achieving CGOSD institutional autonomy by September 30, 1998.

Sub-Criterion 1.c is, therefore satisfactorily met.

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

All infrastructure construction elements have been completed. Additionally, all elements of the Institutional Development and Operations and Maintenance Training and Support contracts have been completed. The following accomplishments are particularly noteworthy.

Although the magnitude and cost of the project are impressive under any circumstances, they become more so when placed in the context of "Egypt in the early 1980s." At that time there were limitations in the capabilities of the Egyptian public and private sectors in planning, design, construction, and operation and maintenance of wastewater facilities. Moreover, the involvement of USAID and US consultants necessitated construction practices of the highest standards. A project of this nature would have posed a challenge to any mature western utility.

In Egypt, the task was handed to a young governmental organization. As mentioned previously, CWO had just been formed to represent the owner of these facilities in overseeing the Project's execution. This task, however, presented a major challenge. The newly created organization did not have experience in

this type of work, nor did it have the proper institutional capacity. It did have, however, a small core staff of managers and engineers. This core staff worked hard, observed and learned from working with seasoned professionals from around the world, applied what they learned, and allowed others to develop. The real tribute to CWO, however, is the magnitude of the CS II Project that the agency was able to oversee, both in terms of cost and size. CWO performed its mission well and saw the successful completion and transfer of the assets to CGOSD. Today, CWO continues its mission as one of the premier planning and construction execution governmental organizations in Egypt. The CS II Project and USAID share this noteworthy accomplishment.

Another noteworthy accomplishment of the CS II Project has been the development of new skills and knowledge in the operation and maintenance of the Greater Cairo wastewater system. During the life of the Project, especially during the start-up and commissioning phase, hundreds of thousands of hours of technical training in the proper operation and maintenance of the facilities was provided to thousands of CGOSD employees. This massive effort has resulted in CGOSD having a core staff skilled in sewer inspection and maintenance, pump station operation and maintenance, primary and secondary treatment operation, maintenance management and inventory control, and sludge handling and disposal.

Another indirect benefit of the CS II Project has been the development of a water pollution control industry in Egypt. From planning and design of facilities, to construction and construction management, and manufacturing of equipment and chemicals, Egypt has experienced the birth and growth of a wastewater private sector in goods and services. The development of this industry has been significant enough to the extent that today Egyptian design and construction companies export their expertise to other Arab and African countries, and they have become dominant regional players in the wastewater sector. Moreover, as the GOE expands the access to sanitary services in the minor urban and rural communities, there is presently a sustainable domestic capability to meet this demand.

Sub-Criterion 2.a is, therefore, very satisfactorily met.

Sub-Criterion 2.b—Problem Resolution:

The problems related to the infrastructure deficiencies of the Greater Cairo wastewater collection system and treatment facilities, as addressed in the USAID Project Papers and Grant Agreements, have been successfully resolved as indicated in the conclusion of Sub-Criterion 1.a. The wastewater collection and treatment and sludge handling and disposal facilities have expanded, improved, and, in some instances, been replaced. New facilities incorporating the latest technology in equipment and processes have been successfully placed in operation. The majority of the beneficiaries of the CSI and CSII included 2 to 3 million people on the West Bank and 30 million individuals living downstream from Cairo who benefited because raw sewage is no longer dumped into the Nile.

The social benefits of the CS I & II Projects are nowhere as apparent as they are in the low income and poor neighborhoods of Cairo. While the major pump stations, wastewater treatment facilities, and sludge handling and disposal facilities are essential components of a wastewater system for improved environmental conditions, the house connections to the wastewater collection system and the sewer lines in each neighborhood are the vital links of the community to better health, living conditions and prosperity. The hundreds of kilometers of sewer lines and service connections and thousands of manholes and distribution chambers built by means of the FAR Agreements had a positive, profound, and visible socio-economic impact on the residents of low-income and poor areas of Greater Cairo, especially in the Zenein, Embaba and the Pyramids areas.

Institutional weaknesses within CGOSD continue to exist to this date, making organization the only area where the problem, as defined in the Project Paper and its Supplements, that has not been fully resolved.

Sub-Criterion 2.b is, therefore, satisfactorily met in terms of the infrastructure problem resolution, but only marginally met in terms of the institutional deficiencies.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

To the knowledge of the assessment team, no comprehensive post-project study has been conducted to evaluate the benefits of the CS II Project on the health of the residents of Greater Cairo. However, due to the well known and documented direct relationship between improved sanitary conditions and improvements on public health, it can reasonably be concluded that the Project has greatly contributed to improved public health and better living conditions for millions of Cairo residents.

Sub-Criterion 3.a, had, therefore, a substantive impact.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

The benefits to society from an expanded and more efficient wastewater system are widely acknowledged but difficult to measure. The most obvious is that better sanitation reduces disease and improves public health. Improved health, in turn, reduces overall health costs, creates a more productive work force. Better sanitation generally improves the quality of life.

Sub-Criterion 3.b, had, therefore, a substantive impact.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

The impact of the USAID interventions on the financial and operational performance of CGOSD had mixed results, at best. The CSI and CSII projects had a higher impact on the operational performance of the utility than on the financial. The reason for this is that the USAID contractors responsible for operational performance improvements were mostly unaffected by external barriers. The development of comprehensive training documents, standard operating and maintenance procedures, computerized maintenance management program, and considerable procurements of spare parts and tools had a significant improvement on the operating capabilities of the organization. Were it not for the barriers that deficient administrative and control systems and lack of commercial orientation caused, these impacts would have been much greater and longer lasting.

The impact of the USAID interventions on the financial performance of the utility failed largely because of the stubborn and almost irrational resistance of the Cairo governorate to sufficiently increase the water and wastewater tariff and, thus, provide urgently needed operating funds to the organization. Additionally, bureaucratic financial management practices dictated to the local utilities by the MOF exacerbated an already dismal financial performance of the utility. Finally, the failure of Cairo water and wastewater utilities to meet cost recovery targets established by USAID resulted to the withdrawal of substantial investment capital from these two utilities, causing additional financial problems to them.

Sub-Criterion 3.c had, therefore, an overall modest impact.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

The benefits of the institutional strengthening programs at CGOSD, measured on the basis of the institutional weaknesses that existed before and after, were mixed. The main reason for this is that the external barriers to decentralization and cost recovery that existed before and during the USAID interventions were beyond the control of the contractor and CGOSD management. The institutional development interventions require sectoral policy reforms to be fully effective and sustainable.

Moreover, for certain elements of an institutional strengthening program to “trickle down” to another essential “layer” of sustainability, more time is required. Systems, programs, and procedures can be developed within planned time frames. Their institutionalization, however, often requires several years of continuous effort under the guidance of an outside consultant. Continuation of assistance until reforms in certain key organizational functions are fully institutionalized will reduce the likelihood of reversion to the conditions that existed before the assistance efforts commenced.

The recent establishment of the Holding Company for Water and Wastewater has certainly influenced the results of this sub-criterion in a positive way. We are cautiously optimistic about the institutional sustainability of the Greater Cairo Wastewater Company due to its new commercial orientation.

Sub-Criterion 4.a is, therefore, likely achieved.

Sub-Criterion 4.b—Physical Facility Sustainability:

It appears that the priority of CGOSD in its operational and management practices is to transport wastewater away from the homes, businesses and institutions, which is not a minor task for a complex and aging urban center of more than sixteen million residents and workers. The system is, therefore, currently running, in the sense that it pumps and treats wastewater. However, it is slowly, but steadily, deteriorating because of lack of proper operation and maintenance management. Maintenance is mostly corrective and not preventive. One key reason for this is that the Egyptian operations & maintenance systems are not conducive to “preventive practices” of any type. It will take comprehensive interventions into this type of mindset over long periods of time to remedy this practice.

These are systemic problems that are deeply rooted in the culture and management practices of almost every public agency or company in Egypt, thus, making physical sustainability the Achilles’ heel of the water and wastewater sector. Moreover, the growing demand for expansion of treatment and network facilities in areas recently included in the service area of the Greater Cairo Wastewater Company along with the need for rehabilitation of the existing system will stress even more an already struggling organization.

A high probability exists of an operational failure of a pump station, wastewater treatment plant component, or sludge handling and disposal unit, which would cause wastewater back ups or spills over large areas of greater Cairo. When “critical elements” are either not done at all or well enough, it is just a matter of time before the lack of proper operational and maintenance management practices result into failures. Cairo operates some “super” pump stations that handle huge volumes of wastewater. As the amount of wastewater increases – with population growth and the incorporation of additional areas - the stand-by capacity of the pumps decreases. Then, if one of the pumps fails - due to a mechanical problem or lack of spare parts - there will inevitably be flooding somewhere in the city.

Sub-Criterion 4.b is, therefore, not likely achieved.

Sub-Criterion 4.c—Financial Sustainability:

The financial sustainability of the Cairo Wastewater Company parallels that for the Cairo Wastewater Company as they have the same tariff rates and bills are collected by Cairo Water for both organizations. Tariff increases have been insufficient to meet the financial needs of the utility organization as the collection rate remains at about 92 percent and cost recovery is only 84 percent. Thus, insufficient revenue generation remains a central issue of institutional financial sustainability that will require bold interventions to be resolved. On the positive side, the Holding Company plans within the next two years to reduce the workforce and allow market forces to dictate rate increases. However, as long as water rates remain low, the revenues from wastewater will remain woefully low. Given all these conditions we are not very optimistic about the prospects of financial independence in the two Cairo utilities.

Sub-Criterion 4.c is, therefore not likely achieved.

Greater Cairo Wastewater Company: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	3	3.33
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	4	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	3	
Effectiveness	Project accomplishments	4	3.5
	Problem resolution	3	
Outcomes	Impacts (positive or negative) on health and environment.	3	2.67
	Economic and social impact on beneficiaries	3	
	Impact on the financial and operational performance of the utility	2	
Sustainability	Institutional sustainability	3	2.33
	Physical facilities sustainability	2	
	Financial sustainability	2	
Overall			2.96

Rating Scale

Scale	Relevance, Effectiveness	Outcomes	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Alexandria Water Company

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0270.02	Alexandria Water Company (AWCO) Construction Contract	1997-2006	78,000	To improve the reliability and safety of AWCO's water supply system. The project covers improvements to the water transmission and distribution system and water treatment plants. Preparation of Master Plans and construction of High Priority Projects.
263-0270.02	Institutional Strengthening Contract	1999-2005	16,000	To strengthen the institutional capacity of AWCO to accomplish (a) improved recovery of O&M costs; (b) improved decentralization of its management; and (c) improved capacity to deliver services. Preparation of strategic plan and automation of meter reading and billing collections.

Review of Problem

The Alexandria Water Company (AWCO) serves an area from Abu Qir in the east, 300 kilometers along the Mediterranean coast to Marsa Matruh in the west, and south along the desert highway to Beheira Governorate. Being downstream of almost all other users of the Nile means the raw water AWCO withdraws for treatment is seriously threatened from both a water quality and quantity perspective. Directly related to the water resources issue is the population to be served by AWCO in the future. Estimates are that AWCO's year round and summer peak populations will both double from 1996 to 2022 - the planning horizon of the last master plan¹¹⁶. This in itself will cause serious problems with respect to water availability.

The quality of the raw water tributary to the eight water treatments plants serving this vast area was poor and continued to deteriorate. Coupled with this problem was the lack of an adequate central laboratory, which was needed to monitor both raw and treated water quality. Third, the distribution network in the central coastal districts had become seriously unreliable, and aging (over 60 years) facilities needed to be replaced to reduce high losses and disruptions in this important area. Finally, AWGA was in need of institutional strengthening in such areas as organizational structure, personnel practices, management procedures, and information systems to bring the authority up to the standards of modern water utility practices. In addition to these major needs, other needs included: (1) an accelerated program to replace non-functioning customer meters, (2) rehabilitation works at several treatment plants to improve their reliability, and (3) immediate works to address problems in raw water quality and quantity.

Health and Environment

Overall, Alexandria's environment seems to have improved, based on conditions reported in the 1978 Master Plan¹¹⁷. However, in many respects population growth has overwhelmed the substantial efforts made to improve water supply, sanitation, housing, and transportation. Most of the problems found in 1978 still exist, though they have shifted their locale somewhat and are now concentrated primarily in the informal housing areas. However, informal housing represents over one third of AWCO's served population and is growing faster than the general population.

The health and environmental conditions in these areas are poor, although most problems are caused by the lack of wastewater services. While water from AWCO is available to almost 90 percent of the residents of these informal housing settlements, there is a major problem with low water pressure and water quality, related to the condition of the pipes and the potential cross connections and backflow into the system from sewage overflows.

Economic and Social Considerations¹¹⁸

It is estimated that there are somewhere between 125 and 150 informal settlements located in five of Alexandria's six administrative districts. Compared to informal settlements found throughout the developing world, housing in the informal settlements of Alexandria was found to be well built. The majority of informal settlements consist of two to four story apartment buildings, often with shops on the first floor. Their population is a mix of civil servants, farmers, laborers, craftspeople, and retirees. A significant portion of the households surveyed reported a monthly income below EGP 250/month (the poverty line for a household of four) and all households surveyed brought in less than EGP 1500 per month.

116 Water Master Plan Report for Alexandria Water General Authority, Sept. 2000, CDM

117 Alexandria Waterworks Master Plan Study, November 1978, CDM.

118 Water Master Plan Report for Alexandria Water General Authority, Sept. 2000, CDM

Most households pay less than EGP 20 monthly for water - which is, by the way considerably more than what most households pay in the urban Alexandria or Cairo areas. The most prevalent method of getting water was through an illegal-informal (homemade, not metered) or legal-informal (homemade, but metered by AWCO) piping system. Because of the low water pressure, tenants of these developments had to carry water upstairs in buckets. In some areas there are also periods where water was cut off for indefinite periods of time. The majority of households was found to have toilets inside their apartment or shared one inside their apartment building. Wastewater disposal were found to be severely lacking in these areas, creating a significant health and environmental problem.¹¹⁹

Facilities and Level of Service

AWCO has two sources of water: the Mahmoudia and Noubaria Canals, both of which draw water from the Nile River. Both have ample hydraulic capacity for AWCO's needs. Raw water is adequately treated by conventional processes, but concerns exist about salinity and pesticides in the Noubaria Canal and treatment-resistant pathogens in both canals. AWCO's eight water treatment plants (WTP) have overall capacity to meet current demand. However, for three facilities, the Manshia, Noubaria, and Borg El Arab facilities summertime demands exceed plant capacities. The transmission and distribution system is, for the most part, adequate, although as with the WTPs there are segments of the system that need expansion.

Unaccounted-for water, which includes lost water - water provided to unmetered users - had averaged 35 percent to 40 percent in recent years. Only 90 percent of all AWCO's customers are metered. Treated water quality leaving the WTPs was acceptable and distribution system sampling showed that chlorine residual and coliform counts were within acceptable ranges, except on the North Coast where the long transmission system and reservoir condition were problems.

Overall, many areas of informal housing experienced regular periods of low pressure and, in many cases, periods of no water availability. Much of the transmission/distribution network was well over 50 years old. Many water treatment components were beyond their useful life. Treatments plants required upgrading to meet anticipated future regulations and AWCO's own goals. Rehabilitation of the Mahmoudia Canal was crucial to AWCO's water supply.

Operational and Institutional Issues

The most critical long-term issue for AWCO was the reliability of raw water supply, given increasing demands from all users of AWCO's source canals. Other major issues for AWCO were: constraints imposed on its financial planning and budgeting by the national government; lack of good demographic information; and the indirect subsidization of customers on the North Coast by AWCO's other rate-payers.

The utility generated revenue more than sufficient to cover costs of O&M, and in fact reported a surplus of revenue over all obligations for FY 1999/2000. However, maintenance was being deferred and capital projects were not keeping up with increasing demand for water.

Technical support in areas of mapping, GIS, and computer modeling of the distribution system were outdated and not well maintained in terms of functionality and usability.

Assessment of Problem Resolution

Alexandria has had a municipal water system since about 1820 when the Mahmoudia Canal was completed. AWCO was one of the first companies in Egypt that started providing its customers with treated water. During its more than 145 years existence it has operated as a private company for more

119 Water Master Plan Report for Alexandria Water General Authority, Sept. 2000, CDM

than 115 years. Since its formation the water utility has undergone many changes in its structure and governance. In 2004 the GOE authorized the transformation of 14 water and wastewater utilities into subsidiaries of a new Holding Company. AWCO is now a public sector company. It serves a population of 4.5 million which increases to over 6 million during the summer months. It has 1 million metered customers, more than Cairo or any other water utility in Egypt. It treats its water supplies in 8 operating plants, has 33 storage reservoirs, and delivers the treated water to its customers through a network of 43 booster pumping stations and 6,500 km of pipelines.

Other than the development of a Waterworks Master Plan in 1978 that was funded by the World Bank, AWCO has financed all its capital investments through its operating budget. In 1997, USAID funded a project to improve the reliability and safety of AWCO's water supply system. The project covered studies, design of pipelines and improvements to the water treatment plants, procurement of equipment and tools, construction of High Priorities Projects and Urban Poor Projects.

The assessment of the problem resolution as addressed in the Project Paper was difficult to complete for the following reasons: (a) While most of the elements of the project, such as the Master Plan and Institutional Strengthening Contract, have been completed, about 10 percent of the main contract - infrastructure development - remains incomplete. At the time of this evaluation a major dispute between AWCO and the construction contractor had not been resolved and both parties were determined to go to arbitration for settling their dispute¹²⁰. (b) There has been no Final Report done by the Engineer and no Project Assistance Completion Report (PACR) done by USAID for the construction contract. In light of these two major constraints, the evaluation team was unable to conduct a comprehensive assessment of AWCO with the same level of detail as was done for the Cairo Water and Cairo Wastewater projects. The Project Rating for AWCO will, thus, be limited only to the Criteria and Sub-Criteria for which complete data are available. Moreover, the focus of the assessment will be the performance of AWCO as measured against the indicators of SpO 18 for which results are available through FY 2004.

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries' needs:

For the reasons stated above, there no sufficient data to complete this section.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

For the reasons stated above, there no sufficient data to complete this section.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

For the reasons stated above, there no sufficient data to complete this section.

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

The project accomplishments will be limited to those achieved by the Institutional Strengthening Contract. The key accomplishments were in Finance and Revenue; Technology and O&M;

120 A settlement agreement was signed in September 2006 between the contractor and the Alexandria Water Company and the contractor withdrew his claim. Construction activities were then completed in November 2006.

Administration and Management; Human Resources; Strategic Planning; Dispute Resolution; Legal; Public Relations; Customer Relations; and Computerization.

The effectiveness of these accomplishments, as judged by AWCO's management satisfaction¹²¹ and the performance of the utility were very substantial.

Sub-Criterion 2.a is, therefore, very satisfactorily met.

Sub-Criterion 2.b—Problem Resolution:

The studies, design, procurement, and training required in the AWCO D/CMC Project have been completed. Complete are also the Urban Poor-1, Urban Poor-2, and Urban Poor-3 components of the construction contract. The High Priority Projects are underway but not completed yet. Therefore, for the reasons stated above, there no sufficient data to fully rate this section.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

With the completion of the Urban Poor-1 and Urban Poor-2 projects, the USAID infrastructure for greater Alexandria has achieved one of the major health and environmental improvement objectives of this project. Therefore, even without a final resolution of the overall problem, the evaluation team has decided that the project had a positive impact on health and environment because of the social and economic significance of the urban poor improvements.

Sub-Criterion 3.a is, therefore, substantively achieved.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

Although the Urban Poor Projects are completed and have yielded social and economic benefits to the residents of the informal settlements, the evaluation team cannot provide an overall rating for this sub-Criterion since the High Priority Projects remain incomplete and under contractual dispute.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

The impact of the project on the operational and financial performance of the utility is substantive. On the construction side, a large number of operational improvements were implemented and are operational. They include: The provision of centralized chlorine storage and reservoir; flow meters, chemical feeds, transmitters and instrumentation; repair and replacement of filter control systems; installation of on-line analyzers for turbidity, chlorine and pH; centralized control systems; emergency standby generators. These have improved the quality and reliability of services of the utility. On the financial performance area, the utility's financial plan recognizes and includes the costs of long-term operation and maintenance and its tariffs are designed to fully recover these costs as well as the debt service costs and interest on loans.

Sub-Criterion 3.c is, therefore, substantively met.

121 September 3, 2006 interview with Eng. Nadia Abdou, Chairperson of Alexandria Water Company.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

AWCO's strongest positive indicator for sustainability is its long and uninterrupted service to the residents of greater Alexandria for almost one and a half centuries and a dedicated, "home-grown" staff that has operated and managed the utility as an economic authority for a long time. Currently, AWCO appears to have a financial plan that allows it to generate enough revenue to cover its operational and maintenance costs. Moreover, there are in place sustainable supporting institutions nationally and locally, and trained personnel to staff these institutions. AWCO is considered, thus, a sustainable entity. The evaluation team would have rated AWCO higher in this sub-criterion would it not have been for the fact that in three (out of five) performance indicators - unaccounted-for water, percent of bills collected, and cost recovery - it has regressed in FY 2004 falling back to or below the values of its base year (2000). This could be attributed to the installation of a large number of water meters that has helped to measure the actual volume of water sold rather than needing to estimate (as had been the practice in the past). Future values for these indicators should show a clearer trend. At this time, however, the apparent trend cannot be viewed as positive.

Sub-Criterion 4.a is, therefore, likely achieved.

Sub-Criterion 4.b—Physical Facility Sustainability:

As mentioned in the previous sub-criterion, AWCO has managed to provide quality services to its more than one million customers for a very long time. Even after the latest USAID-funded infrastructure improvements, however, the fact remains that the utility faces a seriously aging infrastructure, on one hand, and a fast growing service area, on the other, that will stretch to the limit the institutional and financial resources of the company. And when that happens, two key operational components—human resources development, and systems maintenance—are the ones to suffer first. There is a concern, therefore for the utility's long-term sustainability, albeit not as serious as in the other companies of the Egyptian water and wastewater sector.

Sub-Criterion 4.b is, therefore, likely achieved.

Sub-Criterion 4.c—Financial Sustainability:

AWCO has been the first water or wastewater utility in Egypt to have succeeded to not only recover its operations and maintenance costs, but also recover its debt service costs and retain a small surplus. In a sector that has suffered from huge deficits that have been subsidized to this date by the GOE, AWCO's performance is certainly exemplary. A company should not rest on its laurels, however. As indicated in Sub-Criterion 4.a above, AWCO has slipped in three key indicators in the past three years—cost recovery, unaccounted-for water, and rate of bill collection. All three of these indicators have and will have a direct negative impact on the ability of the company to become financial sustainable, especially in view of the serious challenges it is facing because of its aging infrastructure and growing service area.

Sub-Criterion 4.c is, therefore, likely achieved.

Alexandria Water Company: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	NA	NA
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	NA	

	Relevance of Grant Amendments and design modifications in response to changes on the ground.	NA	
Effectiveness	Project accomplishments	4	4
	Problem resolution	NA	
Outcomes	Impacts (positive or negative) on health and environment.	3	3
	Economic and social impact on beneficiaries	NA	
	Impact on the financial and operational performance of the utility	3	
Sustainability	Institutional sustainability	3	3
	Physical facilities sustainability	3	
	Financial sustainability	3	
Overall			3.33

Rating Scale

Scale	Relevance, Effectiveness	Outputs	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Alexandria Water Company: SpO 18 Assessment (FY 2004)

Indicator-specific Ratings		
SO or IR Level Indicator	Performance Indicator	Rating
SpO 18: Access to Sustainable Utility Services in Selected Areas Increased	18.a – Cumulative number of people with new or improved water or wastewater service in selected areas	<i>Exceeded target</i>
	18.c – Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector	<i>Did not meet target</i>
IR 18.1 Utility Services Enhanced	18.1.a – Percent increase (relative to baseline) in capacity of selected water and wastewater utilities	<i>Exceeded target</i>
IR 18.2 Commercialization of Utilities Enhanced	18.2.a – Percent of produced water not accounted for	<i>Did not meet target</i>
	18.2.b – Percent of annual billings collected for water and wastewater sold	<i>Did not meet target</i>
IR 18.3 Legal and Regulatory Framework Established	18.3.a – Cumulative number of legal and regulatory milestones attained	NA

Alexandria Wastewater Company

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0100	Alexandria Wastewater System Expansion I	1979-1997	422,076	Stop raw sewage flooding into city streets; expand the system to serve previously unsewered areas; eliminate beach pollution; and provide O&M and institutional strengthening assistance.
263-0241	Alexandria Wastewater System Expansion II	1997-2006	203,000	Expand the treatment capacity of the two wastewater treatment plants and the capacity of pump stations; eliminate the last sea outfall; and continue with O&M and institutional strengthening assistance.

Review of Problem

The city's original wastewater system was designed at the turn of twentieth century. It was expanded in the 1940s and 1960s, but it was designed to serve only a population of 350,000. Prior to 1980, the wastewater collection and treatment system of Alexandria had suffered from the effects of age, misuse, lack of maintenance, and design deficiencies. The sewers were old, full of sand and grit, and unable to handle the flows of wastewater. Severe flooding of the streets was caused by inadequate capacity of pump stations, the collection system and treatment plants. Raw wastewater was discharged into the Mediterranean Sea during the winter months and into Lake Maryout during the summer months. Widespread waterborne diseases, such as cholera, dysentery and typhoid, and skin infections were prevalent, especially during the summer months. During this time, before the development of the north coast and the Red Sea, Alexandria was the major destination for millions of vacationers from Egypt and the Middle East.

To alleviate this problem, the Government of Egypt (GOE) initiated a massive infrastructure improvement program aimed at improving the health and living conditions in the city of Alexandria. The city stretches along the Mediterranean Sea from Abu Qir in the east to Amria in the west. It is sandwiched between the Mediterranean Sea on the north and Lake Maryout on the south. Its north-south dimensions range from 2 to 6 kilometers.

Health and Environment

The effects of inadequate wastewater collection system and an almost nonexistent treatment of wastewater had devastating effects on both the health and environment of Alexandria, which is Egypt's second largest city and principal harbor.

The environmental impact of discharging raw wastewater into the sea was not nearly as severe as that of discharging sewage into the lake which had become almost septic, especially during the summer months. This environmental degradation was perhaps the worst in Egypt.

Moreover, infant mortality rates and incidents of waterborne diseases were high prior to the USAID infrastructure interventions. Waterborne diseases such as typhoid, paratyphoid, bacillary and amoebic dysentery, and infectious hepatitis are all endemic to Egypt. USAID has documented the relationship

between the incidence of enteric diseases and the availability of potable water supplies and wastewater disposal facilities¹²².

Economic and Social Considerations

In 1980, the City had a population of 2.5 million residents and 800,000 summer visitors. About 40 percent of Egypt's industry, employing approximately 15 percent of the country's manufacturing labor force, was at that time located in Alexandria. Principal industries in the City include paper, textiles, cement, chemical and fertilizer manufacturing operations, oil refineries and electric power plants.

Politically, the City is in the Governorate of Alexandria, which is divided into six administrative districts. The population was increasing at a rate of 2.2-2.8 percent per year. Population growth was not homogeneous across the city, however, as the population of the five central districts was decreasing. The population included approximately 1 million people who lived in squatter communities, unplanned areas which, lacked government services and did not have adequate public utilities. It was estimated that about half of the squatters who lived in 39 squatter settlements did not have public collection and disposal of sewerage. Residents of these areas were mainly of lower socioeconomic status, such as laborers, janitors, and domestic servants.

Assessment of Problem Resolution

USAID's response to the health and environmental problems associated with the wastewater collection and treatment system for greater Alexandria was quick and significant. Funding by USAID exceeded \$630 million and is only second to that provided to Cairo. As a result, two major primary treatment plants with a combined capacity of more than 1 million cmd and seven major pump stations were built. A mechanical sludge dewatering facility and a sludge disposal site were constructed and more than 100 km of collectors transported wastewater away from the streets and the sea to the two wastewater treatment plants. Three laboratories (including a state-of-the art central laboratory), a training center, administrative offices, maintenance shops and spare parts storage facilities were provided. This along with a multi-year O&M assistance and institutional strengthening program led to the most comprehensive solution to Alexandria's wastewater infrastructure deficiencies.

A complete assessment of the problem resolution in Alexandria by the USAID-funded infrastructure interventions is somewhat limited, however, because of the lack of Final Reports and PACRs for the Phase I and Phase II projects. In light of these constraints, the evaluation team was unable to conduct a comprehensive assessment of the Alexandria Wastewater Company with the same level of detail as was done for the Cairo Water and Cairo Wastewater projects. The Project rating for the Alexandria Wastewater Company will, thus, be limited only to the Criteria and Sub-Criteria for which data are available. Moreover, the focus of the assessment will be the performance of AWCO as measured against the indicators of SpO 18 for which results are available through FY 2004.

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries' needs:

The Alexandria Wastewater Projects (I & II) were USAID and the GOE's response to alleviating the problems arising from the existing wastewater system at that time. Phase I of the infrastructure interventions focused on the development of a wastewater collection and treatment system. Phase I included two new primary treatment plants, seven major pump stations, a sludge handling facility and a

122 Water and Wastewater Sector Assessment, May 1983, USAID

sludge disposal site. Phase II include the expansion of the two treatment plants, the expansion and rehabilitation of the pump stations, and the closure of the last sea outfall.

To eliminate the serious problem of flooding in most areas of Alexandria, the first components of Phase I focused on the design and construction of the pump stations and rehabilitation and expansion of the collection system. While these components of the project represented immediate improvements to the system, the system needed radical improvements to the almost nonexistent treatment capacity of the facilities. Two new plants were built to eliminate the discharge of raw wastewater into the sea and lake. Phase II was designed to address the increased flows resulting from population growth and to accommodate increased flows as a result of providing service to unsewered areas. Moreover, the last sea outfall was closed and its flow conveyed to the West Treatment Plant.

These improvements significantly increased the access to adequate wastewater disposal by Alexandria's population and improved their health and environment, such as a decrease in infant mortality and waterborne diseases. Overall, USAID's interventions assured the completion of a whole system, from household connections to final treatment, adequate for both effluent and sludge disposal. The establishment of priorities and the sequencing of implementation of the various construction components were very good.

Sub-Criterion 1.a is, therefore, very satisfactorily met.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

The planning, design and construction of Phase I and Phase II are good examples of an appropriate resolution to an infrastructure problem. The assessment of the wastewater collection, conveyance and treatment problem in Alexandria and the priorities given to its resolution were appropriate and conducted according to international norms and standards. The decision to built pump stations and new treatment plants and to significantly expand the collection system, thus providing relief from sewage flooding to millions of residents and eliminating pollution of the Mediterranean Sea, was both technically and socially sound.

There is however one exception to the use of appropriate technologies in the problem resolution of the Alexandria Wastewater Project (AWP). It was the decision to use a highly sophisticated and computerized mechanical sludge handling facility designed to handle the sludge from both treatment facilities. Adding to the challenge of adopting this new technology were the management shortfalls, deficient maintenance programs and the nature of the sludge - most of it transported over a long distance from the East Treatment Plant and highly septic and with a high hydrogen sulfide content – and the weakness of the decision becomes apparent. Coming to the defense of USAID and the design engineer who strongly objected to use of this technology in Alexandria, this decision was unilaterally made by the then Minister of Housing and Public Utilities who was impressed with the use of this technology in France and wanted to see it used in Egypt.

The Alexandria Wastewater Project significantly contributed to developing an in-country expertise (individual skills and knowledge, and company expertise) in administering contracts, design, and construction. Especially in the construction management area, it greatly enhanced the understanding and application of FIDIC and claims resolution practices, by means of technology transfer to the Egyptian wastewater private sector.

Sub-Criterion 1.b is, thus, satisfactorily achieved.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

Both Alexandria Wastewater Projects (I and II) used grant amendments and design modifications to improve the usefulness of the project components or expand technical assistance services in response to changes on the ground. The most significant benefits from these amendments were the inclusion of an O&M assistance and institutional strengthening component, and the design and construction of several essential support facilities, such as laboratories, training center, tools, spare parts, maintenance shops and storage facilities, and administrative and personnel facilities. All this was accomplished by an excellent collaborative effort among the USAID project officers, the utility senior management, and US D/CMC contractor.

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

All infrastructure construction elements have been completed. Additionally, all elements of the Institutional Development and Operations and Maintenance Training and Support contracts have been completed. The following accomplishments are particularly noteworthy.

Both treatment facilities are meeting or exceeding design specifications. The East Treatment Plant, in fact, was nominated as Best Treatment Plant in Egypt by the Water Environment Federation. During the institutional development project, the Alexandria General Organization for Sanitary Drainage (AGOSD) took a leadership role in financial and organizational reforms and was instrumental in the issuance of a Presidential Decree that began sector reform in Egypt. There were three tariffs increases that significantly improved the cost recovery of the utility.

A Public Awareness Department, which was funded by USAID as part of the Institutional Development project, was established (the first one in Egypt) and succeeded to secure public service announcements on Egyptian television and radio. Also, an Industrial Waste Management Department was created that pioneered the concepts of waste minimization, pollution prevention and industrial cost recovery. This latter department is still functioning. In fact, it has grown and has become an important revenue center for the utility through a variety of services that it offers to the industries of Alexandria.

Sub-Criterion 1.b is, therefore, very satisfactorily achieved.

Sub-Criterion 2.b—Problem Resolution:

The problems related to the infrastructure deficiencies of the Alexandria wastewater collection system and treatment facilities, as addressed in the USAID Project Papers and Grant Agreements, have been successfully resolved as indicated in the conclusion of Sub-Criterion 1.a.

The wastewater collection and treatment and sludge handling and disposal facilities have replaced, expanded and improved the aging and largely ineffective wastewater infrastructure of Alexandria. New facilities incorporating the latest technology in equipment and processes have been successfully placed in operation. The majority of the beneficiaries of AWP Phase I and II included more than 6 million people who have benefited from improved sanitation resulting from eliminating sewage ponding and flooding of streets and neighborhoods. One of the most severe problems that existed prior to USAID assistance in Alexandria was the pollution of the Mediterranean Sea and Lake Maryout. All sea outfalls have been closed and wastewater receives primary treatment before it is discharged into Lake Maryout. The benefits

would be higher should secondary treatment¹²³ be provided. However, there is nevertheless a considerable resolution of the problem.

Sub-Criterion 2.b is, thus, satisfactorily met.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

Although no pre- and post-project studies were conducted to measure the environmental benefits of the AWP Phase I and II on the Mediterranean Sea and Lake Maryout, the elimination of raw wastewater discharges into the sea had a huge positive environmental impact. The environmental benefits to Lake Maryout are considerably less. The wastewater discharged into the lake receives only primary treatment, and although both treatment facilities meet or exceed their design standards and the West Treatment Plant approaches treatment levels resembling secondary treatment, there is still considerable pollution of the lake. Perhaps the greatest environmental improvement to Lake Maryout is the reduction of tens of thousands of tons of sludge per year that used to settle in the bottom of the lake from the discharge of raw sewage into it.

Infant mortality is one measure of the general health of a population. Observing these rates over time is an indicator as to whether the health of the population is improving or deteriorating. The infant mortality rate (IMR) measures infant deaths during the first year of life. Components of the IMR are the neonatal mortality rate (NMR) and the post-neonatal mortality rate (PNMR). The NMR measures infant deaths during the first 28 days after birth. The PNMR is the difference between the IMR and the NMR, and represents deaths from months 1 through 12. Neonatal mortality is influenced by genetics, congenital factors and the mother's health, while PNMR depends to a greater extent on factors in the infant's environment and is, thus, more likely to be influenced by sanitation factors such as improvements in the wastewater system.

From 1980 to 1993 the overall IMR decreased from 70 to 25 per 1,000 live births. This decrease is a combination of the NMR which decreased 49 percent and the PNMR, which decreased 72 percent. The infant mortality rate for the Alexandria Governorate has been decreasing steadily since 1980, indicating an improvement in the general well-being of the City. Improvements in the wastewater collection and treatment system are one of a number of environmental factors that have contributed to the decrease in these rates. For the period influenced by the AWP (1987-1993) the IMR decreased 28 percent (NMR decreased 20 percent and PNMR decreased 34 percent).¹²⁴

The rates of mortality (deaths) and morbidity (cases of illness) from waterborne diseases also showed a positive impact as a result of AWP. The incidence rate for hepatitis, typhoid and paratyphoid showed dramatic decreases for the period from 1986 to 1990. The rate of hepatitis decreased 50 percent while typhoid decreased 76 percent over this period. Paratyphoid decreased 82 percent during the same period.¹²⁵ These decreases seem attributable, at least in part, to improvements in wastewater collection and treatment, e.g., removing raw sewage from the streets of the City and eliminating its discharges from the sea where millions bath every year.

123 Primary treatment is the removal of sand, grit and other settleable solids by physical means, i.e. gravity settling in large basins. Secondary treatment follows primary and includes the removal of organically biodegradable matter (BOD). Primary treatment removes less than 50% of solids and BOD, while secondary treatment can obtain as high as 75-85% removal. Another important feature of secondary treatment is that it removes "oxygen demanding" solids and thus significantly reducing the depletion of oxygen in bodies of water that receive the wastewater effluent.

124 Final Report, Human Health Study, Alexandria Wastewater Project-Phase II, June 1997

125 Ibid.

Sub-Criterion 3.a is, therefore substantively met.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

The social benefits of the Phase I & II Projects are nowhere as apparent as they are in the low income and poor neighborhoods of Alexandria. The first wastewater collector was constructed in 1987. Various reports had described sewage flooding as common situation prior to 1987. In some low-lying areas, sewage regularly flooded streets, forming ponds of sewage. This situation existed for three or more months out of the year in some areas, causing odor and humidity problems, flooding of lower floors, increased insects, cracking of walls, and crumbling of paint in houses. People complained that transportation could not reach their neighborhoods, resulting in great difficulty in getting to work or even in an inability to go to work. Some children were prevented from attending school because of transportation difficulties. Areas with sewage flooding also reported an increase in diarrheal diseases. Connection of the sewers of these areas to the collectors of the AWP significantly improved these conditions by removing raw sewage out of the streets of the squatter neighborhoods.

Sub-Criterion 3.b is, therefore substantively met.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

The impact of the USAID interventions on the financial and operational performance of AGOSD was in general positive. The AWP projects had a higher impact on the financial performance of the utility than on the operational. The development of comprehensive training documents, standard operating and maintenance procedures, computerized maintenance management program, and considerable procurements of spare parts and tools had a significant improvement on the operating capabilities of the organization. Were it not for the barriers that deficient administrative and control systems and lack of commercial orientation caused, these impacts would have been much greater and longer lasting. The operation and maintenance of the Mechanical Dewatering Facility (MDF) is an exception to otherwise good operational performance of the wastewater system facilities.

The impact of the USAID interventions on the financial performance of the utility has been significant. AGOSD was the first economic authority to achieve three successive rate increases. From 2000 its cost recovery rate increased from 46 percent to 75 percent in 2004 - a 63 percent increase. The collection rate of billed water increased from 61 percent in 2000 to 84 percent in 2003, but it decreased to 48 percent in 2004¹²⁶, a worrisome sign pointing to the need for increased collection enforcement. In conclusion, the impact of the institutional interventions on the financial performance of the utility has been very good, but there is room for improvement until the utility reaches full cost recovery.¹²⁷

Sub-Criterion 3.c is, therefore, substantively achieved.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

The focus of the institutional strengthening programs of AWP was on developing the institutional and management tools that the utility needed to fulfill its mission. This involved ensuring that the agency was managed by competent professionals who could provide cost-effective service to its customers, extend its services to previously unsewered areas, stop raw sewage flooding in city streets, eliminate beach pollution, and upgrade the treatment process to match the latest technological standards. These objectives

126 FY 2004 Special Objective 18 Annual Report

127 Final Report: FY 2004 Performance Monitoring Reporting for USAID/Egypt's Infrastructure Program (Oct 2005), USAID/Egypt

have been, to a great extent, achieved and most of the components of the utility continue to operate well. There are qualitative differences, however, in the operational and maintenance performance of different facilities within the Alexandria Wastewater Company. Success in the operation of individual facilities, therefore, appears to be the result of individual efforts by facility managers and their staff and not of an effective central management system. This situation points to weaknesses in the senior management of the company which has failed to institutionalize the performance management programs developed by the contractors.

Sub-Criterion 4.a is, therefore, likely met.

Sub-Criterion 4.b—Physical Facility Sustainability:

The condition of the physical infrastructure of the Alexandria Wastewater Company is a glaring example of the systemic problems that face Egyptian water and wastewater utilities in general and the Alexandria system in particular. What is unique in Alexandria is that the condition of the wastewater infrastructure varies considerably from facility to facility. This difference is visible more at the West Treatment Plant (WTP) and especially the Mechanical Dewatering Facility (MDF). This is due to a number of reasons, not least of which are weaknesses in maintenance management which become more obvious when the operating conditions become more challenging, as is the case with the WTP and MDF.

The condition of these two facilities, especially of the MDF, does not only undermine the physical sustainability of the utility, it sets off an alarm for swift corrective action. It should be noted that lack of interventions could cripple the ability of these facilities to perform their intended purposes.

Sub-Criterion 4.b is, therefore, not likely achieved.

Sub-Criterion 4.c—Financial Sustainability:

The financial sustainability of the utility is certainly better than its physical sustainability. It has considerably improved in the past ten years and particularly in the past five. And although in the most recent data cost recovery meets its target value set in SpO 18, its trend is worrisome as it has not consistently improved over the years. Moreover, the Alexandria Wastewater Company is facing a considerable expansion of its service area in the near future, which only means that its management and financial problems will increase. Significant improvements need to be made in tariff rate and bill collection, accompanied with cost reductions in operating expenditures. And this should be accomplished without undermining the preventive and corrective maintenance of the infrastructure.

Sub-Criterion 4.c is, therefore, only likely met.

Alexandria Wastewater Company: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	4	3.67
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	3	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	4	
Effectiveness	Project accomplishments	4	3.5
	Problem resolution	3	
Outcomes	Impacts (positive or negative) on health and environment.	3	3

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Sustainability	Economic and social impact on beneficiaries	3	
	Impact on the financial and operational performance of the utility	3	
	Institutional sustainability	3	2.67
	Physical facilities sustainability	2	
	Financial sustainability	3	
Overall			3.21

Rating Scale

Scale	Relevance, Effectiveness	Outcomes	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Alexandria Wastewater Company: SpO 18 Assessment (FY 2004)

Indicator-specific Ratings		
SO or IR Level Indicator	Performance Indicator	Rating
SpO 18: Access to Sustainable Utility Services in Selected Areas Increased	18.a – Cumulative number of people with new or improved water or wastewater service in selected areas	<i>Met target</i>
	18.c – Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector	<i>Exceeded target</i>
IR 18.1 Utility Services Enhanced	18.1.a – Percent increase (relative to baseline) in capacity of selected water and wastewater utilities	<i>Met target</i>
IR 18.2 Commercialization of Utilities Enhanced	18.2.a – Percent of produced water not accounted for	<i>NA</i>
	18.2.b – Percent of annual billings collected for water and wastewater sold	<i>Did not meet target</i>
IR 18.3 Legal and Regulatory Framework Established	18.3.a – Cumulative number of legal and regulatory milestones attained	<i>NA</i>

Canal Cities Water and Wastewater

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0048	Canal Cities Water and Sewer	1978-1988	165,332	To provide sustainable water and wastewater services

263-0174	Canal Cities Water and Wastewater II	1987-2000	377,078	and facilities in the cities of Suez, Ismailia, and Port Said, and to strengthen the institutional capabilities of the Suez Canal Authority and the three municipalities.
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Review of Problem

Before the construction of the Suez Canal there existed only small towns serving as government outposts. The Canal changed all that. The capital investment and the revenues it generated required administration. The capital infrastructure and the ships it served required maintenance. The Canal Cities of Port Said, Ismailia, and Suez developed to serve these needs. The water and wastewater infrastructure of the Canal Cities was developed early in the twentieth century by the consortium that built and administered the Suez Canal. The systems were expanded periodically to serve the three cities, which grew in slow orderly fashion during the first half of the century. At the time the GOE took over operation of the Canal and its infrastructure in 1956, the water and wastewater systems of the three cities encompassed virtually all populated areas and were in relatively good operating condition.

During the 1967 War, all three cities suffered considerable damage. Additional damage was inflicted to the infrastructure during the 1969-70 War of Attrition, and the 1973 War. Perhaps even worse damage was done by the evacuation of the three cities between 1967 and 1973, when the treatment plants and pump stations deteriorated badly from lack of operation. Raw sewage flooded the streets and ground floor dwellings, and the drains receiving effluent wastewater from the treatment plants were septic for their entire length. These conditions had created serious public health and environmental problems and significant barriers to prosperity and economic growth in general.

Health, Environmental and Economic Considerations

The Canal Zone has been the focal point of much of the military conflict in the Middle East. Development in this area contributes to stability of the region. A highly developed and profitable Canal Zone gives Egypt an increasing stake in maintaining peace in the area, while dynamic economies and modern infrastructure enhance the strength and decrease the vulnerability of the area.

Economic development requires water and sanitation facilities as a basis for improving public health. A USAID Policy Paper on “Domestic Water and Sanitation”¹²⁸ noted that the combination of unsafe drinking water and inadequate sanitation facilities constitutes one of the major causes of death and disability among the poor in developing countries. Water-born diseases impede learning among children who are chronically ill or malnourished, and diminish productivity of adults through lethargy and chronic absenteeism. Thus it observes that safe, convenient water supply and adequate sanitation is a fundamental component of a broad based economic growth strategy.

Prior to Phase II, untreated wastewater was discharged into the Bay of Suez, Lake Timsah, and Lake Manzala, thus, causing a great deal of pollution and inhibiting fishing, tourism and recreation in the three cities.

Facilities and Level of Service

Master Plans developed in 1979 established the basis for the urgently needed improvements to the infrastructure. Those involved minor rehabilitation and expansion of water and wastewater treatment facilities, and expansion of the water distribution and wastewater collection systems. These top priorities formed the basis of the Canal Cities Water and Sewerage Project (Phase I) obligated in 1978.

128 “Domestic Water and Sanitation”, May 1982 - <http://www.usaid.gov/policy/ads/200/water/index.html>

Funding was insufficient to complete all project elements, however, and the project was amended to direct all resources on the wastewater collection system, in order to eliminate the flooding and ponding of raw sewage in densely populated areas that posed a serious public health problem in the three cities.

The wastewater collection network constructed by Phase I was expected to serve 60-70 percent of the population in the year 2000. While the Phase II Project did not initially propose to fund additional collection systems, it became necessary to expand the collection system and sewer network in all three cities to serve growing populations and new neighborhoods.

The Phase I Project successfully removed the sewage from the streets as intended. However, raw sewage was discharged directly into waters that were used for fishing, boating and swimming. Additionally, drains used to handle by-pass wastewater flows were running at capacity, limiting additional connections into the collection system. As a result, the governorates of the three Canal Cities identified the treatment of wastewater as their top priority.

Finally, the cities of Ismailia and Suez had adequate raw water supplies from their sweetwater (fresh water) canal sources through the year 2000. Port Said, however, suffered from a restricted water supply, because the capacity of the Port Said Canal, the only source of fresh water to the city, was reduced to 90,000-125,000 m³/day, far below the maximum daily demand of 276,000 m³/day projected for the year 2000. The expansion of water conveyance facilities for Port Said, thus, was a top priority of SCA, and the Phase II Project proposed to include this as a project element.¹²⁹

Some of the most difficult work was accomplished under the Phase I Project, as well as by the GOE on its own account. However, considerable work remained to be done. These needs may be summarized in the following elements as conceived in the Phase II Project Paper:

- Wastewater treatment for the three Canal Cities
- Water Supply for Port Said
- Availability of Trained Water O&M Personnel
- Strengthening of Local Government Wastewater Departments

Operational and Institutional Issues

SCA had an impressive record of managing the water distribution systems of the three cities. Moreover, it had training facilities and programs for the operation and maintenance of the canals and intended to develop a similar training capacity in the water sector for its own employees. It had the institutional capacity and physical space required. However, the SCA needed technical assistance and financial support from USAID to develop these programs.

Although there was substantial damage to the wastewater facilities during the 1967 and 1973 wars, much of the deterioration could be attributed to improper operation and inadequate maintenance of the system. Phase I provided O&M training and institutional support but the training was delivered only to the limited staff that the local governments were able to provide. These staffs were barely adequate to operate and maintain the new pumping stations, much less the new and expanded wastewater treatment facilities. The Phase II Project would require the training of additional O&M personnel. Additionally, institutional support would be needed to improve the management capabilities of the staff of the treatment facilities. Financial management and a tariff structure would be required as well in this element of the project.

Moreover, there was a need for an organization responsible for the execution of these projects. Prior to the Canal Cities Phase II Project, the two major USAID-funded wastewater infrastructure development projects were for the Cairo and Alexandria wastewater utilities. Both cities used internal capabilities to

129 USAID Project Paper for Canal Cities II

administer the construction contracts. Such capability existed neither with the Canal Cities wastewater utilities, nor with the governorates of the three cities. As a result, the National Organization of Potable Water and Sanitary Drainage (NOPWASD) became the implementing agency for the Grant Agreement and the organization responsible for contract administration of the three host-country construction contracts.

The responsibilities of NOPWASD, in brief, were to review and approve the preliminary design of the facilities, review final design, approve all variation orders, work with the CMC in construction management, and approve payments to construction contractors. NOPWASD, however, had not had any significant experience in this area prior to Canal Cities Phase II Project. Although NOPWASD was involved in Phase I, the size and complexity of Phase II posed a much greater challenge for the organization.

Finally, the design, construction, and construction management capabilities of Egyptian engineering consulting, and construction companies, in the water and wastewater sector, continued to be limited in the early nineties. Because of that, an indirect objective of the USAID infrastructure development programs was to assist in the development and strengthening of the technical capabilities of such companies.

Assessment of Problem Resolution

The infrastructure interventions for the Canal Cities included one wastewater treatment facility in each of the three cities, construction and expansion of the existing raw water transmission system serving the city of Port Said, and assistance in the institutional development of the operating agencies for the water and wastewater facilities constructed. More specifically, the following facilities were included for each city:

Port Said Wastewater Facilities: A new wastewater treatment plant capable of providing advanced primary level treatment with disposal of the treated effluent to Lake Manzala was constructed on reclaimed land in Lake Manzala. Appropriate conveyance facilities were constructed to connect the existing wastewater infrastructure to the new plant. Plant facilities included a workshop, a warehouse, and an administration building with laboratory and training facilities. Engineering services and plant-specific operation and maintenance assistance were integral parts of the project.

Ismailia Wastewater Facilities: A new wastewater treatment plant capable of providing advanced primary level treatment with disposal of the treated effluent to the ground via a land application system was constructed to the southwest of the city. Appropriate conveyance facilities were constructed to connect the existing wastewater infrastructure to the new plant. Plant facilities included a workshop, a warehouse, and an administration building with laboratory and training facilities. Engineering services and plant-specific operation and maintenance assistance were integral parts of the project.

Suez Wastewater Facilities: A new wastewater treatment plant capable of providing advanced primary level treatment with disposal of the treated effluent to the ground via a land application system was constructed to the north of the city. Plant facilities included a workshop, a warehouse, and an administration building with laboratory and training facilities. Engineering services and plant-specific operation and maintenance assistance were integral parts of the project. In addition, a feasibility study for wastewater treatment plant in the south of the city was also planned.

Port Said Raw Water Facilities: The existing raw water transmission facilities from Qantara to Port Said were rehabilitated and expanded to increase the water supply of the City of Port Said. It was proposed that concrete lining of the existing raw water canal, or other appropriate means including a pipeline, would be used to increase the capacity of the system. The latter was chosen. Complementary facilities included a new lined reservoir near El Raswa treatment plant.

Institutional Support and Human Resources Development: The long term viability of the physical systems constructed under Phase I and Phase II would not have been possible without the strengthening

of the institutional capacity of those organizations responsible for managing, operating, and maintaining these facilities.

At the end of the Project, it was anticipated that the following would be accomplished:

- Increased wastewater treatment for the three cities, and water supply coverage for the city of Port Said;
- Improved water and wastewater services;
- Improved operation and maintenance of the facilities;
- Increased revenue collection; and
- Decreased water and wastewater losses.

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries' needs:

The wastewater collection and treatment and sludge handling and disposal facilities have expanded, improved, and, in some instances, replaced the aging and largely ineffective wastewater infrastructure of the three Canal Cities. New facilities incorporating the innovative and appropriate technologies in equipment and processes have been successfully placed in operation with significant improvements to the health, environment and social condition of the project beneficiaries. Moreover, the condition of all facilities remains very good after several years of operation.

Sub-Criterion 1.a is, thus, very satisfactorily achieved.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

The design of all wastewater treatment facilities and their support structures is identical in all three cities. Moreover, the quality of construction is high in all components, although two different construction contractors were used. This could be attributed to a thorough pre-qualification process of bidders by USAID. Finally, the condition of the facilities after seven years of operation (for the oldest facilities) is good, by international standards, and much better than average, in the context of other Egyptian water/wastewater treatment facilities. This could be credited mainly to the involvement of SCA, as the management and operations contractor of the facilities, but to the simplicity of design and the extensive use of appropriate technologies used by the design engineers, as well

One unique and innovative feature of the CCII Project was that it introduced an “enhanced primary” level of treatment. This type of treatment, which utilized aerated, facultative and polishing lagoons, was selected to address the environmental concerns with discharging effluent wastewater into the Suez Canal and its tributaries.

Moreover, the success and sustainability of the CCII Project can be credited to the appropriate technologies that were employed. Some of the treatment processes did not use all of the latest technology available at the time, but instead used technologies that could be sustainable in Egypt. For example, the sludge dewatering process does not rely on the supply of polymers that are difficult to obtain and expensive to buy in Egypt. Instead, the sludge drying lagoons rely on the sun light and sandy soil that are abundant.

A third unique feature of the project was the co-composting facility designed to combine the sludge of the wastewater treatment plant in Port Said with solid wastes from the city, compost the mixture and convert them into a soil conditioner. While this concept is an attractive one and should be considered for future

use, it has some inherent problems associated with the type of residential refuse and solid waste practices in Egypt. There will be further discussion concerning this issue in the sustainability section of the report

Sub-Criterion 1.b is, therefore, very satisfactorily met.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

Projects as the CCII Project are normally expected to be completed on time and on budget. In practice, however, it does not happen too often, especially in this part of the world. When a project is completed on time and well below the original budget, it merits attention and praise. Such was the case of the CCII Project.

A combination of good pre-qualification process of construction contractors, a good CMC, a simple design and use of appropriate technologies greatly contributed to considerable savings in the final cost of the project. Moreover, additional financial benefits materialized because of Value-Engineering¹³⁰.

The considerable savings that materialized in the project were used for further wastewater improvements in each of the Canal Cities. These value-added components were made possible with the Seventh Amendment to the Grant Agreement and included rehabilitation of sewers, pump stations, and equipment; procurement of equipment and spare parts; infiltration and salinity studies; and industrial waste surveys. In total, 20 pump stations and 789 km of sewers were rehabilitated in the three cities. Additionally, a 12 km force main was constructed in Ismailia.

Sub-Criterion 1.c is, therefore, very satisfactorily met.

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

Overall, the effects of the CCII Project on the three Canal Cities have been overwhelmingly positive in terms of public health and environmental improvements primarily, and social and economic benefits as well. The development of the wastewater infrastructure for the three Canal Cities in the Phase II Project required a careful assessment of the water quality of the Suez Bay, Lake Timsah, and Lake Manzala prior to the selection of the design alternatives. Moreover, Law 48 and the contractual effluents requirements have necessitated a continuous and accurate monitoring of the wastewater effluent of the three treatment facilities. The Master Plan updates of the three cities completed in 1999 also included extensive chemical and biological analyses to determine the impact of the treatment plant effluent on the receiving bodies of water.

These extensive and sustained monitoring programs have significantly contributed to the development of a water quality monitoring capability that includes water sampling and laboratory analysis. There is evidence of this capability in the three cities and NOPWASD.¹³¹

Another indirect benefit of the CS II Project has been the strengthening of a *water pollution control industry* in Egypt. The Cairo and Alexandria water and wastewater infrastructure development projects laid the foundations for this new industry and the Canal Cities II Project further strengthened this

130 Value engineering is a systematic method to improve the "Value" of goods and services by using an examination of function. Value, as defined, is the ratio of Function to Cost. Value can therefore be increased by either improving the Function or reducing the cost. It is a primary tenet of Value Engineering that quality not be reduced as a consequence of pursuing Value improvements.

131 Final Evaluation of the Canal Cities Water and Wastewater Phase II (CCII) Project, Optimal, 18 November 2003

capability. In addition to traditional engineering and construction practices, the CC II Project successfully introduced new and appropriate technologies for wastewater treatment to Egypt, which in turn strengthened the potential for their application in future projects in Egypt and elsewhere.

From planning and design of facilities, to construction and construction management, and manufacturing of equipment and chemicals, Egypt experienced the inception and growth of private sector companies that produce goods and services for the wastewater sector. The development of this industry has been significant enough to the extent that today Egyptian design and construction companies export their expertise to other Arab and African countries, and they have become dominant regional players in the wastewater sector. Moreover, as the GOE expands the access to sanitary services in the minor urban, and rural communities, there is presently a sustainable domestic capability to meet this demand.

The ultimate criteria in assessing the performance of a wastewater treatment system are its consistent and sustainable operation, and the quality of its treated effluent. Based on that, the Canal Cities II Project has exceeded its design effluent standards. The wastewater facilities have consistently produced an effluent of high quality and one comparable to a higher level of treatment.¹³² This can be attributed in part to the fact that the facilities are operating below their design BOD and TSS loadings and hydraulic flow, thus, extending the detention time of the wastewater in the treatment cells. As the flow to the treatment facilities increases and, thus, the BOD and TSS loadings, the percent removal of BOD and TSS will decrease and bring the effluent down and closer to the effluent standards.¹³³

Sub-Criterion 2.a is, therefore, very satisfactorily met.

Sub-Criterion 2.b—Problem Resolution:

The effects of the Project have been significant and positive in resolving the problems identified in the Project Paper. Specifically:

1. There is no longer raw wastewater discharged into Suez Bay, Lake Timsah, and Lake Manzala, the new treatment plants provide treatment that far exceeds their effluent standards.
7. Port Said has a new fresh water pump station that augments the water supply to the city.
8. The condition of the wastewater collection system has been improved by major rehabilitation.
9. Infiltration into the collection system has been reduced.
10. A cadre of managers and O&M personnel has been developed as a result of extensive training. This is reflected from the good operation and condition of the facilities after more than seven years of operation.
11. Public health has improved by eliminating flooding of streets, homes, and schools.

A more detailed analysis of the problem resolution follows. The performance of treatment plants at Suez, Ismailia, and Port Said, as measured against the pre-CCII Project conditions, indicate significant health and environmental improvements and satisfy the end of project expectations of the Project Paper and Grant Agreement.

Suez Wastewater Treatment: The Suez Wastewater Treatment Plant has been in operation since August 1995. The plant was designed to handle an average daily flow of 130,000 m³/day and treat wastewater with influent characteristics of 400 mg/l total suspended solids (TSS) and 280 mg/l biochemical oxygen demand (BOD₅). The plant design was based on meeting an effluent standard of 50

¹³² Data on individual treatment plants is provided under Sub-Criterion 2.b.

¹³³ Final Evaluation of the Canal Cities Water and Wastewater Phase II (CCII) Project, Optimal, 18 November 2003

mg/l TSS and 60 mg/l BOD₅. This represents over 85 percent reduction of the TSS load and over 75 percent reduction of the BOD₅ load.¹³⁴

During the 12-month period ending December 2002, the average daily flow to the plant was 121,000 m³/day. During the same period, the average influent TSS and BOD₅ concentrations were 206 mg/l and 224 mg/l respectively. The effluent concentrations of TSS and BOD₅ were 34 mg/l and 15 mg/l respectively. This shows effluent values well below the effluent quality standards, and 84 percent removal of TSS and 93 percent removal of BOD, which are at or above effluent design values.¹³⁵

Ismailia Wastewater Treatment: The Ismailia Wastewater treatment plant has been in operation since January 1996. The facility was designed to receive an average daily flow of 90,000 m³/day and treat wastewater with influent characteristics of 240 mg/l of TSS and 270 mg/l BOD₅. The plant design called for meeting an effluent standard of 50 mg/l TSS and 60 mg/l BOD₅. This represents a reduction of 80 percent of TSS and approximately 75 percent of BOD₅ load.²⁹

During the 12-month period ending December 2002, the average daily flow to the plant was 76,540 m³/day. During the same period, the average influent TSS and BOD₅ concentrations were 212 mg/l and 184 mg/l respectively. The effluent concentrations of TSS and BOD₅ were 21 mg/l and 47 mg/l respectively. This shows effluent values below the effluent quality standards, and 90 percent removal of TSS and 75 percent removal of BOD, which are at or above effluent design values.¹³⁶

Port Said Wastewater Treatment: The Port Said Wastewater Treatment Plant has been in operation since January 1997. The plant was constructed on a filled-in area in Lake Manzala and has a design flow capacity of 190,000 m³/day. The plant was designed to treat wastewater with influent characteristics of 330 mg/l of TSS and 300 mg/l BOD₅. The plant design called for meeting an effluent standard of 50 mg/l TSS and 60 mg/l BOD₅. This represents a reduction of 85 percent of TSS and approximately 80 percent of BOD₅ load.²⁹

During the 12-month period ending December 2002, the average daily flow to the plant was 115,000 m³/day. During the same period, the average influent TSS and BOD₅ concentrations were 136 mg/l and 97 mg/l respectively. The effluent concentrations of TSS and BOD₅ were 25 mg/l and 8 mg/l respectively. This shows effluent values well below the effluent quality standards, and 82 percent removal of TSS and 92 percent removal of BOD, which are slightly below for TSS and above for BOD effluent design values.¹³⁷

Water Supply: The Qantara Pump Station was constructed about 40 km south of Port Said and pumps water from the Sweetwater Canal to a 50,000 m³ water reservoir south of the El Raswa Water Treatment Plant. It has a capacity of 200,000 m³/day and has been in operation since 1998. The combined capacities of the northerly branch of the Sweetwater Canal and the Qantara Pump Station satisfy the average daily water demand for the City of Port Said till the year 2020.

Institutional Development: Institutional weaknesses with the wastewater departments of the three cities continue to exist to this date, making Institutional Development the only area where the problem, as defined in the Project Paper and its Supplements, has not been fully resolved.

While much progress was achieved in the areas of developing a competent workforce capable of operating, maintaining and managing the wastewater treatment systems of the three cities, the areas of financial management, revenue collection and cost recovery remain pretty much at the level they existed prior to Phase II Project. The principal reason for this is that no progress in these areas can materialize

134 Ibid.

135 Ibid.

136 Ibid.

137 Ibid.

without substantive sectoral reforms at the national level. A more detailed institutional assessment will be presented under sustainability assessment below.

Sub-Criterion 2.b is, therefore, satisfactorily met.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

The Canal Cities Projects provided an adequate water supply to Port Said, and wastewater treatment facilities for all three Canal Cities. This allowed expansion of the wastewater collection systems to neighborhoods without sewer service, and avoided contamination of surface water adjacent to populated areas. The following environmental and health improvements were achieved in the three cities:

Suez Bay: The Suez Bay Monitoring Program was initiated in February 1994 and conducted during twelve-month periods in 1995, 1996 and 1997. The purpose of the program was to assess the water quality in the area of the Bay where the Suez new wastewater treatment plant would discharge its effluent. The program activities were designed to measure the water quality of the lake before and after the completion of the treatment facilities to evaluate the impact of the discharges on the Bay.¹³⁸

The Phase I monitoring program conducted during a 12-month period in 1995 was aimed to establish a base-line of fecal coliform (FC), total coliform (TC) and fecal streptococci (FS) contamination in a large area of the Bay, including the area near the wastewater effluent discharge, that existed prior to the construction of the Suez wastewater treatment plant. The results of Phase I indicate that excessive levels of bacterial contamination were recorded at the Sayl drain outfall (outfall of the Suez old WWTP). Averages of TC, FC and FS counts were 310,890/100ml, 188,420/100ml and 1,877/100ml respectively with the highest values recorded at more than three times the average values.¹³⁹

Laws 48 and 4 mandate wastewater effluent at the point of discharge is not to exceed coliform count of 5,000/100ml. When the bacterial contamination at the Bay is measured against this effluent standard, it becomes apparent that serious pollution had existed prior to the operation of the new wastewater treatment plant.¹⁴⁰

Phase II monitoring took place during a 12-month period starting in October 1995, after the start-up of the new WWTP. The highest recorded TC, FC and FS counts at the Sayl drain were respectively 16,000/100ml, 16,000/100ml and 2,400/100ml. This indicates that bacterial pollution at the Bay was highly reduced after the operation of the new WWTP. Considering that the shortest distance between the outfall point and the shoreline measures about 1.5 km, dilution and dispersion would further improve the water quality at the shoreline, where swimming and recreational activities occur, from the conditions that existed prior to the start-up of the new WWTP.¹⁴¹

Lake Timsah: In Ismailia, tourism and fishing are two major sources of revenue for the residents of the city and therefore, the deterioration of lake water quality had a major adverse health and economic impacts on the area. The reason for this was that wastewater from Ismailia's old WWTP was discharged into the Mahsama Drain which empties into the West Lagoon of Lake Timsah. At the time prior to Phase II there was minimal or no wastewater treatment.

The "Technical Report on Water Quality Analyses for the City of Ismailia", issued in March 1990 by BVI/MW consultants, reports that public health problems at swimming beaches in Lake Timsah were

138 Ibid.

139 Ibid.

140 Ibid.

141 Ibid.

significant due to raw wastewater discharges to the lake. Although no scientific surveys were conducted, public health problems were reported by anecdotal evidence of eye, ear, and skin infections among the residents who regularly swam in the lake.¹⁴²

The evaluation team was unable to locate any reports of water quality studies conducted after the Ismailia WWTP went into operation. During an interview with the Director of Works of the SCA, however, it was reported that the construction of the new WWTP for Ismailia acted as a major incentive to SCA to undertake a clean-up of the lake after the completion of the new facility. At the cost of 50 million EGP, the lake was dredged at a depth of approximately 2 m. The shore of the lake adjacent to the residential and tourist areas was graded and layered with clean sand.

This, along with the significantly improved wastewater effluent discharges into the lake, has become the cause of renewed tourist, swimming and recreational activities. Many residents who had abandoned their homes have returned to the shores of Lake Timsah.

Lake Manzala: Lake Manzala is the largest of Egypt's Nile Delta lakes. The lake is traversed by numerous sand and clay islets that effectively divide the lake into basins that, in turn, limit overall water circulation between basins. Prior to Phase II, untreated wastewater was being bypassed around the old WWTP. This facility sustained the worst damage of all Canal Cities facilities during the war and was non-operational. The sewage was discharged, via an open channel, into the body of water between the north shore of Lake Manzala and the reclaimed land on which the new treatment plant was to be built.

The "Technical Report on Water Quality Analyses for the City of Port Said", conducted by BVI/MW consultants and issued in March 1990, reported that studies conducted by several Egyptian research institutions found a relatively high incidence of trematode larvae infestation in the bodies of fish (*Tilapia* spp.) Collected at various locations in Lake Manzala. This was an indication that discharges of untreated sewage into the lake are likely to result in adverse human health effects. There were also anecdotal reports of human health problems resulting from eating contaminated fish from the lake. Moreover, the lake is recognized as being an ecologically significant, internationally important wetland for resident, migratory and wintering bird species.

There are not sufficient water quality data available to conduct a proper analysis of the before and after conditions of the water quality of Lake Manzala and, thus, assess the positive impact of the plant treatment on the lake. From the high level of removal of harmful pollutants from the wastewater effluent, it can be safely concluded, however, that the quality of the lake has been enhanced since the WWTP went in operation.

Health: To the knowledge of the assessment team, no comprehensive scientific study has been conducted to evaluate the benefits of the CCII Project on the health of the residents of the three Canal Cities. The evaluation team reviewed several reports of Demographic and Health Surveys (DHS) conducted for the Ministry of Health and Population, and the National Population Council. While these surveys track trends in several health indicators, they provide no baseline and follow-up statistical data that link access to safe water and proper sanitation to health improvements. Moreover, the DHS conducted thus far present their findings according to major geographic areas that are not specific to the three Canal Cities. This is unfortunate given the direct relationship of safe water and adequate sanitation to health, especially to childhood illnesses, such as diarrhea - a major cause of illness and death among young children.

However, due to the well-known and documented direct relationship between improved sanitary conditions and improvements on public health, it can reasonably be concluded that the Project has greatly contributed to improved public health and better living conditions for millions of Canal Cities residents.

142 Ibid.

Sub-Criterion 3.a is, therefore highly met.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

Prior to the USAID infrastructure interventions in the three Canal Cities, untreated wastewater was discharged into the Bay of Suez, Lake Timsah, and Lake Manzala, thus, causing a great deal of pollution and inhibiting fishing, tourism and recreation in the three cities. The new wastewater treatment plants provide significant removal of harmful pollutants. This is documented in a water quality monitoring study conducted in the Bay of Suez before and after the treatment facilities went on line. The study shows that bacterial pollution at the Bay was highly reduced after the operation of the new WWTP.

Sub-Criterion 3.b is, thus, highly met.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

Overall, the new wastewater treatment facilities of the three Canal Cities and their support structures, and the water pump station for the City of Port Said that were constructed in the Phase II Project remain in very good condition after several years of operation. A number of aerators in all three WWTPs were out of service at the time the PACR assessment was conducted in 2003 and had been out of service for a considerable time. Although this condition does not pose a serious problem at this time, it is troublesome and points to a couple of institutional sustainability concerns. The principal concern goes to the heart of the institutional issues in Egypt, which is insufficient cost recovery.

Another item of concern is the co-composting facility in Port Said. This facility had been out of service for several months. The major cause is mechanical problems that are correctable but at a high price tag. Lack of sufficient funds seems to be the action stopper for the Canal Cities wastewater treatment facilities.

There are more issues with the co-composting plant, however, that require attention. The residential refuse that the governorate has provided for the co-composting process, thus far, has not been of good composting value. It has contained extensive plastic, glass and metal. This has lowered the quality of the compost and the demand for its reuse. A visual inspection¹⁴³ of the large volume of composted material accumulated in the storage area revealed a very low quality product that remains unwanted.

The Canal Cities utilities have not been included in the SpO 18 Performance Monitoring Plan (PMP) and, thus, no data on cost recovery are available. Moreover, the Canal Cities are not part of the Affiliates of the new Holding Company for Water and Wastewater, thus adding to the lack of recent operational and financial data.

Sub-Criterion 3.c is, therefore substantively achieved.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

Institutional weaknesses with the wastewater facilities of the three cities continue to exist to this date, making Institutional Development the only area where the problem, as defined in the Project Paper and its Supplements, has not been fully resolved. While much progress was achieved in the areas of developing a competent workforce capable of operating, maintaining and managing the wastewater treatment systems of the three cities, the areas of financial management, revenue collection and cost recovery remain pretty much at the level they existed prior to Phase II.

143 By George Kinias, Water/Wastewater Specialist, September 2006

The current structure of the three wastewater facilities is cumbersome. It divides the wastewater treatment and collection departments (organizationally and financially), and places the management and operation of the wastewater treatment under NOPWASD, which contracts that responsibility to private contractors, as it does not have the internal capacity to do so. The result is utilities which by design lack a central management that accepts the responsibility of owning the assets, establishing tariffs, institutionalizing financial management practices, such as cost accounting, budgets, and statements of revenue and expenses, and providing clear lines of communication and management.

For a variety of reasons, the water and wastewater utilities of the Canal Cities have not been included in the elite list of subsidiaries thus far. It is recommended, therefore, that one subsidiary company is formed that combines the wastewater collection and treatment organizations for the three cities under one management. This arrangement would provide all the benefits of a unified wastewater system under the central management of a utility. This arrangement, however, should not include the water utilities. SCA should continue running them, as they own the assets. Moreover, they have managed and operated very well these facilities for over a century.

Sub-Criterion 4.a is, therefore, only likely met.

Sub-Criterion 4.b—Physical Facility Sustainability:

The new Canal Cities wastewater treatment facilities have been operated and maintained under contract since their start-up. They are, thus, the longest contract-operated facilities of this type in Egypt. Their current condition as well as the contract monitoring and compliance mechanism constitutes an excellent case study in contract-operations (con-ops) in Egypt.

The Canal Cities con-ops experience, although not totally successful, has created several positive results¹⁴⁴ as follows:

- The operating performance of all three facilities is very good, exceeding design and effluent standards.
- The operating and preventive maintenance practices employed by the plant staff could rival those of any western utility.
- The laboratory operations are very good with sporadic lapses in QA/QC.
- General housekeeping and ground maintenance are exceptional.
- The plant personnel are knowledgeable of their responsibilities.

Certainly a great deal of this success should be attributed to the corporate culture of Suez Canal Authority, one of the oldest and well managed governmental organizations in Egypt.

The principal deficiency in this case study, and one of extreme importance and concern, is the lack of major corrective maintenance, as witnessed in the out-of service aerators in all three facilities, and the shut down of the co-composting plant in Port Said. And the most credible cause for this deficiency can be traced to the lack of sufficient operating funds. The rating of this sub-criterion would have been, certainly, higher had it not been for this deficiency.

Sub-Criterion 4.b is, therefore, likely achieved.

¹⁴⁴ These findings are based on an in-depth evaluation of the Canal Cities' facilities conducted in November 2003 by George Kinias as part of the PACR. The Inspector General's staff accompanied him on this evaluation and their 2004 audit is based on this site evaluation.

Sub-Criterion 4.c—Financial Sustainability:

Determining the financial viability of the three Canal Cities wastewater utilities has been very difficult. The reasons are because of structural problems, and organizational and financial management weaknesses. The financial information received and evaluated by the team was incomplete, unverifiable, and, thus, inconclusive¹⁴⁵. Although the cost recovery rate, and collection rate of the wastewater utilities could not be determined, general conclusions could be made from the financial information received:

1. The revenues collected from the wastewater surcharge and other services fall short of the total combined expenses required to operate and maintain the wastewater collection and treatment utilities of the three cities. The shortfall is made up by GOE subsidies payable to the utilities from the governorates and the MOF.

2. Poor financial performance of the utilities appears to be the core cause of the existing problems associated with the aerators and co-composting facility. Corrective maintenance has been seriously neglected during the past several years as a result of lack of funding. Continuation of this highly troublesome condition is the most severe threat to the sustainability of the facilities.

Sub-Criterion 4.c is, therefore not likely met.

Canal Cities Water and Wastewater: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	4	4
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	4	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	4	
Effectiveness	Project accomplishments	4	3.5
	Problem resolution	3	
Outcomes	Assessment of impacts (positive or negative) on health and environment.	4	3.67
	Economic and social impact on beneficiaries	4	
	Impact on the financial and operational performance of the utility	3	
Sustainability	Institutional sustainability	3	2.67
	Physical facilities sustainability	3	
	Financial sustainability	2	
Overall			3.46

Rating Scale

Scale	Relevance,	Outcomes	Sustainability	Overall
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¹⁴⁵ The Canal Cities assistance was not included in the SpO 18 monitoring and moreover, the Canal Cities are not part of the new Holding Company. The result is that there is insufficient financial data as explained in the project-by-project analysis.

	Effectiveness			Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Middle Egypt (Provincial Cities) Development

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0127 263-0161	Provincial Cities Development (Middle Egypt)	1982-1995	384,229	To improve and expand the water and wastewater systems in Beni Suef, Minia and Fayoum and to further improve the institutional capacities of the cities to plan, implement and maintain the systems.
263-0270	Egypt Utilities Management (Middle Egypt)	1997-2006	221,000	

Review of Problem

The three Middle Egypt governorates of Beni Suef, Fayoum and Minia have an estimated population of 8.7 million of which 21 percent are living in urban areas. Based on estimates reported in the Middle Egypt utilities corporate plans, the three Middle Egypt companies provide about 93 percent of the population of Middle Egypt with piped water supply and about 16 percent with safe wastewater services.¹⁴⁶ There was a lack of capacity of the local governmental units to fully plan for, implement, operate, maintain and manage their own activities. Budgetary resources for both capital investment and operations have fallen short of actual needs of local government to expand their services relative to population growth. The water and sewer systems are totally inadequate in terms of their capacity and condition to serve the minimum needs of the cities.

In general, the growth of Minia, Beni Suef, and Fayoum has outstripped the capacity of the existing infrastructure to provide adequate services. Each of the cities has a public water system owned and operated by the city. In the case of Fayoum, the city's water treatment plant is supplemented by a General Organization for Potable Water plant that was originally designed to serve the rural areas of the governorate but part of the production is now used by the city because of the city's needs. Each of the cities also has wastewater treatment facilities. Both water and wastewater system facilities coverage is inadequate with the poorer areas of the city least served. Planning for future expansion has been almost non-existent, being done on an ad hoc basis, mostly because of the uncertainty of funds and the lack of planning expertise. Operation and maintenance is again hampered by budgetary constraints, lack of staffing, and lack of planning.

Infrastructure Needs

The water and wastewater systems of the three cities were decades old and had suffered from lack of proper operation and maintenance. Moreover, they were totally inadequate in terms of capacity and level

¹⁴⁶ Final Report, Middle Egypt Utilities Institutional Strengthening Project, June 2005

of treatment.¹⁴⁷ Low water pressure, low or nonexistent level of treatment of the water supply systems, and absence of standby and emergency capacity were typical problems associated with the level of water supply services. The wastewater infrastructure problems were worse. Large areas of the cities, in some instances more than sixty percent, were not served with sewers. These were predominantly the lower income families. Wastewater treatment was nominal and in some cases only a portion of the influent wastewater received treatment, with the remaining being discharged without any treatment at all.¹⁴⁸

Institutional and Operational Issues

There were significant institutional weaknesses at the national, governorate and local level associated with the capability and availability of personnel to oversee the design and construction of the planned infrastructure. Moreover, there were the usual financial management constraints - addressed in the sector constraints at the beginning of this section - that presented serious challenges not only in the financial management of the project but in the utility financial management as well. While the existing facilities were “operational”, there were major gaps in the number and types of personnel needed to provide efficient and effective operation and maintenance in a sustainable manner. Finally, improvements in cost recovery, autonomy and self-sufficiency, and customer services were needed.

Assessment of Problem Resolution

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries’ needs:

The findings presented in this section apply only to the infrastructure interventions of project 263-0127, since there has not been a Project Completion Assistance Report (PACR) done for project 263-0270. From the PACR of project 263-0127¹⁴⁹, it appears that the quantitative constraints addressed in the Project Paper - increase in water supply and wastewater collection - have been resolved. The improvement of wastewater treatment was reported as partially achieved.

Sub-Criterion 1.a is, at best, satisfactorily achieved.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

There are no sufficient data to rank this sub-criterion. The PACR for project 263-0127 did not address this issue and, as mentioned previously, there is no PACR for the Egypt Utilities Management (Middle Egypt) project. 263-0270.

Sub-criterion 1.c—Relevance of Grant Amendments and Design Modifications in Response to Changes on the Ground:

Following mid-term evaluations conducted in 1984, there were Grant Agreement amendments and project modifications that addressed remaining needs and conditions that required resolution. It appears that these modifications were relevant, based on the needs identified by the mid-term evaluations.

Sub-Criterion 1.b is, thus, satisfactorily achieved.

147 Project Paper, Mid-Egypt, Provincial Cities Development, Aug. 1981

148 Project Paper, Mid-Egypt, Provincial Cities Development, Aug. 1981

149 Project Assistance Completion Report, Provincial Cities Development, September 2000

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

Based on the PACR of project 263-0127, all construction elements have been effectively completed in accordance to the Project Paper and its modifications. In the institutional strengthening area, there were solid accomplishments. The financial viability of the three utilities improved considerably since the USAID assistance began. Both cost recovery and collection rate of bills issued increased. Automated financial systems replaced poorly functioning or non-existent manual systems. Cost accounting now provides utility managers with the actual costs of operating various systems. O&M systems including standard operating and maintenance procedures, record keeping, and preventive maintenance allow managers at all levels to monitor plant operations, record production, and respond to operational problems. Geographic Information Systems (GIS) now cover all major urban networks and some village networks. Public awareness campaigns encouraged good customer behavior, such as getting legal connections, paying bills on time, and seeking assistance from customer service centers when facing problems.

Sub-Criterion 2.a is, thus, satisfactorily achieved.

Sub-Criterion 2.b—Problem Resolution:

The USAID interventions implemented through projects 263-0127, 263-0161 and 263-0270 were successful in resolving the problems identified in the project papers and related amendments. In the area of water systems, the supply of water increased from 48 liters per capita per day (lcd) to 110 lcd after the project was completed.¹⁵⁰

The technical capabilities of the three cities in design and construction oversight improved considerably. Also, there were improvements in the number and level of utility operations and management. As mentioned in the previous sub-criterion, there were important improvements in financial and operational management systems that resulted in more effective and efficient operations.

Sub-Criterion 2.b is, thus, satisfactorily achieved.

3. Outcomes

Sub-Criterion 3.a—Assessment of Impacts (positive or negative) on Health and Environment:

There is not sufficient data to evaluate and rank this sub-criterion as the PACR for the Provincial Cities Development (Middle Egypt) project - 263-0127 - did not address this issue and there is no PACR for the Egypt Utilities Management (Middle Egypt) project - 263-0270.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

Similarly, there are not sufficient data to evaluate and rank this sub-criterion either.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

There are not sufficient data on the impact of the projects on the operational performance of utilities and the evaluation team was not able to conduct site visits to any of the facilities of Middle Egypt due to time constraints.

150 Project Assistance Completion Report, Provincial Cities Development, September 2000

Regarding the impact on the financial performance of the utilities, however, there is ample evidence from the annual monitoring of SpO 18 that there were measurable and positive impacts. The most important was the increase of the rate of bills collected. The collection rate increased from 78 percent in 1999 to 98 percent in FY 2004, which was the last available monitoring report.¹⁵¹ The target for not accounted-for water was met, although the level of this indicator for the Middle Egypt utilities remains exceedingly high - 37 percent of water produced is not accounted for. Finally, the cost recovery indicator was not met, although there has been significant improvement in cost recovery from 43 percent in the 1999 base year to 91 percent in FY 2004.¹⁵²

Sub-Criterion 3.b is, thus, substantively met.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

The institutional strengthening accomplishments of project of 263-0270 were perhaps the most noteworthy in this intervention. Based on the performance indicators of SpO 18, Middle Egypt performed as well, if not better, than the other utilities that received similar assistance from USAID. Considering, however, that these efforts were just completed, it is very premature to pass judgment on the long-term sustainability of the utilities with a high level of reliability. The jury is still out. Based on other “older” projects, utilities can often fall back into old, bad management practices.

Sub-Criterion 4.a is, thus, likely achieved.

Sub-Criterion 4.b—Physical Facility Sustainability:

The first PACR for project 263-0127 addressed the physical sustainability issue peripherally and there is no PACR for project 263-0270. Moreover, the evaluation team was not able to conduct site evaluations of the three utilities because of lack of sufficient time. Thus, the sub-criterion could not be evaluated or ranked.

Sub-Criterion 4.c—Financial Sustainability:

As mentioned in sub-criterion 1.b, significant improvements were accomplished in the financial viability area of institutional strengthening. Despite these improvements, however, full cost recovery remained as elusive as ever by the end of 2004 and water produced and not accounted for remains a big concern. After initial tariff increases and improvements in collection of bills overdue, these improvements have leveled off and, in some instances, regressed. This is a case for concern in terms of long-term financial sustainability. On the positive side, the establishment of the Holding Company is a reason for limited optimism.

Sub-Criterion 1.b is, thus, likely achieved.

151 Final Report: FY 2004 Performance Monitoring Reporting for USAID/Egypt’s Infrastructure Program (Oct 2005), USAID/Egypt

152 Project Assistance Completion Report, Provincial Cities Development, September 2000

Middle Egypt (Provincial Cities) Development: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	3	3
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	N/A	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	3	
Effectiveness	Project accomplishments	3	3
	Problem resolution	3	
Outcomes	Impacts (positive or negative) on health and environment.	N/A	3
	Economic and social impact on beneficiaries	N/A	
	Impact on the financial and operational performance of the utility	3	
Sustainability	Institutional sustainability	3	3
	Physical facilities sustainability	N/A	
	Financial sustainability	3	
Overall			3

Rating Scale

Scale	Relevance, Effectiveness	Outcomes	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Middle Egypt Development Project: SpO 18 Assessment (FY 2004)

Indicator-specific Ratings		
SO or IR Level Indicator	Performance Indicator	Rating
SpO 18: Access to Sustainable Utility Services in Selected Areas Increased	18.a – Cumulative number of people with new or improved water or wastewater service in selected areas	<i>Met target</i>
	18.c – Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector	<i>Did not meet target</i>
IR 18.1 Utility Services Enhanced	18.1.a – Percent increase (relative to baseline) in capacity of selected water and wastewater utilities	<i>NA</i>
IR 18.2 Commercialization of Utilities Enhanced	18.2.a – Percent of produced water not accounted for	<i>Exceeded target</i>
	18.2.b – Percent of annual billings collected for water and wastewater sold	<i>Exceeded target</i>

Indicator-specific Ratings		
SO or IR Level Indicator	Performance Indicator	Rating
IR 18.3 Legal and Regulatory Framework Established	18.3.a – Cumulative number of legal and regulatory milestones attained	NA

Secondary Cities Development

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0236	Secondary Cities Development	1994-2005	325,000	To expand and develop sustainable, replicable, water/wastewater facilities in selected urban centers in Egypt.

Review of Problem

The early infrastructure development efforts by USAID and GOE focused on the large urban centers of Cairo, Alexandria, and Canal Cities where the needs for rehabilitation and expansion of the water and wastewater were the most urgent. The governorates and the National Organization for Potable Water and Sanitary Drainage (NOPWASD) were responsible for improving water and wastewater services to the remaining population. NOPWASD had a backlog of 200 secondary cities that had requested GOE assistance to construct new water and wastewater treatment facilities and networks or to expand and rehabilitate existing facilities. NOPWASD was trying to address top priority needs through their centrally funded budget and from international donors, but institutional weaknesses compounded its problem.

Moreover, despite considerable institutional strengthening efforts, the sustainability of USAID's future investments in the water and wastewater sectors were jeopardized by inappropriate policies and institutional arrangements caused by overly centralized GOE control and lack of budgetary resources. Weaknesses in the GOE water and wastewater sector were evident in the local entities that operated, managed and maintained the water and wastewater facilities. The Secondary Cities project aimed, therefore, to develop a sustainable new generation of water and wastewater projects that could serve as models for more generalized institutional reform within the sector.

End of Project Status

At the end of this project, it is expected that the following will be accomplished:

1. Infrastructure constructed, operated and maintained at design capacity in eight selected cities. Safe water and adequate sewerage systems will be provided for the project's beneficiaries.
12. Entities responsible for operation and maintenance of water/wastewater systems in eight selected cities operating autonomously.

Health and Environmental Analysis

Extensive research has been conducted in Egypt into the water- and wastewater borne diseases by the Naval Medical Research Unit and the Ministry of Health. These studies indicate that diseases such as

cholera and typhoid fever, are communicated to the general Egyptian population through contact with improperly treated water or by unsanitary disposal of sewage. Accurate information regarding specific health conditions in selected cities, however, is not available.

Significant long-term positive environmental benefits were anticipated for the proposed improvements for water supply and wastewater treatment at all sites.

Economic Considerations

An analysis of the proposed sub-projects was conducted. Benefits of improved water systems result from: greater access to potable water by households and businesses; higher quality water services; and lower water production and delivery costs. The benefits of wastewater system enhancements result from more households and businesses being connected to wastewater systems.

In general, a willingness-to-pay approach was used to estimate most of the economic benefits resulting from water/wastewater system improvements. Evidence of what consumers actually pay for water/wastewater services was used to provide estimates of the economic benefits they receive from such services. Since waste/wastewater tariffs are not market determined, and are exceedingly low, non-tariff measures of willingness-to-pay have been used. For example, the typical payment to water vendors by families not served by piped water was used as a measure of the benefits of providing such families with piped water, while the costs of roof water tanks was used to value the benefits of improved water services. Similarly, the benefit of increased sewer connections was valued in terms of what un-sewered households pay to have wastewater vaults emptied on a regular basis.

This approach to estimating benefits, however, is apt to provide a lower bound estimate of benefits, as it does not take in consideration the much higher quality of services that would be provided under the project. In addition, a variety of environmental and health-related benefits, which are largely external to the specific consumers, are probably not reflected in the benefit estimates. Both factors lead to a likely understating of the actual economic returns to particular sub-projects.

Social Considerations and Beneficiaries

The Secondary Cities Project focused on, among other things, improving the quality of life of the residents in the selected cities. Although Cairo and Alexandria represented approximately one-fourth of Egypt's population, they had been receiving three-fourths of USAID/Egypt's funds allocated for the water and wastewater sector. The selected beneficiary cities for the Secondary Cities Project were located among three geographic zones: (1) The Nile Delta (Mansoura); (2) Upper Egypt (Luxor, and Aswan Group); and (3) The Red Sea (Sharm El Sheikh and Nuweiba). The objective was for the entire population of these selected cities to benefit either directly or indirectly from this project. A comprehensive communications strategy was developed, which was flexible and appropriate to the community's socio-economic status and value systems.

The residents of the selected cities have indicated a willingness to pay for O&M costs provided that adequate services are available. The socio-economic/cultural indicators such as poverty, type of activities, willingness to pay and political involvement among the three zones were identified during the design stage.

Institutional Analysis (Organizations)

During project design, a preliminary analysis was conducted of the operation and maintenance requirements of the project interventions. Various institutional reform options were explored in light of ownership, operation, and maintenance of existing and planned facilities. The objective of the analysis was to develop (for each location) an institutional arrangement that would support long-term sustainability of the utility.

Existing Arrangements: Service in the cities is provided by Category IV Organizations - governmental divisions within the organizational structure of the local entity, with engineering departments reporting to the markaz organization or local departments of the Ministry of Housing and Public Utilities. Specific organizations for water supply and sanitary drainage did not exist. At the governorate level, the service is only one of a number of services provided by the Housing Directorate. A similar situation exists at the city level. There are interesting variations to this, however.

GOE Implementing Agencies: NOPWASD has served as the implementing agency for all Water/Wastewater projects funded by USAID since 1979¹⁵³. Under previous USAID-funded projects, local water/wastewater departments, which are responsible for the O&M of the facilities, played no role in the design and construction of physical facilities.

NOPWASD is burdened with a bureaucratic system in which an action on even the smallest of tasks gets bogged down in complex review and approval processes. All of the decision making authority is centered in the position of its Chairman and USAID experienced numerous difficulties for this reason during the implementation of the Canal Cities and Provincial Cities projects.

Technical Analysis

The technical analysis assessed the existing facilities in terms of type, size, characteristics, condition, general location and availability of qualified staff to operate and maintain. The current value and remaining useful life of the existing facilities were examined. The feasibility of alternative water and wastewater infrastructure interventions was analyzed. The type, size, characteristics, and general location of the future facilities along with the level of additional environmental study were identified. O&M costs, construction time, and useful life of the proposed infrastructure were estimated. Probable population/tourism growth rates and city Master Plan needs were developed and preliminary recommendations for actual water/wastewater systems made.

The proposed interventions (new plant construction or expansion of existing facilities) at each site are different depending upon local needs and capabilities. The water/wastewater treatment approaches which were proposed are ones with a proven successful track record in Egypt. Selection of appropriate technologies for each site was highly site-specific.

Project Outputs

The activities proposed in the Secondary Cities Development project include the provision of water and/or wastewater treatment facilities in each of the project cities, selective rehabilitation and expansion of the water distribution and wastewater collection systems, and institutional reform to achieve long term sustainability and financial viability of the entities responsible for operation and maintenance of the infrastructure provided.

Assessment of Problem Resolution

USAID, with the support of the GOE, conceived the Secondary Cities Results Package project in 1992 as a demonstration of decentralized water and wastewater sector improvements for a diverse selection of cities in Egypt. Government reforms and institutional development assistance programs for the candidate cities were needed to provide the framework for the emerging independent public utility operations. Engineering designs for new and rehabilitated water and wastewater facilities were directed towards establishing viable utility works that would meet the current and future demands of the population in the

153 With the exception of the projects implemented in Cairo, Alexandria and the water projects in the three Canal Cities.

selected cities. This dual track approach resulted in parallel programs: an Institutional Development Services Contract (IDS) and an Engineering Design/Construction Management Contract (ED/CM).

The ED/CM developed five construction packages:

- New Mansoura water treatment plant and rehabilitation of the existing Mansoura water treatment plant.
- Aswan Cities water and wastewater facilities
- Luxor wastewater facilities
- Mansoura water and wastewater facilities
- Nuweiba water and wastewater facilities

1. Relevance

Sub-Criterion 1.a—Relevance of infrastructure interventions to identified beneficiaries' needs:

The water and wastewater systems that existed before the Secondary Cities Project (SCP) were either inadequate in terms of capacity or their components needed considerable rehabilitation to function properly. The new/upgraded facilities increased the capacity of water supply and wastewater collection and treatment by 63 percent from the base line of 1999, and more than 1.6 million persons had access to new or improved water or wastewater systems.¹⁵⁴

Sub-Criterion 1.a is, therefore, satisfactorily achieved.

Sub-Criterion 1.b—Utilization of appropriate technologies to problem resolution in accordance with international norms and standards:

Utilizing appropriate technologies to resolve problems in developing countries is often a serious challenge. Implementing agencies or engineering companies sometimes lose sight of the fact that simple is better and instead proceed with the design and construction of facilities that are either too complex and/or expensive to operate and maintain on a sustainable basis. It was refreshing to see that simple and appropriate technologies were used in the SCP¹⁵⁵, e.g. the use of lagoons and reuse of the wastewater effluent were excellent choices.

Sub-Criterion 1.b is, thus, very satisfactorily achieved.

Sub-Criterion 1.c—Relevance of Grant amendments and design modifications in response to changes on the ground:

There is not sufficient information to evaluate this sub-criterion as no PACR has been prepared for the SCP.

154 Final Report: FY 2004 Performance Monitoring Reporting for USAID/Egypt's Infrastructure Program (Oct 2005), USAID/Egypt

155 Final Evaluation Report, Wastewater Facilities for the City of Luxor, December 2004, CDM; Final Evaluation Report, Mansoura New Water Treatment Plant, September 2004, CDM; Final Evaluation Report, Water and Wastewater Facilities for the City of Nuweiba, Sept. 2004, CDM; Final Evaluation Report, Contract D and FARA no. 2, Mansoura, October 2005, CDM

2. Effectiveness

Sub-Criterion 2.a—Project Accomplishments:

The ED/CM component of the SCP undertook urgently needed infrastructure improvements in the water and wastewater systems and successfully implemented them. In the IDS component, there were important accomplishments in the four utilities that received technical assistance. Some of the key accomplishments include:

- Establishment of a regional training facility in Daqahliya PEA.
- Performance of hydraulic modeling studies in Mansoura, Aswan and Luxor.
- Development and implementation of a governorate-wide O&M contract in South Sinai.
- Performance of multiple, governorate-wide staff rationalization studies in Aswan PEA.
- Delivery of numerous engineering and technical assistance services (mapping, leak detection and waste control, inventory management, O&M budgeting, capital investments planning, and sewer cleaning) to selected non-project cities/areas.
- Advisory services to develop and implement effluent reuse schemes in Nuweiba, Nasr El-Noba, Balana, and Luxor.
- Advisory assistance in replicating IDS successes—automated billing and collections, personnel, payroll, inventory, fixed assets and general ledger systems— in non-project areas.

Together these “add-on” initiatives increased the number of project beneficiaries fourfold from 1.6 million to 6.7 million and greatly expanded the engineering and technical services scope of work.

Sub-Criterion 2.a is, thus, satisfactorily achieved.

Sub-Criterion 2.b—Problem Resolution:

At the end of this project, it was expected that the following would be accomplished:

1. Infrastructure constructed, operated and maintained at design capacity in eight selected cities: Increased capacity will result from the construction of new facilities and/or rehabilitation of existing ones. Safe water and adequate sewerage systems will be provided for the project’s beneficiaries.
13. The entities responsible for operation and maintenance of water/wastewater systems in the eight selected cities would be operating autonomously.

The activities proposed included the provision of water and/or wastewater treatment facilities to each of the project cities, selective rehabilitation and expansion of the water distribution and wastewater collection systems, and institutional reform to achieve long term sustainability and financial viability of the entities responsible for operation and maintenance of the infrastructure.

While the construction of the infrastructure and the institutional reforms were accomplished, the project fell short in the financial sustainability of the utilities. More on this will be addressed below under sustainability.

Sub-Criterion 2.b is, therefore satisfactorily achieved.

3. Outcomes

Sub-Criterion 3.a—Impacts (positive or negative) on Health and Environment:

Among the impacts that are expected to result from the implementation of water and sanitation projects is a reduction in the burden of water-borne diseases in the involved communities. While most of the other

USAID infrastructure projects have assumed that positive health and environmental impacts are associated with improved water and sanitation, the SCP was able to conduct research into the incidence of water-borne diseases in the project areas and produce credible data that showed declining trends in the incidence of some diseases that can be attributed, at least in part, to project impacts.¹⁵⁶

The health benefits varied according to regional and environmental conditions in each of the communities. For example, schistosomiasis is more prevalent in Lower Egypt, while diarrhea-related illnesses are less common in Upper Egypt because of drier climate.

Child deaths (under age 5) due to diarrheal illness declined between 10 to 22 percent from the pre-project mortality burden in the SCP communities. Schistosomiasis also declined, especially in the Delta area of Mansoura. Although schistosomiasis had begun a downward trend prior to the completion of the project's improvements, the incidence declined more rapidly during the period when results of project-related water and sanitation systems improvements began to be experienced at the household level. Modest declines in incidences (5 percent) of hepatitis A, typhoid and paratyphoid were also observed as a result of the project's improvements in water and wastewater services.¹⁵⁷

Sub-Criterion 3.a is, thus, substantively met.

Sub-Criterion 3.b—Economic and social impact on beneficiaries

Based on the findings of an economic impact assessment of the SCP, there was a highly beneficial impact on the project communities and the Egyptian economy that will last for many years.¹⁵⁸ Given that the communities of Luxor, Aswan and South Sinai are among the top tourist destinations in Egypt and as such responsible for the bulk of revenues generated from tourism, these benefits receive additional importance. Moreover, improvements in the health of the community have a positive impact on the social wellbeing of its residents.

Sub-Criterion 3.b is, therefore, substantively achieved.

Sub-Criterion 3.c—Impact on the financial and operational performance of utility:

Significant improvements materialized in the operation of the utilities in the SCP communities, such as mapping, leak detection and waste control, inventory management, O&M budgeting, capital investments planning, and sewer cleaning. Public awareness and customer care improvements were responsible for increases in the collection of past due bills and improvements in overall cost recovery. As no site visits in the Secondary Cities were possible during this evaluation, an assessment in the operational and maintenance practices of the constructed facilities is not possible.

Sub-Criterion 3.c is, therefore, substantively achieved.

4. Sustainability

Sub-Criterion 4.a—Institutional Sustainability:

The IDS/SCP was the longest institutional strengthening intervention in the history of USAID/Egypt and with the most far reaching and ambitious agenda. One of the challenges that the IDS faced was the utilities receiving assistance were located in widely dispersed geographical areas and represented a broad spectrum of socio-economic conditions. Further complicating this challenge was the fact that the organizational arrangements ultimately adopted by the four utilities assisted did not exist at project start-

156 Assessment of Economic Impacts of the Secondary Cities Project, June 2004

157 Ibid.

158 Ibid.

up, and prevailing service delivery systems, cost structures, and treatment technologies varied from one location to another.

Although it was not possible to interview local utility managers and observe administrative, financial, and operational practices first hand during this evaluation process, it can be safely concluded, from reviewing relevant documents and from past experiences with the annual SPO 18 monitoring process, that the institutional interventions were positive and will have a sustainable effect on the four utilities.

Sub-Criterion 4.a is, therefore, likely met.

Sub-Criterion 4.b—Physical Facility Sustainability:

There is no PACR for project 263-0236 by the time this evaluation was conducted. Moreover, the evaluation team was not able to conduct site evaluations of the four utilities because of the lack of sufficient time and so an evaluation and ranking of this sub-criterion is not possible.

Sub-Criterion 4.c—Financial Sustainability:

Overall, the SCP activities had a major positive impact on the lives of people and the local utilities in the four involved governorates. One of the disappointing aspects of the IDS, however, is that most of the utility organizations continue to function at less than full cost recovery. The results of the SpO 18 for FY 2004 show that cost recovery was achieved (107%), up significantly from the 51 percent in the 1999 base-line year. This reading is misleading, however. Luxor had a cost recovery rate of 200 percent in 2004 due to the collection of a huge amount in arrears that skewed the actual values for that year for all four utilities. During the same period, Mansoura and Aswan had an average cost recovery of only 64 percent, which is only slightly higher than in 1999. In fact, Mansoura's cost recovery has regressed since 1999. Additionally, unaccounted for water is shown as exceeding its target in 2004 mostly because the target value for that year was significantly raised. In fact, this indicator was 49 percent, up from 43 percent reported in the 1999 base-line year. This is a troublesome trend as the rate of water losses has not improved. About fifty percent of all water produced is not accounted for, and thus not billed. Finally, the rate of bills collected has dropped since the 1999 base-line year.

Because of all these discouraging trends, financial sustainability in the four utilities is questionable at this point and it is an area that should receive particular attention from the Holding Company.

Sub-Criterion 4.c is, therefore, not likely met.

Secondary Cities Development: Project Rating

Criteria	Sub-criteria	Sub-set Rating	Criterion Rating
Relevance	Relevance of infrastructure interventions to identified beneficiaries' needs	3	3.5
	Utilization of appropriate technologies to problem resolution in accordance with international norms and standards	4	
	Relevance of Grant Amendments and design modifications in response to changes on the ground.	N/A	
Effectiveness	Project accomplishments	3	3
	Problem resolution	3	
Outcomes	Impacts (positive or negative) on health and environment.	3	3
	Economic and social impact on beneficiaries	3	

	Impact on the financial and operational performance of the utility	3	
Sustainability	Institutional sustainability	3	2.5
	Physical facilities sustainability	N/A	
	Financial sustainability	2	
Overall			3

Rating Scale

Scale	Relevance, Effectiveness	Outcomes	Sustainability	Overall Rating
4	Very Satisfactory	High	Very Likely	Very Satisfactory
3	Satisfactory	Substantive	Likely	Satisfactory
2	Marginal	Modest	Not Likely	Marginal
1	Poor	Negligible	Unlikely	Poor

Secondary Cities Development Project SpO 18 Assessment (FY 2004)

Indicator-specific Ratings		
SO or IR Level Indicator	Performance Indicator	Rating
SpO 18: Access to Sustainable Utility Services in Selected Areas Increased	18.a – Cumulative number of people with new or improved water or wastewater service in selected areas	<i>Exceeded target</i>
	18.c – Percent of operation and maintenance costs covered by collected revenue in the water and wastewater sector	<i>Exceeded target</i>
IR 18.1 Utility Services Enhanced	18.1.a – Percent increase (relative to baseline) in capacity of selected water and wastewater utilities	<i>Exceeded target</i>
IR 18.2 Commercialization of Utilities Enhanced	18.2.a – Percent of produced water not accounted for	<i>Exceeded target</i>
	18.2.b – Percent of annual billings collected for water and wastewater sold	<i>Did not meet target</i>
IR 18.3 Legal and Regulatory Framework Established	18.3.a – Cumulative number of legal and regulatory milestones attained	NA

APPENDIX VI: POWER SECTOR - PROJECT BY PROJECT ANALYSIS

Electric Power Distribution

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0001	Electric Power Distribution	1975-1980	29,834	To restore the electric power distribution infrastructure in the cities of Port Said, Ismailia, and Suez in order to facilitate industry and commerce in the Canal Zone.

Status at Inception:

Following the 1973 Yom Kippur war with Israel and the withdrawal of Israeli troops from the Suez Canal area, the canal cities of Port Said, Ismailia, and Suez were returned to Egyptian control. The infrastructure in these cities had suffered considerable damage and deterioration due to conflict and neglect. The Government of Egypt established these cities' infrastructures' rehabilitation as a high priority as part of an economic recovery plan. In 1974, based on an assessment of the state of the power networks in these cities, the Government of Egypt presented USAID a request for assistance to finance their rehabilitation. USAID mobilized the engineering firm Sanderson & Porter to prepare a complete set of project specifications and bid documents for the rehabilitation of the three cities' 11-kV and 380-volt distribution networks. Sanderson & Porter were subsequently retained to assist in the entire procurement process at the request of the GOE. Westinghouse was selected as the prime contractor for the bulk of the rehabilitation work, with multiple commodity suppliers selected as sub-contractors.

Project Highlights and Overview:

USAID contracted with an engineering and construction firm to address the damage and deterioration of the power distribution networks in Port Said, Ismailia, and Suez that had resulted from years of neglect and armed conflict with Israel. USAID's contractors collaborated with the Egyptian General Egyptian Electricity Corporation on the preparation of bid documents for selected rehabilitation activities. Upon review and approval, USAID provided a grant of \$30 million to cover the foreign-exchange portion of the costs of the selected rehabilitation activities.

Outputs and Outcomes:

Materials procured with this funding included transformers, switchgear, cables, and heavy machinery for associated construction and equipment installation. Surplus materials (cables) were subsequently transferred for use under a separate USAID project for network rehabilitation in (predominantly) Alexandria (USAID project 263-0033). These materials' installation, despite delays, benefited the residents and commercial customers in the Port Said, Ismailia, and Suez areas. The project assistance completion report attributes the emergence of commercial and industrial developments to the improvements in the power system that this project delivered.

Comments and Lessons Learned:

The rehabilitation of the electricity networks in the three cities of Port Said, Ismailia, and Suez contributed to the economic recovery in the Canal Zone. In the associated Project Completion Report, USAID project officers opined that implementation was largely efficient, and that materials were procured and available for installation within 18 to 24 months from project inception. A few instances of

excess (and inappropriate) material were observed. USAID project officers suggested that the project might have been more efficiently implemented had it been handled as a commodity import activity. Project monitoring was stifled by a lack of on-site oversight by US project managers and USAID representatives. Finally, it appears that residual funding available towards the end of the project may have been expended for its own sake, without careful and rigorous evaluation of project needs. The USAID project completion report contains the suggestion that future late-term expenditures of residual funds be subjected to closer scrutiny.

Conclusions:

Notwithstanding noted deficiencies and faults during implementation, this rehabilitation activity was successful in accelerating the restoration of service to the affected service areas, contributing to economic recovery and stability in the Canal Zone.

Rating: Met Expectations

Helwan and Talkha Gas Turbine Plants

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0008	Helwan and Talkha Gas Turbine Plants	1976-1980	69,000	To fund the construction of one 120 MW gas turbine generator plant at Helwan, and one 180 MW gas turbine generator plant at Talkha, to provide power for Egypt's continued industrial expansion and urban growth, and to help improve welfare and living conditions in urban and rural areas.

LOP Funding: \$29,834,000 (1975 original obligation: \$30,000,000)

Status at Inception:

In 1976 the Egyptian Electricity Authority (EEA) remained an operational organization within the Ministry of Electricity, divided into four main departments: Manpower, Finance and Economy, Operations, and Study, Research and Projects. Operationally, the EEA remained separated into five operating zones, which operated independently from one another with separate generation, transmission, and distribution facilities and associated business/commercial functional departments (billing and collections.)

Accounts of EEA's finances in the early to mid 1970s are peculiar. While average tariffs were set at just under \$0.02 per kWh (roughly equivalent to prevailing rates in the US), and while the price paid for fuel was roughly 25 percent that of US prices, the EEA managed to operate in the red. This operational loss was attributable largely to low collection levels and high levels of accumulated arrearages. The Government's attempts (enacted in 1975) to rectify this situation amounted to a simple increase in final end-user tariffs to \$0.03 per kWh, which clearly failed to address the underlying causes of the EEA's financial ills – low rate of revenues due to an inability to enforce fiscal discipline on end-users.

Project Highlights and Overview:

USAID's program to support the installation of the Helwan and Talkha gas turbines addressed the then-current financial situation of the EEA. USAID proposed conditions that would require the EEA's tariff to increase to allow for a return to equity (RTE) of nine percent. This condition was essentially a nominal

one, as the increase in retail tariff levels described above would, if properly applied, have allowed for this target RTE level.

Assumptions¹⁵⁹ underlying the Helwan and Talkha gas-turbine installations included annual revenues of approximately \$25 million, based on an 80 percent load factor and operation at 3500 hours per year, with a retail tariff established at the new, higher rate of \$0.03 per kWh. Operating costs assumed for the plant were estimated based on the subsidized fuel rate and low labor costs, summarized here:

- Fuel Costs: \$8,769,280
- Salaries: \$68,000
- Maintenance: \$660,000
- Total Operating Costs: \$9,497,280

Using these values, the Helwan and Talkha gas-turbine investments were projected to yield a payback period of just 6.5 years, corresponding to an internal Financial Rate of Return of 20 percent, with a net profit before interest, taxes, and head-office administrative charges of \$10.3 million annually.

The economic analysis conducted as part of the Helwan and Talkha gas-turbine project preparation was admittedly and necessarily deficient due to the gross distortions within the power sector and the Egyptian economy. The economic value of electricity supplied to end-users could not be reliably determined due to a variety of factors. Most importantly, customers' demand profiles and elasticities were impossible to determine due to imbedded distortions in the form of price subsidies and rationing. In negotiating and justifying to USAID the investments in the Helwan and Talkha plant, the GOE attempted to assure USAID that the rate of return to these investments would be "reasonable," as defined by the GOE. At the time, USAID documented its observation that the heavily subsidized fuel deliveries to the power sector represented a considerable drain on the national economy, and suggested that a rate increase to \$0.035 would be necessary to fully capture the cost of power provision.

In choosing gas-turbine technology over more traditional steam-turbine generators, project designers conceded that the gas-turbine technology was inferior in simple terms of economic efficiency. Nevertheless, gas-turbines were chosen due to the speed with which they could be brought on-line – within 30 months from inception to commissioning – to meet Egypt's urgent load requirements. The commissioning of a steam-turbine plant was estimated to require an additional two years from inception to commissioning, which was considered an inadmissibly incremental period.

The project authors' analysis of the value of the Helwan and Talkha project factored in all costs, including the expansion of the transmission and distribution networks in order to accommodate the new generation capacity and an assumed 500 percent increase in the value of fuel stock used to supply the plant (using Gulf crude costs as a proxy.) Their estimate of the true marginal cost of power supplied by the Helwan and Talkha plants was \$0.063 per kWh, assuming a target RTE of 10 percent. The project's authors noted that this cost was indicative of a future trend in costs of power in Egypt, as new generation with similar marginal cost profiles would be brought on to satisfy the rising demand in the economy.

On the benefits side, the Helwan and Talkha power plants were assumed to deliver a number of direct and indirect benefits. The increased availability of power in the Helwan and Talkha industrial areas was assumed to provide opportunity for employment expansion; and also mitigate hitherto seasonal employment fluctuations caused during periods of reduced power availability when hydroelectric capacity in the country declined during drier months and per seasonal agricultural requirements.

Approximately one year after project inception (in June 1977), project consultants Gilbert Associates/Gilbert and Commonwealth completed a preliminary project report with a revised cost

159 USAID Project Paper for *Helwan and Talkha Gas Turbine Plants* project, financial assumptions pp. 20-21.

estimate for the Helwan and Talkha gas-turbine investments. The revised estimate placed the final cost of the project at \$69 million. While the GOE was formally required, per the terms of the previously signed agreement with USAID, to cover from their own resources all costs in excess of the original \$50 million USAID-provided loan for this project, the GOE proved incapable of complying with this requirement in a sufficiently timely manner to allow the project to proceed on-course. Given the project urgency, and the additional cost that further delays might entail, USAID agreed to extend an additional loan of \$19 million to cover the increased cost of the project. The increases in cost estimates were attributed to a difference of \$12 million in equipment costs, \$1 million in pre-commissioning costs, \$750,000 in engineering, and sundry contingency costs.

In approving the additional \$19 million facility, the USAID project authors highlighted a number of discrepancies in underlying assumptions on the state and projected requirements of the Egyptian power system that formed the basis for the original project approval. USAID's analysis revealed that original projections for the system's capacity and assumptions on load growth rendered all the more urgent that the Helwan and Talkha project be brought to completion - the generation deficiency appeared to be even more acute than originally understood. Further, additional capacity would need to be brought on line more quickly than previously anticipated.

Outputs and Outcomes:

USAID's contribution to the construction of the Helwan and Talkha gas turbine plants included the foreign exchange portion of all equipment and materials for the plants' construction. Additionally, subsequent to project inception, USAID increased its support in order to cover, *inter alia*, costs associated with civil and construction works carried out by non-Egyptian firms. (Originally, the GOE was scheduled to cover local costs. It was after inception that it was discovered that no Egyptian firms were available or capable to undertake the civil works and other construction work required.)

The addition of the Helwan and Talkha plants' capacities increased generation capacity by 300 MW, which in 1981 amounted to just over six percent of total *nameplate* capacity in the country of 4900 MW (usable capacity was somewhat less at just under 4000 MW due to disrepair of major facilities, including the High Dam.)

Conclusions: The Helwan and Talkha project was intended to fill an urgent need in expanded generation capacity. Its design, however, was deficient in the assumptions underlying it on the growth in demand that the new capacity was designed to satisfy. Cost overruns also plagued the project. As will be seen in the implementation of future generation expansion programs sponsored by USAID (i.e. the combined-cycle expansion at the Talkha plant), the engagement of a turn-key implementer can transfer risk for most aspects of project completion to the prime contractor. This risk-mitigation approach was not employed for this project.

Rating: Met Expectations

Abu Sultan (Ismailia) Thermal Power Plant

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0009	Abu Sultan (Ismailia) Thermal Power Plant	1976-1988	250,000	To fund the construction of a 300 MW thermal power plant (steam turbine) near the city of Ismailia in the Suez Canal area, as part of US assistance for the recovery of the Suez Canal area whose infrastructure was badly damaged during the long period of intermittent warfare.

LOP Funding: \$249,576,000 (1976 original obligation: \$99,000,000; Amended 1977 to \$141,000,000; Amended 1983 to \$250,000,000)

Status at Inception:

With the economic recovery that followed the cessation of hostilities with Israel after 1973, demand for electric power began to climb at a rapid rate. Projections of growth of in excess of 10 percent per year were assumed in 1976 as USAID prepared to support the Abu Sultan (Ismailia) thermal power plant's construction (in parallel to the gas turbines at Helwan and Talkha.) The installation of an additional 300 MW at Abu Sultan (Ismailia) was seen as indispensable in order to provide for adequate reserve margins for safe system operation, given its isolation from other national grids and the vulnerability to system instability in cases of failure of the 500 kV lines delivering power from the Aswan and High Dam in southern Egypt.

Project Highlights and Overview:

The Abu Sultan (Ismailia) Thermal Power Plant project was conceived of as part of a complex of US Government assistance for the rehabilitation of the Suez Canal area whose infrastructure and basic facilities had suffered severe damage during the prolonged period of intermittent warfare between 1967 and 1973. This broader program included the reconstruction of an industrial base, as well as housing facilities for the population that would return as reconstruction progressed. The 300 MW Ismailia power plant would form a central part of this program, electric power availability being a critical element for any rehabilitation. The plant would also be synchronized with the national power grid, thus delivering greater system stability and flexibility to meet load requirements.

The plant designed called for the installation of two separate 150 MW outdoor steam turbine units on the shore of the Great Bitter Lake (from where cooling water would be drawn), and adjacent to planned transmission line expansion. The 150 MW size was considered optimal for these units, and provision was made for the optional expansion of the plant by an additional 300 MW (through the addition of a further two 150 MW units.) Design specifications for the boilers called for dual-fuel capability, accepting both heavy fuel oil (No. 6 fuel) and natural gas, with full load possible with either fuel. At the time of project conception, the allocation of natural gas to the plant had not been confirmed, while the availability of heavy fuel oil was confirmed through delivery by the General Petroleum Corporation by barge to a special purpose transfer facility on the Great Bitter Lake. The use of heavy fuel oil was identified as an inferior option for environmental reasons, considering the high sulfur content and the need for air pre-heaters to prevent boiler and nozzle damage. The prevailing cost (to the plant, not economic cost) of each fuel was roughly equivalent to 20 percent of true value, based on prevailing Gulf crude spot prices of the day.¹⁶⁰

USAID's design consultants, Sanderson & Portman estimated the life-of-project cost at approximately \$160,000,000, of which foreign-exchange costs would comprise just under \$99,000,000. It was this amount that USAID committed originally to this project.

The Ismailia plant, analyzed in isolation from the rest of EEA, was projected to yield annual revenues in excess of \$45,000,000, based on a total output of 1.5 TWh (80 percent load-factor at 8,000 per year run-time, accounting for associated line-losses and own-use requirements) and at the then-prevailing nominal tariff of \$0.03 per kWh. On these assumptions, the internal financial rate of return to investments was projected at 16.5 percent, with a net profit (before interest, taxes, and administrative charges) of \$29 million per year. Nevertheless, a strict analysis of the true economic cost of power generated at the Ismailia plant would justify a bus-bar price of \$0.485 per kWh, assuming the full cost of fuel and a target

160 USAID Project 263-0009 Ismailia Thermal Power Plant Project Paper (circa 1976)

return to equity of 10 percent. The project's authors noted these cost projections as a harbinger of things to come for the future of the Egyptian power sector.¹⁶¹

On the benefits side, the Ismailia power plant project was expected to yield a number of direct and indirect benefits. The four-year construction period would provide considerable skilled and non-skilled employment opportunities for the local population. Skills learned during this period by the local population would also increase labor productivity in the aggregate for the longer term, especially for metal workers, construction workers, and fitters. Further, the local economy would be bolstered immediately to support the labor employed at the construction site. Further, permanent direct employment for up to 200 persons would be created post-commissioning for operation and maintenance of the plant.

The most significant and direct benefit of the plant would be the provision of adequate power to support the expansion of industry in the Canal Zone Area and on the Sinai Peninsula, and for local commerce and residential use in the same area. The impact on human welfare and intangible aspects (quality) of daily life would be likewise significant. Power allows for refrigeration and for food and medicines to be stored longer and more safely. Access to lighting allows for greater productivity as people can extend their daily activities and children their studies.

After the commencement of construction, and based on constantly updated assessments of Egypt's growing demand for electric power, a third 150 MW unit was sited adjacent to units 1 & 2. This expansion was funded through a commercial financing package through the US Export-Import Bank and Citibank; USAID's project management contractor, Gilbert Associates (Gilbert and Commonwealth) were granted an expansion of their mandate by USAID's administrator to oversee the construction of this third unit, which began in 1981. In 1983, USAID granted a further extension of assistance for the completion of the Ismailia power plant complex and the construction of a fourth 150 MW unit, extending a further \$109 million for this project's realization.

Outputs and Outcomes:

USAID's project facilitated directly the construction of an additional 450 MW in generation capacity, and indirectly to the construction of 150 MW, at a time of critical need for the recovery of the Egyptian economy. The economic recovery of the Sinai Peninsula was directly supported by USAID's investment in this plant. (The 150 MW Unit 3 of the 600 MW facility was funded by US Ex-Im bank, based on the track-record of USAID-funded units 1 and 2.)

Conclusions: USAID's provision of additional funds for the Ismailia plant's expansion (additional units) testifies to the importance of the plant's construction at the time. The contribution to employment and opportunities in the local economy in the affected areas, and to stability of the Egyptian power system, were significant.

Rating: Exceeded Expectations

National Energy Control Center

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0023	National Energy Control Center	1976-1987	42,296	To provide improved reliability and efficiency of operation of the Egyptian power system through the installation of on-line computerized control

¹⁶¹ *Ibid.*

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
				system to cope with the growing complexity of the Egyptian power system that rendered the previously practiced manual control methods no longer adequate.

LOP Funding: \$42,296,000 (1976 original obligation: \$24,000,000; Amended 1978 to \$41,000,000; Amended 1980 to authorized ceiling of \$43,500,000)

Status at Inception:

The power system in 1976 consisted of five interconnected zones: Upper Egypt, Cairo, Alexandria, Lower Egypt, and the Canal Zone. Major generating facilities were located in the south of the country along the Nile (the Aswan and High Dams), and scattered thermal facilities in and around Cairo and Alexandria. (Several industrial facilities with their own generating capacities complemented the system, comprising around five percent of total installed capacity in the country.) System capacity (nameplate) was substantially overstated; useful capacity was considerably less for a variety of reasons:

The Aswan and High Dams were unable to function at full capacity due to navigation requirements on the Nile, whose flow was regulated by these hydro plants' discharges; and by irrigation requirements that also dictated the rate of discharge. The country's thermal plants' firm capacity was only about 80 percent of their nameplate capacity due to decreased efficiencies resulting from age and poor maintenance histories.

Egypt's EEA had embarked on an aggressive program to complete new facilities to meet the growing demand for electric power and to support Egypt's economic growth. Short-term and relatively high-cost gas-turbine facilities were commissioned to meet interim requirements, while Egypt's long-term capacity growth would be met through the construction of a series of new thermal plants (steam turbines): the Kafr El-Dawar, El Guarb, and Abu-Qir plants, as well as the USAID-funded Ismailia thermal power plant and the German/Austrian-funded Suez I plant and an adjacent Suez II plant. These plants would increase the total generation capacity of the Egyptian power system by 1,617 MW, or by as much as 40 percent of the existing capacity of just fewer than 4,000 MW.

Egypt's system loads were becoming increasingly complicated and demanding as a result of Egypt's industrial expansion program. The Ministry of Industry had approved several new industrial facilities that would increase load demands on the power system, including the expansion of the iron and steel complex in Helwan; a fertilizer and ferro-silica plant at Aswan, a phosphate mine at Esna, and new cement plants in Alexandria and Suez. Further new industrial loads were contemplated, including the extension of aluminum facilities and petroleum refinery capacity. This new industrial load growth would account for an increase in demand of 1,269 MW by 1978.

A major constraint on the power system through the 1960s and much of the 1970s had been the condition of its high-voltage and medium-voltage transmission and low-voltage distribution infrastructure. Of particular concern was the reliability and capacity of the 500 KV lines connected to Egypt's hydro facilities. Frequent outages had been a major problem, arising from poor insulating features that were not adequate to the environmental operating conditions in Egypt. By 1976, the EEA had begun to address these inadequacies in order to accommodate greater loads from the Aswan and High Dams.

System dispatch and monitoring was the responsibility of the Central Dispatch Office located in the north-western section of Cairo, adjacent to the Cairo West thermal power plant. The Central Dispatch Office's responsibilities included general supervision of the entire high-voltage transmission network and the coordination of dispatch functions in both Northern and Southern ("Upper") Egypt; and direct dispatch of the Aswan and High Dams and the management of the 500 KV line from them to Cairo. The Central Dispatch Office's functions were segmented, with separate control facilities for management of the 500 KV system and the Aswan and High Dams; the Northern Egypt 220 KV system and dispatch of

the country's thermal and gas-turbine plants; and the Northern Egypt 66 KV and distribution network. (Four other dispatch offices under the Central Dispatch Office were limited to the control of distribution networks, but had no high-tension transmission functions.) The Central Dispatch Office operated per the following principles and priorities:

- Maximum economic dispatch and exploitation of available hydroelectric and thermal plants to meet Egypt's load requirements;
- Maintenance of system stability (frequency and voltage);
- Maintenance of system preparedness to rectify any failure or system disruption.

The Central Dispatch Office was staffed by 416 persons, of whom 119 were electrical engineers with higher education degrees. In the opinion of Sanderson and Porter under their World Bank-funded assessment of the Egyptian power sector, this represented a considerable degree of over-staffing, and was a reflection of Egypt's socialist employment policies. Additionally, Sanderson and Porter concluded that the organization of the Central Dispatch Office's functions was insufficiently de-concentrated, and too little decision-making authority was delegated to middle-management. The implication was that management inefficiencies would delay the ability of the on-duty operators to respond to system emergencies or disruptions.

Project Highlights and Overview:

The National Energy Control Center (NECC) project was intended to fund the construction of a central power-system control center to monitor, supervise, and control the Egyptian united power system. USAID's assistance was to fund the procurement of computer and control-room hardware and related software, as well as communication equipment, remote data-acquisition equipment, and associated design/engineering and operational training services. Additionally, USAID support would supply the NECC with a two-year stock of spare parts and on-call support for a period of two years post-completion by the vendor.

The heart of the NECC would be comprised of the Computer and Dispatching Center, which would be comprised of two identical computers, providing redundancy in case of failure, and also the ability for system planners to run load-planning and generation models and scheduling routines. A communications system would link the control center with all connected power plants and substations, using a combination of microwave and high-frequency carrier signals via transmission lines, and supplemental telephone facilities for both voice and data functions. Remote Terminal Units (RTUs) would also be installed at key points within the system (at generating facilities and sub-stations) to serve a Supervisory Control and Data Acquisition system.

The creation of the NECC would allow system operators to collect data from the system's generation facilities and transmission substations to determine the most efficient and cost-effective modes of system operation while providing for system reliability and stability. Its data-collection capabilities would also allow for improved diagnostic analyses of any system disruption events.

The procurement for services for the completion of the NECC proved troublesome and drawn-out. Protracted contract negotiations and change-orders resulting in cost increases, necessitating incremental funding allocations by USAID (grant amendments) and affecting the cost/benefit analysis. However, concurrent changes in the value of fuel and the growth in power demand in Egypt also impacted the financial analysis. Through the confluence of these factors, and notwithstanding a doubling of estimates for NECC operating costs, the internal rate of return of the total investments was re-calculated at 24 percent.

Outputs and Outcomes:

USAID's intervention covered the foreign-exchange costs associated with the creation of a Computer and Dispatching Center, including mainframe computers and remote communications, control and telemetry systems to enable centralized system-monitoring and control.

The total cost of the NECC was estimated at the inception of the project at \$32,500,000, of which USAID would fund \$24,000,000 to cover the foreign exchange cost portion of this investment. The primary benefit of the project would be the reduced cost it would yield in system operation by increasing efficiency and reliability. Annual fuel cost savings (system-wide) would be realized through economic dispatch of generating units, taking into account transmission system capacities and load requirements. These fuel-cost savings would increase as Egypt's generation capacity became increasingly loaded with thermal and gas-turbine generating plant as this capacity expanded consistent with the 9 to 10 percent annual demand growth projected. The EEA estimated that fuel-cost savings generated by the investment in the NECC's capacities would be approximately 1.5 percent per year, while other estimates (albeit those of commercial equipment suppliers for the NECC) placed this figure at up to five percent. In addition to fuel-cost savings, automated processes would optimize transmission routing to use higher-voltage (500 KV and 220 KV systems) lines, resulting in lower transmission losses from 4 to 3.5 percent (estimates), which (at then-current loads) equated to 80 million kWh. In total, first-year fuel-cost savings (\$2 million based on the more conservative 1.5% estimate of reductions) and line-loss abatement (\$1.7 million) from the investment in the NECC would be roughly \$3.7 million.¹⁶² Year-twenty estimates at the time put this annual savings at \$25 million (fuel-cost) and \$8.5 million (line-loss reductions), or \$33.5 million per annum. Based on an estimated project cost of \$24 million (admittedly erroneous on two accounts), and assuming an annual operation and maintenance cost of \$500,000 for the NECC, the projected benefits of the investment were estimated to yield internal rate of return of 19 percent.

Conclusions: The creation of capacity in the National Energy Control center contributed immensely to the stability and efficiency of the Egyptian Unified Power System. EEHC representatives themselves cite the NECC program as USAID's greatest contribution to the overall development of the Egyptian power sector.

Rating: Exceeded Expectations

Shoubrah El-Kheima Thermal Power Plant

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0030	Shoubrah El-Kheima Thermal Power Plant	1979-1991	261,200	Construction of a 1260 MW thermal power plant at Shoubrah El-Kheima to help Egypt meet the rapidly growing demand for electric power, then rising at upwards of 9% per annum.

LOP Funding: \$261,200,000 (1979 original obligation: \$100,000,000 ; Amended 1981 to \$190,000,000; Amended 1984 to \$208,000,000; Amended 1985 to authorized ceiling of \$268,000,000)

Status at Inception:

The Shoubrah El-Kheima Thermal Power Plant project was intended to support the construction of a 1260 MW thermal power plant in the district of Shoubrah El-Kheima, just north of Cairo, consisting of four

162 USAID National Energy Control Center Project Paper 263-0023 Economic Analysis, p. 27 (circa 1976).

identical 315 MW thermal steam-turbine units. The plant was to be sited on the site of an abandoned/disused plant with an existing infrastructure, including underground 220 KV transmission lines that would be used to connect the new plant to the Egyptian energy system. The 1260 MW Shoubrah El-Kheima plant would be the largest thermal plant in all of Egypt and North Africa. The project was part of USAID's continuing program of assistance to the Egyptian power sector, and based on a desire to help Egypt meet the rapidly growing demand for electric power, then rising at upwards of nine percent per annum. The additional capacity was expected to be sufficient through the beginning of the 1990s.

With power demand projected to grow at nine percent per year, the commissioning of the Shoubrah El-Kheima plant was essential for meeting Egypt's growing power demand. At the time of its commissioning, the Shoubrah El-Kheima plant could provide for 19% of Egypt's peak load of 6.7 GW (circa 1990). As of 2005, the plant was providing 18.5% of Egypt's total output, with an availability of 96%.¹⁶³

Project Highlights and Overview:

The Shoubrah El-Kheima power-plant project was justified based on projections of Egypt's power demand, as estimated in an assessment funded by the World Bank and conducted by Sanderson & Porter. Later estimates suggested that demand-growth would accelerate through the 1980s to between 12 to 15 percent. USAID retained Sanderson & Porter separately to prepare a feasibility study for the Shoubrah El-Kheima plant in 1978, which identified the need to install initially two 300 MW units, expandable by a third unit at a later date. Bechtel (Overseas Bechtel, Inc.) was selected as the design, engineering, and construction vendor for the project. During contract negotiations with Bechtel, it was decided to expand the scope for construction to include the optional third 300 MW unit. Bechtel's design proposal for three separate 315 MW units was delivered in August 1980 to the contracting client, EEA. Bechtel enhanced the value of their services by proposing an accelerated design and construction schedule for the first of the three 315 MW units from an original estimated 60 months to 51 months, with the second and third units to be completed nine and fifteen months thereafter. To cover part of the cost of the expansion of scope (i.e. the third 315 MW unit), USAID granted an additional \$90 million in August 1981. In March 1984, USAID provided a supplemental grant of \$18 million to cover minor cost-overruns that had materialized vis-à-vis a number of USAID-sponsored components of the project.

Egypt's demand growth continued to accelerate at a pace unanticipated at the time of project inception. Bechtel were asked to advise on the technical and environmental feasibility of the expansion of the Shoubrah El-Kheima plant by an additional 315 MW plant in 1984. The installation of a fourth unit would produce economies of scale in allowing the existing support infrastructure to be expanded to the fourth unit at an estimated (foreign currency) cost of \$135 million. In 1985, USAID granted an additional increase in ceiling of \$60 million to partially finance this cost.

The Shoubrah El-Kheima plant was co-financed with the participation of other donors, including the African Development Bank (AfDB), Canadian International Development Agency (CIDA), and the *Compagnie Francaise d'Assurance Pour le Commerce Exterieur* (COFACE), and others. Their contributions are illustrated in the table below. (EEA provided own resources for local currency-incurred costs):

Donor/Agency:	Funding Contribution
USAID	\$261,200,000
World Bank	\$226,000,000
EEA (Egypt Electricity Authority)	\$128,400,000

163 Egypt Electricity Holding Company data

Donor/Agency:	Funding Contribution
African Development Bank	\$86,000,000
European Investment Bank	\$79,500,000
CIDA	\$49,900,000
OECD-Japan	\$37,600,000
COFACE	\$28,900,000
European Economic Community	\$25,200,000
Government of Italy	\$6,000,000
TOTAL:	\$926,000,000

Source: USAID Project Assistance Completion Report, Project 263-0030

Minor obstacles and setbacks during construction were encountered, but did not significantly impact the immediate success of the project. These minor issues were not uncommon for the industry: Turbine efficiencies were less than advertised, which resulted in an assessment of damages to Westinghouse of \$10.5 million in compensation; Westinghouse was likewise assessed late fees for delay in delivery of control panels in the amount of \$323,000. The proceeds from these damages were used by EEA for the procurement of a stock of spares for the operation of the plant.

In addition to the construction delays, a post-commissioning assessment of the cooling intakes (conducted by Bechtel at EEA's request) revealed faults in the design of the impellers used to draw cooling water into the plant, which resulted in reduced efficiencies. The sub-contractor was recalled to rectify the identified design faults.

In 1990, a significant vibration in the first turbine was detected, necessitating the shut-down of Unit 1 for eight months. In this instance, the cause of the vibration was deemed to be the fault of an Egyptian construction firm that laid the foundation for the plant, but to whom no recourse was available as the firm had ceased to exist. Westinghouse concluded a contract for repairs to the unit directly with EEA.

Outputs and Outcomes:

USAID's contribution to the Shoubra El-Kheima plant construction project covered the cost of procurement of four turbines, associated pumps, cooling, and control systems, and engineering services for Units 1-4 of the plant. The importance of USAID's support to the project was increased when the World Bank ceased funding of the plant's fourth unit for reasons of Egypt's non-compliance with World Bank covenants.

In addition to plant construction and engineering costs, USAID also covered extensive training for plant staff, amounting to 4200 man-days of training in four- to six-week training sessions, and created training facilities at the plant that would come to serve the entire EEA (EEHC) complex, with staff from other plants attending training at these facilities.

The project was completed on-time or ahead of schedule, and in 1992 was performing reasonably well, with a thermal efficiency of 38.2 percent (reasonable for a steam turbine construction), and with a reliability factor of over 94 percent and availability of 86 percent. Employment at the plant was 679 full-time positions, including technicians, craftsmen, engineers, and administrative/service personnel.¹⁶⁴

Economic benefits of the plant were significant. In 1992, the plant was generating 6.9 TWh per year, which was a significant contribution to the electricity supply fuelling Egypt's expanding economy. EEA

¹⁶⁴ Source: USAID Project Assistance Completion Report, Project 263-0030

used the Shoubrah El-Kheima plant as a training facility for personnel employed elsewhere in the industry.

Conclusions: The Shoubrah El-Kheima plant undertaking was distinctive in its success, given the multitude of donor sponsors, and the necessity for coordination among them. The diversity of donor funding sources and concomitant diversity of contractors did yield issues with recourse to a responsible entity in the case of Unit 1's vibration fault, which would speak in favor of contracting with a single design/engineering/construction implementer for future plants. Fortunately in this instance, no catastrophic or exorbitantly expensive failures were experienced. Overall, the plant was essential to the Egyptian power sector's stability and ability to meet rapidly growing demand.

Rating: Exceeded Expectations

Urban Electric Power Distribution Equipment

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0033	Urban Electric Power Distribution Equipment	1977-1991	97,128	To rehabilitate and expand the distribution networks in Cairo, Alexandria, Shebin El-Kom, and Beni Suef.

LOP Funding: \$97,128,000 (1977 original obligation: \$17,000,000; amended 1978 to \$46,000,000; amended 1980 to \$56,000,000; amended 1984 to \$86,000,000; amended 1985 and fully obligated to authorized ceiling of \$97,188,000)

Status at Inception:

Initial feasibility studies conducted under a 1977 World-Bank funded project indicated a need for extensive rehabilitation of the electrical distribution system in Egypt's major cities in order to cope with load-growth and reliability requirements. Harza's feasibility study identified materials necessary for procurement and installation under a five-year upgrade plan whose foreign-exchange cost exceeded \$284 million. These materials included hundreds of kilometers of above- and below-ground medium/low-voltage cables, in addition to literally millions of spare parts and tools, vehicles, meters, relays, switches, and the like.

Project Highlights and Overview:

A pre-project feasibility and preliminary design study was conducted by Harza Engineering under an IQC issued by USAID in preparation of this project. (The World Bank subsequently extended additional funding to Harza to expand their feasibility studies in preparation of parallel work funded by the World Bank for regional electrification.) Harza's involvement in assessing the requirements of distribution network rehabilitation and expansion in these cities was used as justification for a sole-source award to Harza for the implementation of this project.

Harza's initial feasibility and preliminary design study illustrated an unambiguous need for urgent rehabilitation and expansion work to satisfy rising demand and to assure reliability and quality of service. Demand continued to grow at 10-13 percent per year in Cairo and Alexandria (where reliable data were available.)

At inception, Harza produced a procurement schedule for a five-year period that totaled \$284 million, of which USAID's portion would be limited to the original contemplated ceiling of \$97.2 million. USAID opted to obligate on an annual basis as the project implementation progressed. Harza continued to adjust and refine procurement requirements during implementation, which covered substantial hardware and

facilities to accommodate its deployment. Collaboration in Alexandria progressed positively, while in Cairo, Shebin El-Kom and Beni Suef continued investment in these areas was deemed in 1983 to be unjustified. Focus shifted to Alexandria, where distribution company staff proved responsive to project needs and competent to manage and implement long-range expansion plans. Harza and the Alexandria distribution company management reassessed the project needs in that city, and additional procurement plans were adopted. The project period of performance was extended by four years from its original completion date of 30 September 1987 to 30 September 1991 to accommodate this adjustment.

Outputs and Outcomes:

This distribution rehabilitation and expansion project was the single largest such project in the world in its time. USAID's program of support funded the construction of seven warehouses, an inventory control and work-order recording system, and plant and equipment for the installation and upgrade of substations at the 380 V to 66 kV voltage levels, including cabling, meters, protective relays, fault indicators, switches and grounding devices. USAID also funded hands-on training on the use of test instruments, construction techniques, and network operations. A total of 784 man-days of training was conducted.

The project resulted in the extension of service life of critical distribution network equipment and improved system reliability. Future system expansion was rendered simpler and more technically feasible as a result of system design improvements and reconfiguration.

Comments and Lessons Learned:

The project produced remarkable improvements in the quality and availability of electric power to residential, commercial, and industrial end-users in the four target cities, with the most remarkable results in evidence in Alexandria. In Alexandria, immediate benefits included lower losses, more stable voltage levels, and fewer service interruptions. System stability devices and improved safety and fail-safe hardware also reduced the incidence of component failure due to voltage spikes, reducing maintenance and replacement costs at substations.

All four cities' distribution networks benefited from the construction of modern warehouse facilities, which at the time of their construction were some of the best in the entire country. These warehouses included modern computerized inventory and control systems. Fault-detection and diagnostic/system-monitoring equipment made network operation and repair more efficient.

The multitude of project counterparts (i.e. distribution network management teams in the four targeted cities) yielded quite different levels of success and collaboration, which complicated and frustrated the project implementers. No single EEA counterpart was assigned to serve as the first and final point of contact for the project implementation, which limited accountability and efficiency in the decision-making process. This problem disappeared once the project was focused solely on Alexandria, where a single responsible agent was assigned, and where an appropriate level of competence was exhibited on the side of the counterpart agency. The reported inefficiencies in implementation and negotiation for small-scale procurements are likely reflective of the difficulties in achieving efficient project management that this underlying problem caused.

Conclusions: While substantial benefits have been documented, many aspects of this program's design, from a project-framing and project-management point of view, were seriously deficient. USAID seems not to have anticipated the difficulty which the project implementer would face in attempting to coordinate activities with multiple - and disparate - counterparts simultaneously. The project would have likely enjoyed greater success had the parameters and expectations for the program been established with all counterparts in advance and more explicitly, and with the designation of a single Egyptian coordinating entity. USAID was wise to re-focus efforts on Alexandria, where success was being achieved, and to curtail future investments where marginal returns were far lower.

Rating: Did Not Meet Expectations

Energy Policy Planning

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0123	Energy Policy Planning	1982-1992	20,856	To provide assistance to the Government of Egypt (GOE) in institution-building, professional development, and special studies related to energy planning; and to institutionalize a capability within GOE to analyze energy policy options being considered by energy policymakers.

Status at Inception:

The Energy Policy Planning project was initiated during a period of growing financial requirements to expand electricity generation and with low internal prices for petroleum products and electricity. Energy policymaking at the time tended to be driven by immediate needs, and most decisions were aimed at responding to urgent pressures to meet physical load and demand requirements, with little consideration given to comprehensive integrated energy planning at a national scale. Moreover, the GOE's capacity to undertake comprehensive sector analyses for the energy sector, and to incorporate the results of such analyses in formulating state energy policy, was limited. The Energy Policy Planning project was intended to address this significant gap.

Project Highlights and Overview:

In the early 1980s, USAID/Cairo began to emphasize the need for more rational energy-sector policy and planning capacity within the Government of Egypt. The experience of USAID's program development to that point revealed glaring inefficiencies within the fuel and energy complex in Egypt. The project was launched during a period of growing financial pressures in Egypt, partly because of lower prices for oil exports, but also associated with growing financial requirements to expand electricity generation and with low internal prices for petroleum products and electricity. Energy policymaking in this atmosphere tended to be driven by immediate needs, and most decisions were aimed at responding to urgent pressures at the time, with little recognition of the need for a comprehensive integrated energy policy.

USAID sought to encourage more rational use of Egypt's economic assets in the energy sector. This project was intended to create the capacity within Egypt's industry in order to better frame the future development of the sector – a sector in which USAID would remain invested.

To serve as a counterpart agency, the Government of Egypt established an Organization for Energy Planning (OEP), reporting to the Minister of Petroleum, originally to provide technical support for Egypt's Supreme Council on Energy. In its early years, OEP emphasized an industrial energy conservation program which remains a major part of its portfolio. Under the project, OEP's capacity to undertake energy policy studies was increased, and OEP was able to more credibly and usefully perform an enhanced role in national energy policymaking.

The project was initially implemented under an inter-agency agreement through the Department of Energy with Argonne National Laboratories (ANL) from 1983-1986, and then with a USAID/Cairo direct contract with Meta Systems from 1987 to completion. There appeared to be, during the course of the project's implementation, several issues with coordination of project priorities between ANL and USAID/Cairo, with USAID seeking to use the project as a vehicle for immediate policy discussion, while ANL's focus was based on a more literal interpretation of the project objectives as stated in the project documents - the creation of capacity within the OEP. Present-day policy dialogue was not the project's immediate priority.

ANL's departure in early 1986 led to a hiatus of technical assistance delivery to the OEP as the selection of a second implementer was conducted. Meta Systems did not mobilize their team until 1987. This hiatus represented a significant setback in project progress, and led to a lack of confidence in each another's capabilities between the OEP and USAID/Cairo.

Notwithstanding project difficulties and tension between USG agencies, the project did achieve a fair measure of success in elevating the OEP and building its capacity. The OEP was well endowed materially with office space and suitable office equipment, including computer systems that provided sufficient data-analysis and processing capabilities, as well as in-house desk-top publishing capabilities. Most importantly, the OEP staff seemed to demonstrate a high level of technical knowledge and sophistication, according to a project review assessment conducted in 1989 by an adjunct to the US Department of Energy on behalf of USAID's Science and Technology Bureau.

Outputs and Outcomes:

The primary objective of the project – "to assist the GOE to strengthen its institutional capability to establish and maintain an energy information base and to conduct...analyses of energy...needs in support of...energy planning"¹⁶⁵ – was substantially achieved. An Oak Ridge National Laboratories interim evaluation¹⁶⁶ of the Energy Project Planning project concluded that the project had assisted the OEP in developing sufficient internal capacity in terms of its leadership, institutional structure and systems, and staff capabilities to serve the GOE in these functions. The demand for these functions, however, failed to materialize, and the OEP's services were not fully utilized to inform Government energy policy.

Comments and Lessons Learned:

After project completion in 1991/1992, the OEP placed its focus on the provision of training services to various clients, including research centers, scientific institutes, and private-sector customers in energy-efficiency policy, methods and technologies, and less so on high-level economic analysis of energy-sector policy and development. In 2003, the OEP was placed under the authority of the Egyptian Ministry of Planning. By all accounts, the significant capacity of the OEP that was developed under USAID assistance was never fully exploited in the encouragement of the adoption by the GOE of more rational and economically-sound public policy vis-à-vis the energy sector's development. Its assignment to the Ministry of Planning, and lack of direct relationship with the Ministry of Energy and Electricity, reflects its marginalization as an institution influencing state policy in energy sector development. This seems reflective of a failure on the part of the Government of Egypt to make rationalization of national energy policy a priority; and of the continued treatment by the Government of Egypt of the energy sector as a tool of social and development policy, wherein economic efficiency of the sector and its relationship to the rest of the Egyptian economy remains a secondary consideration.

During implementation, the lack of coordination of USG agencies seemed to impact the utility of the program. While USAID is reported to have made attempts to use the project as a vehicle for elevating discussions of policy and sector rationalization, the project was never strictly intended as such. The disconnect appears to have been evident from the outset, but never explicitly addressed with GOE counterparts. USAID's expectations of the project seem not to have been fully agreed with the GOE, and were therefore not explicitly stated in the project design. Its focus remained on the development of a technical capacity for which demand and opportunities for practical application seemed to remain absent within broader the broader GOE policy-making framework.

Conclusions: Despite its name, and for a variety of reasons documented here and elsewhere in this report, this project failed to produce the expected change in the GOE's focus for energy-sector development.

165 Energy Policy Planning, Project 263-0123, Project Paper Logical Framework.

166 Interim Evaluation of USAID/Cairo Energy Policy Planning Project, accessible at: www.ornl.gov/info/reports/1992/3445603659994.pdf

Human analytical, and to a certain extent, institutional capacity was developed within the OEP, but this capacity has yet to translate into policy transformation at the levels of government where it is needed.

Rating: Did Not Meet Expectations

Energy Conservation and Efficiency (Environment)

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0140	Energy Conservation and Efficiency (Environment)	1987-1998	49,500	To promote and accelerate the adoption of improved commercial technologies, processes, and practices to save energy and increase industrial efficiency, and to enhance Egyptian institutional capacity to implement energy conservation.

Status at Inception:

Egypt's industrialization and economic recovery, as well as energy use, was accelerating rapidly during the 1980s¹⁶⁷. The environmental impact of this growth in consumption began to manifest themselves, and urban air quality was of particular concern. High-sulphur fuel oil used in power generation, over-use of heavily subsidized leaded gasoline, and insufficient controls and standards for industrial pollution all contributed to heavy urban pollution and high incidence of morbidity. For example, 29 percent of children in Helwan suffered from obstructive lung diseases attributable to air pollution emanating from the Helwan cement plant, compared to a nine-percent in rural Egypt.¹⁶⁸ Concern for environmental issues was increasing as awareness grew, and Egypt's government was being pressured by donor agencies to improve its environmental policies. At the same time, projected price increases for fuels and electricity piqued interest in energy efficiency measures.

Project Highlights and Overview:

During the first phase of the activity, the project's emphasis was on the identification and implementation of energy-efficiency technologies and training of Egyptian personnel. Through 1993, the project had identified 130 plants in the public and private sector as potential targets for energy-efficiency efforts. Of these, 58 were selected for further review, and feasibility studies were conducted to determine the technical and economic feasibility of appropriate applications. The primary technology pursued was in boiler efficiency (fuel-mixture optimization), which was rolled out in 54 plants, resulting in savings estimated at \$11.5 million per year. The Energy Conservation and Efficiency Project (ECEP) was renamed the Energy Conservation and *Environment* Project in 1993.

The 1993 project amendment built on the successes of the project up to that date. The amendment and project re-design was intended to improve the effectiveness of the project in promoting replicability and sustainability of the energy conservation activities, reallocating funding to reduce emphasis on higher-cost energy conservation technologies, encouraging increased cost-sharing by pilot-project beneficiaries, increasing the web of Egyptian consulting firms engaged in project implementation, focusing on low-cost/no-cost approaches to energy efficiency, and increasing efforts in public outreach and awareness.

167 Egypt's total energy consumption rose by over 100% during the period between 1980-1989. Source: World Bank World Development Indicators database.

168 Nasralla MM 1992 A Report on Air Pollution and Noise in Egyptian Cities, Egyptian Environmental Affairs Agency, Cairo, Egypt.

Outputs and Outcomes:

The project identified 25 opportunities for technology demonstrations at industrial facilities chosen for their energy-efficiency potential, including the implementation of a \$600,000 gas-analyzer program that increased efficiency of boilers at 54 plants, generating a savings of \$11.5 million per year¹⁶⁹

In addition to the technology applications, significant institutional capacity was developed within the Egyptian counterpart institutions participating in the Energy Conservation and Efficiency Project. Identified target institutions were: the Tabbin Institute for Metallurgical Studies (TIMS), the Development Research and Technological Planning Center (DRTPC), and the Federation of Egyptian Industries. A training schedule for both in-country and US-based training of key Egyptian counterparts was created as follows:¹⁷⁰

Target Audience/Participants	Number of Trainees		
	In Egypt	In US	Total
Industrial Enterprises	100	3	103
Architecture and Engineering Firms	50	2	52
Other Egyptian Participants	200	5	205
TIMS and DRTPC	50	2	52
Ministry of Industry	10	2	12
Federation of Egyptian Industries	20	2	22
TOTAL TRAINEES:	430	16	446

The program of demonstration projects included electric motor efficiency, combustion efficiency (boilers), waste-heat recovery (process heat), energy management systems (monitoring and control), insulation, and high-efficiency lighting.

The project documents estimated that the annual energy savings resulting from the activities of the project should equal \$47 million, or just under the total \$49 million investment that USAID authorized for programming to this activity. The resulting IRR from this activity was thus projected to be nearly 96 percent, with a payback period of just over one year – an incredibly sound investment of resources.

The legacy ECEP institution is now providing consultation on energy-efficiency on a quasi-commercial basis. Although it does not function as a one-stop shop for energy-efficiency solutions (i.e. is not an ESCO), the ECEP are working now with UNDP/GEF on developing ESCO industry in Egypt.

Comments and Lessons Learned:

The project's re-definition in 1993 to emphasize replicability of demonstration project results was appropriate, and should (arguably) have been a feature of the original project design.

USAID source and origin restrictions for physical materials procured under demonstration projects likely impacted the ability of project implementers and, more importantly, Egyptian project counterparts to accurately assess the net-present-value (NPV) of pilot-project investments. Where US equipment was installed when non-US equipment of equal quality would have been significantly less expensive, the demonstrated cost-savings (and thus replicability) of energy efficiency investments would have been negatively affected. The evaluation team confirmed that NPV calculations for demonstration project investments used only the actual cost of inputs, and no proxy values (to represent lower-cost alternative

169 Reported in Energy Conservation and Efficiency Project project amendment documents, p. 12 (circa 1993.)

170 Ibid., p. 30

equipment) were incorporated into any evaluation of likely real-world implementations. In future demonstration projects whose focus is not only a proof-of-technology, but also a proof-of-concept from financial point of view, source-and-origin restrictions on imported equipment should be relaxed, or at a minimum, projects should require that parallel assessments of project benefits are conducted using proxy values where lower-cost non-US equipment might be deployed in real-world replication of the results.

Conclusions: The project did succeed in introducing important energy-efficiency and economic concepts and technologies in Egypt, and in training a great many professionals in the application of important analytical tools. While energy-efficiency opportunities remain to be aggressively pursued in Egypt, this is mostly attributable to the inadequate price-signals that still prevail in the economy.

Rating: Met Expectations

Aswan/High-Dam Power Station

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0160	Aswan/High-Dam Power Station	1982-1995	139,516	The project purpose was to assist the EEA in the rehabilitation and modernization of the Aswan High Dam. An original design fault affecting the reliability of the turbine runners jeopardized the longevity of the station and caused frequent and prolonged outages for repairs, affecting plant reliability and low-cost base-load availability of the Egyptian power system.

LOP Funding: \$139,516,000 (1982 original obligation; amended 1994 obligation and authorized ceiling raised to \$140,000,000)

Status at Inception:

The High Dam at Aswan and the 500 kV lines connecting it to Cairo were constructed during the 1960s on assistance provided to Egypt by the Soviet Union. The dam was designed to fill the man-made Lake Nasser along the Nile, abating seasonal flooding, regulating irrigation off-take, and providing hydroelectric power. The dam was constructed with twelve 175 MW hydroelectric turbines, providing low-cost base- and peak-load power. The first units were placed in operation in 1967, with commissioning complete by 1970. During the first inspection conducted in 1969 of the two units already in operation, cracking of the turbine blades were observed on the 135-tonne Francis-type hydraulic turbine runners. Soviet technical advisors suggested that this was not uncommon, and normally rectified by simple welding repairs. The EEA heeded this advice and repaired the runners accordingly. As other units were brought on-line, similar cracking was found and repaired after the initial two years of operation. However, in 1971, additional cracking was discovered on previously repaired units, indicating a chronic problem calling for more substantial remedial measures. Soviet design experts suggested the problem was the result of improper low-head operation of the turbines, for which responsibility was attributed to the EEA's own engineers. Subsequent consultations with numerous metallurgists and engineers over the following nine years yielded a consensus conclusion that the runners themselves were of faulty design, yielding vibration problems that resulted in the fatigue cracking that was observed. The only remedy to eliminate the problem appeared to be the replacement of the runners themselves with ones of proper design for the given operating conditions.

Project Highlights and Overview:

USAID conducted an initial evaluation of options for dealing with the High Dam's design faults, and concluded that the possibility of catastrophic failure of all twelve units was high, and that therefore all runners on all twelve units should be replaced.

The initial project focus was to be on the replacement of the twelve Francis-type hydraulic runners. During the design phase of the program, additional deficiencies of the plant infrastructure were identified in the 500 kV circuit breakers at the plant substation and on the 500 kV transmission lines leading from it to Cairo. The replacement of the circuit breakers and of the obsolete relay devices on the 500 kV lines were incorporated into the project at the request of the EEA, coordinated with parallel financing of partial replacement of other transmission-line relays financed by other donor sources.

In addition to the above, the 15 kV generator circuit breakers were also found to be defective and subject to failure. Likewise, corrosion was found to have damaged the upstream and downstream gates, making it impossible to properly de-water the intakes (penstocks) and perform work on the turbines. The replacement of the 15 kV circuit breakers and the rehabilitation of the gates and associated mechanical equipment was funded through an additional obligation of \$40 million in 1987, at which time the period of performance was extended through June 1995.

The project is observed to have increased the efficiency of turbines at the dam by 3.7 percent through replacement of the Soviet-designed runners. Plant reliability has increased, gates are now fully and reliability operational, and circuit-breakers and transmission line reliability have also been increased. The plant's output is now roughly 9 TWh per year, and increases in plant efficiency and reliability are estimated to yield an avoided consumption of the equivalent of 2 million tons of fuel oil ("mazout"/No. 6 oil) per year (i.e. avoided load compensation by thermal plants elsewhere in Egypt.) The plant's useful life was extended by at least thirty years.¹⁷¹

Outputs and Outcomes:

The High Dam rehabilitation and modernization project's results were achieved through:

- Installation of replacement and reconditioning of runners, bearings, and generators and the extension of turbine useful life;
- Installation of protective 500 kV line relays and circuit breakers to improve system reliability;
- Replacement of 15 kV circuit breakers;
- Rehabilitation of water-control gates, tubes, and associated plant operation & maintenance heavy-lift equipment.

The rehabilitation work at the plant improved the plant's efficiency by 3.7 percent, improved its reliability, and extended its useful life by at least thirty years. The High Dam remains Egypt's largest single generation plant, with an installed capacity of 2100 MW.

Comments and Lessons Learned:

The High Dam rehabilitation project was an instructional undertaking for USAID, the EEA, and implementers alike. The complexity and scope of the project yielded important lessons on project design procedures and implementation management, as well as providing a unique opportunity to develop and deploy cutting-edge technical methods and approaches.

171 Sources: EEHC 2004/2005 Annual Report, p. 17; Project Assistance Completion Report for USAID Project 263-0160, p. 7.

The revision of project scope post-mobilization reveals the difficulty in fully scheduling an assistance program of such magnitude and complexity. The additional requirements for project success appeared to be of manageable scope and cost. However, these were unforeseen at project inception; and could have proven far more costly. In committing to projects that have the potential to require significant expansion in scope – and in funding requirements – USAID should consider engaging a single implementer to whom all project risks can be assigned. A single implementer might be contracted to conduct feasibility and original project design, and thereafter implementation.

During this project implementation, in addition to completing the engineering and construction requirements of the project, implementing contractors delivered significant amount of training to local Egyptian counterparts. The benefits of this will have long-lasting effects beyond the immediate benefits to the High Dam and Egypt's electricity system. Where possible, USAID projects should seek to take maximum advantage of the opportunity to transfer skills to local workforces.

This engineering and construction project was truly unique at the time. The engineering challenges offered implementers the opportunity to test their limitations and deploy techniques that had not previously been applied, but which since have been adopted industry-wide, in particular with respect to the testing of the integrity of the replacement turbine runners.

Conclusions: This USAID intervention was timely and well-implemented, and delivered significant tangible and intangible benefits. It also provided an opportunity for its implementers – local and off-shore – to prove construction and maintenance techniques that were then state-of-the-art.

Rating: Exceeded Expectations

Alexandria Electrical Network Modernization

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0194	Alexandria Electrical Network Modernization	1989-1998	49,488	To rehabilitate/modernize Alexandria's distribution network; and install regional control center to improve network efficiency.

Status at Inception:

The distribution network in Alexandria consisted of a 20 kV and 11 kV infrastructure in 1989, serving a predominantly residential base (one million customers), with 156,000 industrial and commercial customers served by a 380 volt distribution network. (A small number of large industrial customers were supplied at the 20 kV and 11 kV levels.) The total service area of the Alexandria network was approximately 2600 square kilometers, separated into sixteen different operating districts.

Project Highlights and Overview:

The network rehabilitation component of this project included the modernization of over seven hundred transformer points with associated overhead power lines, the upgrading and installation of 283 kilometers of 11 kV cabling and service and junction boxes, 23 11 kV distribution boxes, numerous voltage regulators and capacitors, diagnostic and remote data-relay equipment and switches. Additionally, substantial training was provided to network operators on the safe and reliable operation and maintenance of a modern distribution network. USAID's contractor, Black and Veatch, scoped the project and oversaw its implementation.

The construction activities for the rehabilitation program started in December 1991 with the utilization of residual material procured under USAID's earlier network modernization/rehabilitation project in

Alexandria (263-0033), while engineering activities began with initial network survey, data-gathering, and system design at project inception in April 1991.

By eliminating the voltage fluctuations which had plagued the Alexandria service area, the Alexandria Electrical Network Modernization produced significant improvements in service quality as well as a notable reduction in losses.¹⁷² This was achieved through the rehabilitation of existing 11 kV distribution points and 380 volt transformer points, and the replacement of cables, connectors, fault indicators, grounding circuitry, and load-break disconnect switches to enhance reliability. In many instances, there was substantial re-design of transformer points and network configuration to enhance safety and ease of service and maintenance. The improvement in fault-detection capability of the system has delivered increased reliability and reduced costs of maintenance and repairs.

The completion of the Alexandria Regional Control Center complemented the network rehabilitation undertaken under this project by providing system operators with the means to monitor and control the extensive Alexandria network from a central location, enhancing reliability by enabling operators to isolate system faults in real-time and thereby minimize service interruptions and avoid costly load-losses and shorten repair times.

Outputs and Outcomes:

The project contributed to the modernization of the Alexandria distribution system through procurement and installation of equipment, as well as training of personnel and capacity-building within the AEDC.

Modernization efforts included:

- Insulation of 600V overhead cables. (Noteworthy was the AEDC's decision to procure these cables from local manufacturers, who tooled-up to produce them per the specifications of the project. These specifications became the new norm for Egyptian low-voltage overhead cables);
- Introduction of capacitor banks to improve efficiency and regulate voltage;
- Design and installation of fiberglass splice boxes, reducing electrical-shock hazard at street-level (several incidents of fatal electrocutions had been reported due to metal-construction splice boxes' short-circuiting.)
- Fault-detection device installation to improve ability to isolate, identify, and repair underground faults;

Training was provided on the use of modern testing equipment, construction tools, fault-repair techniques, and the use of computer-aided-design tools and computerized work-order processing and recording systems. Additionally, specifications for an advanced communication system to facilitate maintenance/repair-work efficiency were delivered. Installation was underway at the conclusion of the project.

Comments and Lessons Learned:

Implementation of this project was successful in large part due to the professionalism and dedication exhibited by the management of the Alexandria distribution system (AEDC). Nevertheless, this performance could have been improved if management authority on the AEDC side had been delegated to a level below the AEDC chairman. Towards the end of the project, this mode of operation did prevail, with noticeable increase in efficiency, as trained AEDC staff were given more autonomy in the resolution of daily management issues.

172 Project Assistance Completion Reports, Alexandria Electrical Network Modernization project 263-0194, p. 12-13; attachment 7 graphic depiction of voltage fluctuation levels.

The project made rational use of existing material (surplus cable) available to the AEDC from previous assistance activities, rather than focusing on all-new procurement for project implementation. This resourcefulness extended the value of the project by reserving fungible resources for other project requirements. Additionally, the attempts to source locally-made cable and other hardware were wise and beneficial, not only from the point of view of cost savings, but also in the impact this had on support and development of the local electrical equipment supply and manufacturing industry.

Conclusions: The project delivered significant improvements in system reliability and service quality by eliminating voltage fluctuations in the Alexandria service area¹⁷³, and enhanced the distribution system's operators' ability to analyze system operations and diagnose faults. Additionally, it contributed to the growth of the local power-equipment supply industry by sourcing commodities locally where possible.

Rating: Met Expectations

Talkha Combined Cycle Power Plant

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0196	Talkha Combined Cycle Power Plant	1986-1991	64,674	To increase the efficiency and productive capacity of the existing eight gas turbines at the Talkha thermal power plant through the addition of Heat Recovery Steam Generators.

Status at Inception:

The Government of Egypt continued to view the Egyptian energy sector as the primary catalyst for economic growth. The oil industry and the hydroelectric potential (Aswan and High Dam facilities) were centerpieces of Egypt's energy policy. Egypt's emphasis in hydrocarbon development was on oil in the Gulf of Suez area, and in downstream activities (refineries). Associated gas from oil production was recognized as a valuable byproduct, and was directed towards power generation. The US government emphasized Egypt's power system as a critical element in its program of assistance in the recovery of Egypt's economy.

By 1982, it was widely recognized that Egypt's reliance on crude oil production as the bedrock of its energy industry could not be sustained. Existing power generation facilities consumed about 35 percent of oil and 50 percent of natural gas produced by Egypt. The increasing scarcity of oil and associated gas made efficiency of power generation an obvious priority.

The rapid growth of demand for electric power represented an obstacle to efforts to increase and maintain plant efficiency. Scheduled maintenance (requiring that capacity be taken off-line) intervals were extended, reducing plant efficiency while keeping capacity available to meet load requirements. System shortages amounted to up to 500 MW on occasion, and resulted in significant load-shedding. An increase in generation capacity and improvements in efficiency were the dual priorities of the GOE's power-sector development strategy.

Project Highlights and Overview:

The project was conceived of in order to increase the efficiency and productive capacity of the existing eight gas turbines at the Talkha thermal power plant through the addition of Heat Recovery Steam Generators (HRSGs). The HRSGs were designed to use the thermal energy from exhaust gases being

¹⁷³ Ibid.

discharged from the existing gas turbines, converting the heat into steam to drive two steam turbines of name-plate 55 MW capacity each. The Talkha plant had been constructed through a USAID grant made in 1976 under project number 263-0008. Construction design of the original plant had anticipated the subsequent installation of steam-generators and steam turbines, which was the objective of this project.

The Talkha gas turbine plant, constructed under USAID grant 263-0008, had been designed for the eventual addition of a steam-cycle to increase its efficiency and energy output. In 1985, the EEA requested that USAID finance the addition of the steam-cycle equipment, which consisted of heat-recovery steam generators (HRSGs) and steam turbines. With these additions, the Talkha plant would become a combined-cycle gas turbine, the state-of-the-art plant configuration in terms of generation efficiency.

Outputs and Outcomes:

As part of the project, the eight existing 24 MW GE gas turbines were to be upgraded to improve gas-flow efficiency and increase turbine output by five percent, with an associated fuel-combustion efficiency of three percent. The high-temperature exhaust gasses would be discharged into eight HRSGs, which (operating as two sets of four units) would direct generated steam into two steam turbines, generating an additional 55 MW each (110 MW total.)

General Electric mobilized on the project in May 1987 and began construction in July of the same year. The gas-turbine upgrades constituted the first element of the program, and continued through late 1988. The anticipated 10 MW in additional output was not demonstrated at the completion of this phase, and GE was required to reimburse a sum of \$850,000 in liquidated damages.

In parallel with the gas-turbine upgrades, in 1987, GE began the construction of the steam-cycle elements. The HRSGs and steam turbines were placed in operation in July 1989. While output and efficiency were increased at the plant, target values were not met and GE was assessed an additional \$200,000 in liquidated damages.

While predicted efficiency and output improvement targets were not met, there was nonetheless a significant increase vis-à-vis both of these indicators. Plant thermal efficiency increased from 25.4 percent to 35.2 percent, with an increase in power output from the plant by 50 percent. The associated savings (due to efficiency improvements) was calculated to represent 251 thousand tons of mazout (#6 fuel), or a savings of EGP 36 million.¹⁷⁴ Plant peak output increased by 52 percent, or 282 MW.

In addition to the direct outputs of the project (increased plant efficiency and capacity), significant technology- and knowledge-transfer resulted from this project. Prior to the project, the EEA had no direct experience with combined-cycle technology. As part of the project, GE provided copious in-country and off-shore training for the Egyptian counterpart personnel. The EEA subsequently used the training experience provided by GE as the basis for the EEA's own training program, thus multiplying this knowledge-transfer effect.

Comments and Lessons Learned:

Staff retention for the best-trained individuals became a problem for EEA. Of the seven who underwent the most intensive off-shore (US) training, four subsequently departed.

The use of turn-key contracting mechanisms proved appropriate in this project, especially in light of the non-achievement of key performance indicators (efficiency and capacity increases.) GE was assessed liquidated damages as compensation for the shortfalls in efficiency gains and output capacity increases. The use of the turn-key contracting mechanism also allowed all of the sub-contracting and commodity procurements during implementation to be managed internally by the single responsible entity (General

¹⁷⁴ Based on 1.95 TWh of power generated in the EEHC 1990/1991 reporting period.

Electric), thus placing the onus on GE to ensure efficiency and negotiate coordination of suppliers and service providers.

Conclusions: While anticipated plant efficiencies were not met, the value of the shortfall was (at least notionally) compensated through the assessment of liquidated damages paid by GE. Over 100 MW of new capacity was added, and significant knowledge-transfer occurred.

Rating: Met Expectations

Power Sector Support - I

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0215	Power Sector Support – I	1989-2004	460,656	To continue to promote the reduction of subsidies provided to the power sector through the provision of capital infrastructure incentives to the GOE.

LOP Funding: \$460,656,000 (1989 original funding ceiling \$336,000,000; amended in 1990, 1991, and 1992 (twice) to final ceiling authorization.)

Status at Inception:

By 1989, Egypt's installed capacity had grown from its original 1976 level of just under 3.8 GW to around 11 GW, with per-capita consumption growing at approximately 8 percent per year during that period. USAID's assistance to the sector's development had contributed drastically to its growth, and was instrumental in the construction of new generating capacity and expansion of the transmission and distribution networks. USAID's assistance accounted for approximately 25 percent of the total installed capacity in 1989.

Energy losses had decreased significantly by 1989 as compared to the mid-1970s, and reliability and quality of service had increased substantially. The system had evolved from its unreliable and uncoordinated base in the early 1970s to become an integrated and centrally-monitored and coordinated sector in 1989.

Despite the achievements in the system's evolution to which USAID assistance had made a significant contribution, Government of Egypt policies continued to distort the sector's economics, and retard its organic and sustainable growth. Tariffs remained a tool a social and economic development policy, which was directly at odds with the long-term objective of a self-sustaining and efficient power sector to support Egypt's growing economy. To the contrary, the continued distortions in power tariffs encouraged over-consumption, thus accelerating demand growth and introducing distortions in the Egyptian economy in favor of investment in energy-intensive (and inefficient) heavy industry processes. The burden on the GOE to expand generation capacity to meet demand growth was thus exacerbated, diverting public resources from other spending priorities.

Project Highlights and Overview:

The Power Sector Support – I project was intended to promote the reduction of subsidies provided to the power sector through the provision of capital infrastructure incentives to the GOE. Project funding was released in tranches upon satisfaction of policy-reform milestones and conditions.

The project was framed as supporting the Government of Egypt's purported program of reform of the electricity tariff policy and subsidization of the power sector. Appropriate price signals were seen as necessary to encourage conservation, thereby abating demand growth and slowing the pace of required investment in expanded generation capacity. More cost-reflective power tariffs would also reduce the

level of subsidy indirectly provided by the Government to the power sector in the form of subsidized (suppressed) prices charged for natural gas and fuel-oil provided for use in electricity generation. The initial tranche of \$136 million under this project was provided in 1989 to fund the construction of a 150 MW combined-cycle generating unit at the Cairo-South power station, to rehabilitate an existing 350 MW thermal unit, to relocate gas-turbine generators, and to provide commodities and design and engineering technical assistance to the EEA.

In 1990, an additional tranche of \$115 million was provided to fund technical assistance (design, engineering, and procurement-management) services for the construction of a 1200 MW thermal power station at El-Kureimat, including partial funding for hardware for the station's first unit. Funding under this tranche also supported upgrades at the National Energy Control Center. This funding was released upon verification of a 38 percent increase in average tariff levels in 1990, satisfying a key USAID condition for funds release.

In June 1991, upon verification of a 50 percent increase in average electricity tariffs, USAID released a third tranche of funding in the amount of \$100 million to fund the continuation of technical assistance services at the El-Kureimat power plant, including procurement of hardware for the station's second unit.

In 1992, total tranche releases of \$80 million were provided upon verification that electricity tariffs had increased to the level of 69 percent of economic cost. This funding provided for the completion of assistance to the Cairo South combined-cycle project, as well as additional equipment for the upgrades at the National Energy Control Center and rehabilitation at the Cairo West power station.

In 1993, the Power Sector Support project was amended to continue support to the EEA in improving the efficiency of network operation and the reduction of transmission losses. Investment in the Cairo Regional Control Center would improve system reliability at the high- and medium-voltage levels by allowing for real-time collection and monitoring of data on system performance, remote operation of system circuit breakers, and improved communication between and among network operators at remote sites and at the central control center. These improvements would reduce the incidence and duration of forced outages, while the Abu Rawash substation would improve network reliability at the 220 kV level.

Funding was originally sought to provide for equipment and installation services at the Cairo Regional Control Center and consultant services, equipment, and construction of a new 220 kV transmission substation at Abu Rawash in response to a declared intention by the GOE to increase electricity tariffs to 80 percent of long-run marginal cost (economic cost) by July 1993. In the end, the reduction of grant amount from \$65 million to \$30 million resulted from the failure of the GOE to fully meet the 80 percent benchmark, and came at the immediate expense of the Cairo Regional Control Center, although support to it would be indicated through diversion of funding from the El Kureimat component of the Power Sector Support project.

Outputs and Outcomes:

The project funded or directly supported the investment in plant and equipment at numerous power-station and network operation installations in Egypt under the six incremental tranches disbursed:

- Construction of a 150 MW CCGT at Cairo South, providing an effective 165 MW of additional capacity and with an efficiency of 48 percent;
- Rehabilitation of the 350 MW thermal plant and relocation of gas turbines to Hurghada, adding an additional 85 MW of capacity and facilitating the transition (rendering economic) from fuel-oil to natural gas;
- Engineering and procurement services for a 1200 MW thermal plant at El Kureimat and equipment packages for Units 1 and 2 of the El Kureimat plant;

- Upgrading of network monitoring and control facilities at the National Energy Control Center, including the expansion of EEHC's microwave communication system to the Suez area and enhanced system-monitoring and reliability;
- Rehabilitation of four steam-turbine units, compressed-air system upgrade, and spare parts procurement at the Cairo West power station;

Comments and Lessons Learned:

The Power Sector Support project was coordinated with activities of other donor agencies. Power-sector reform was the focus of attention by the World Bank, IMF, and USAID in their discussions with the GOE, given the significance of the sector to economic growth and the substantial drain that its continued subsidization represented on the Egyptian state budget. World Bank lending programs were aligned with USAID in the imposition of conditionalities on tariff reform within the power sector, while the IMF identified similar requirements for the reduction of state-funded (direct and indirect) subsidy to the sector.

While the conditionality matrix attached to the Power Sector Support project did emphasize the achievement of cost-recovery end-user tariffs, this emphasis seems to have been incomplete, with focus merely on average tariff levels without specific conditions on cross-subsidization among customer classes. Further, emphasis in the form of a conditionality matrix on tariff reforms, without emphasis on needed institutional reforms within the sector at the operating and policy-formulation levels appears to have been a significant omission of focus. The GOE appears to have been quite willing to declare acceptance and agreement with the USAID conditionality matrix in order to access the funding for direct investment in capacity that was being offered as an enticement to enact required reforms. In the event, the political will seems to have been absent when it came to advancing a real reform agenda. In other words, the reform agenda appears to have been imposed from outside, without full subscription to it at the level of GOE policy makers, perhaps deriving from a less-than-perfect understanding of the economic rationale behind the recommendations that it contained.

Conclusions: USAID's explicit rationale for the Power Sector Support program was the advancement of a policy reform agenda through inducements to the sector in the form of granted capital for investments. An overwhelming majority of project resources were ultimately directed towards the management of the programming of the investment capital – the provision of the inducements themselves – rather than on the achievement of the project's ostensible *raison d'être*. It would also appear that the policy reform agenda pursued within the framework, while correct in its trajectory, stopped short of defining a targeted end-state in terms of regulatory and institutional framework.

Rating: Did Not Meet Expectations

Power Sector Support - II

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0224	Power Sector Support – II	1994-2006	172,300	To support the commercialization of the Egyptian power sector.

Status at Inception:

By 1994, USAID's assistance to the Egyptian electricity sector had totaled \$1.6 billion in project and commodity assistance for the construction of power plants, transmission and distribution networks, substations, and control centers. USAID's assistance had a marked impact on the performance of the Cairo and Alexandria distribution networks, and had contributed to the installation of 3 GW of new generation capacity (with an additional 1.35 GW then still under construction), and to the rehabilitation of

a further 2.7 GW (including the High Dam rehabilitation project.) Energy losses and the incidence of system outages and load-shedding had decreased significantly, with the gap between supply and demand substantially diminished. By 1994, over 95 percent of all urban and rural areas of Egypt were electrified, with all villages with populations of over 1000 inhabitants connected to the grid.

In 1989, the Government of Egypt began to reorient sector development policy toward the achievement of a modicum of sector self-sustainability. Tariff reform topped this agenda, albeit only half-heartedly implemented. Nevertheless, between 1989 and 1993, three incremental tariff increases were implemented, and by 1993 the weighted average tariff system-wide was 73 percent of full-cost recovery levels (i.e. long-run marginal cost.) Nonetheless, financial sustainability of the EEA remained in jeopardy, with liabilities for long-term debt servicing increasing by around 1000 percent between 1985 and 1991, as a result of the EEA's failure to meet its revenue requirements due to low tariffs, low collection rates, and operational inefficiencies.

Simply put, the constraints faced by the EEA in pursuing the object of financial and operational self-sustainability were considerable. The EEA had no authority to retain its own revenues, limited influence on tariff levels, had no control over its own resources for the purposes of system expansion, and in many respects simply lacked the organizational capacity to perform as a commercially-oriented entity.

Project Highlights and Overview:

The Power Sector Support – II project was originally conceived of as a seven-year, \$200 million project, the Power Sector Support II Project would fund capital investments at selected power-sector installations and provide targeted technical assistance as an enticement to the GOE to fulfill sector-reform commitments made under a Memorandum of Understanding between the Government of Egypt and USAID.

As originally framed, the project would promote the development of an efficient and self-sustaining, commercially-oriented power sector in Egypt. Focus would be on the transformation of the Egyptian Electricity Authority into an autonomous quasi-commercial entity.

The Power Sector Support II project was designed to help the GOE and EEA remedy the problems that the EEA faced in achieving efficiency and self-sustainability for the EEA. Policy and institutional reform objectives towards this end were outlined in a Memorandum of Understanding between the GOE and USAID as part of the Power Sector Support II project. These were contained within a policy matrix, and related to:

- Tariff reform to achieve full-cost-recovery tariffs (100 percent of long-run marginal cost), per a methodology to be agreed between the GOE and USAID;
- Financial management within EEA, better management of revenues and collections, and better financial asset and liability management;
- Achievement of operational autonomy for the EEA, removing direct managerial oversight from the Ministry of Electricity and Energy and placing it in the hands of the EEA's management;
- Regulatory reform, including the establishment of an autonomous, transparent, and technically competent regulatory board to enable "informed decisions regarding economic, financial, environmental, and service issues";
- Business processes within EEA, including technical functions such as load-forecasting and the formulation of long-term development plans and strategies, maintenance procedures, economic dispatch capabilities, etc.;
- Implementation of a staff-development strategy to enable increased operational and management efficiencies at all levels.

The Power Sector Support II project was launched in the context of ample coordination among donors, specifically among USAID, the World Bank, the IMF, as well as the AfDB and EIB. These donor institutions had linked support to the sector's development to policy reforms. By 1994, the World Bank had suspended lending activities due to non-compliance with the World Bank's conditionalities, including the continued subsidy to the sector through the provision of subsidized fuel to generation stations. In 1994, it appeared that USAID would remain the key donor supporting the GOE in the power-sector's development, linking continued capital financing of power-sector projects with the implementation of the reform agenda contained in the Memorandum of Understanding (which was itself in part the product of coordination with the World Bank's program.)

Outputs and Outcomes:

The project produced two broad categories of outputs: policy/institutional reforms and infrastructure investments (construction and equipment delivery).

Specific intended outputs in the policy/institutional reform category were improvements in EEHC's financial viability and increased autonomy (commercialization); the creation of a modern regulatory regime; and the institutional capacity of EEHC's system planning and management efficiency. Achievements under this rubric (policy/institutional reform) were the primary objective of the Power Sector Support – II project (although in terms of funding, this aspect of the program was allocated only eight percent of the total project funding.)¹⁷⁵

Under infrastructure development, the project proposed to fund the procurement and installation of static VAR compensators to replace outdated rotating (mechanical) synchronous condensers that were no longer performing. The project also included funding for the installation of a new substation at Wadi El Natroun to cope with growing demand growth in the region. Investments also included the creation of Canal and Northern Upper Egypt Regional Control Centers improve regional network reliability and stability, and the installation of a SCADA capability at the High Dam.

By the time of the project's completion, two major achievements had been noted. First, the EEA was completely transformed, unbundled, and commercialized, and is now structured as a number of separate generation, transmission, and distribution companies that operate independently, while owned by the state-owned Egyptian Electricity Holding Company. The creation of the EEHC by presidential decree in 2000 was a milestone in the evolution of the Egyptian electricity sector. Separately, the creation of the Electric Utility and Consumer Protection Regulatory Agency which came into being in 2002 forms the second critical piece of an institutional framework that, with the right political will and vision, can support and facilitate the emergence of a modern electricity industry in Egypt. Both of these achievements are the direct result of USAID's Power Sector Support II project.

Comments and Lessons Learned:

As with previous USAID-funded projects (in particular the Power Sector Support I project), the overwhelming majority of project resources under this project were allocated to the provision of capital for investment in physical plant and the technical (design/engineering/construction) services that that required. In terms of resource allocation, emphasis on policy reform and institutional-capacity building was relatively low. This is explained in the presentation of the project in its original design as seeking to achieve its primary objectives - the overhaul of the policy environment and transformation of the sector towards commercial orientation - through the provision of enticements in the form of granted capital for infrastructure investments.

It seems clear (and was reinforced in discussions with GOE and EEHC representatives interviewed during the course of this evaluation) that the GOE's main interest, notwithstanding declarations and agreements

175 Power Sector Support – II Project Paper (263-0224), circa July 1994, p. xv.

in memoranda of understanding, was and remains the provision of low-cost capital for continued construction. It appears that the GOE never shared a true sense of ownership of the reform agenda.

USAID's conditionality matrix was deficient in at least two key respects.

- First, it left ambiguous the definition of full-cost recovery levels (i.e. the calculation of LRMC) in leaving the agreement on a methodology for this calculation for a later date, and subject to acceptance by the Government of Egypt.
- Second, the conditionality matrix did not sufficiently emphasize the role and authority of the regulatory commission.

Today, electricity is priced at near to full-cost recovery levels (97%) at the end-user tariff levels – LRMC as viewed from the point of view of EEHC itself. However, this does not take into account the value of the subsidy provided in the reduced price charged for fuel used in power generation.

In the end, while the regulatory commission was established and exists to this day, it lacks many of the most important features that are considered indispensable by most standards throughout the world, in particular tariff-setting authority. Its only real tool for influence over the operating entities of the EEHC (its licensees) is a “name-and-shame” approach to rating the efficiency of the entities’ operations. While the “peer pressure” that this may impose on plant managers might be of some use in encouraging improved performance (the regulatory commission’s staff claim that it is), it cannot credibly be claimed as a truly effective means of serving consumers’ interests by encouraging the industry to keep its costs low. The commission has no tariff-setting authority.

The inclusion of emphasis on institutional and policy frameworks in the context of USAID assistance programs to the Egyptian power sector seems to have come very late in the history of USAID’s involvement in the sector. The institutional inertia was in 1994, and remains today, considerable, and represents a continued impediment to sector rationalization. The GOE still sees the power sector as a tool for economic development policy, which was borne out in a comment made by a representative of the EEHC in noting that low-cost power is seen as encouraging foreign investment in Egypt’s heavy industries. USAID’s programs, and those of other donor agencies, while successful in elevating the subject to the level of serious discussion with the GOE and sector professionals, seem not to have achieved the inculcation of a true understanding and appreciation of the rationale for sector reform in the context of wider macro-economic management of the Egyptian economy.

Conclusions: Many important milestones under this project were achieved. Specifically, the Egyptian power sector is now functionally unbundled; the legal framework exists to allow for private investment in generation; and there exists a fledgling (and potentially promising) regulatory agency that can guide the future of the power sector’s development and facilitate integration of the Egyptian power system into regional markets. While the GOE still demonstrates a reticence to pursue wholesale liberalization and reform, professionals within the power industry seem to understand its need and the benefits it will eventually deliver.

Rating: Met Expectations

APPENDIX VII: TELECOMMUNICATIONS SECTOR - PROJECT BY PROJECT ANALYSIS

Telecom I, II, and III

Summary of USAID's Assistance

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0054	Telecom I	1978-1983	40,000,000	Electronic switching system (ESS) in Zamalek (Cairo).
263-0075	Telecom II	1979-1985	80,000,000	Electronic switching system (ESS) in Maadi, Heliopolis, and Bab El Louk areas of Cairo.
263-0117	Telecom III	1979-1989	121,063,000	Electronic switching system (ESS) in the Auto, brahimia, and Gleem in Alexandria. A contract amendment to Telecom III focused on the New Maadi, Heliopolis II and Demerdash (Abassia) ESS.

The chart below provides statistical indicators regarding the sector prior to the launch of Telecom I, II and III. (In Telecom I, II and III, the engineering consulting, exchange construction, and outside plant construction contracts were combined into one contract resulting in a substantially shorter implementation schedule and below budget costs.)

Description	1978 USAID Telecom Funding Launch
(Population (Millions))	39.7
Population Density / sq. km	42.1
GDP per Capita (\$ Current International)	903
Telephone Lines	374,000
Telephone Lines / 1,000 People	9.42

MCIT Monthly Record of Achievements – November 2006; Central Agency for Public Mobilization & Statistics (CAPMAS) Year Book (1952 – 1983), Page 16, 1984; World Bank Database Statistics

As the network was in such acute need of revitalization and growth at the start of USAID telecom assistance in 1978, \$242 million was provided to Telecom I, II and III with a goal towards improving the quality of service, network revenues and overall network management. These USAID projects were designed to:

- Replace eight old and obsolete rotary systems in Cairo and Alexandria with electronic systems and their related cable connections in addition to junction cable interconnections between all the exchanges in Cairo and Alexandria (**construction**);
- Provide other telecommunications and related equipment needed by ARENTO, identified primarily as air conditioners and stand-by power generators for exchanges in Alexandria to ensure that telephone

exchanges would be dust-free, and temperature and humidity controlled due to the sensitivity of the equipment (**construction**);

- Provide U.S. technical assistance for institutional strengthening activities in the areas of fundamental planning, finance and administration, organizational structure, tariff rates and computer systems and applications (**institutional reform**);
- Provide U.S. technical assistance to design, procure and supervise the installation of the equipment identified above, and to provide on-the-job construction supervision training (**institutional reform**).

Direct and Indirect Outputs

Construction

Egypt had a domestic telephone system that was highly concentrated in Cairo or Alexandria, and although improvement to the system was under way, domestic service was still extremely unreliable. International services were somewhat better as calls traveled over a variety of high-quality links: submarine cables to Lebanon and to southern Europe; radio-relay links with Libya and Sudan; and a ground satellite station just south of Cairo with two antennas for worldwide telephone, television, and data transmissions.¹⁷⁶

Therefore, in Telecom I, II and III, significant progress was made in meeting some of the demands for effective telecommunications services in Egypt's domestic markets. USAID investment focused on high revenue urban centers, especially as this could help to sustain the primary financially hemorrhaging operator – the Arab Republic of Egypt National Telecommunications Organization (ARENTO) - by bringing in badly-needed revenues. Cash flow could then fund broader system wide growth initiatives, eventually benefiting citizens beyond the urban upper classes.

The USAID projects focused upon:

- A \$104.6 million contract, dated February 1982, installed eight electronic switching telephone exchanges in Cairo and Alexandria, including providing training and 24 months of operating and maintenance services.
- A \$77 million contract, dated June 1982, constructed underground electronic and optical cable systems, including providing training and 24 months of maintenance services.
- A \$41 million contract, effective March 1980, provided technical assistance including supervision of major equipment installations, technical planning, finance and accounting, computerization of several ARENTO departments, billing improvements, operations and maintenance, and training.

Equally important, the capacity increase involved the introduction of (then) state-of-the-art electronic switching systems (ESS) in central office exchanges, which were fully paid for via USAID funds. The replacement of eight old and obsolete rotary communication systems in Cairo (five) and Alexandria (three) with electronic switching systems (ESS) and their related cable connections, as well as junction cable interconnections between all the exchanges in Cairo and Alexandria, dramatically improved *access and service performance*.

The eight ESS contracts also included training and 24 months of operating and maintenance services, resulted in improved services to approximately 120,000 subscribers. Moreover, the new equipment doubled the capacity for commercial lines in some areas. The USAID contract to construct underground electronic and optical cable systems, which also included training and 24 months of maintenance services,

¹⁷⁶ <http://countrystudies.us/egypt/74.htm>

increased the transmission capabilities, meaning that the *speed* and *capacity* of the network improved and provided greater and faster communications access for citizens.

Overall, from 1978 - 1989, Telecom I, II, and III affected Egyptian individuals (and international visitors or residents) by¹⁷⁷:

- Adding 263,000 new lines to the network in addition to related training, financial controls, and other system improvements;
- Increasing the call completion rates from an estimated 30 percent of calls in 1977 to more than 90 percent in 1992;
- Increasing the number of communities serviced by the direct dial network from 7 to 189;
- Increasing the number of international channels from 820 to 5560;
- Roughly doubling the call completion rate from 30 to 40 percent up to 60 to 80 percent.

Total USAID contracts eventually reached \$240.9 million, with a GOE contribution of 50 million EGP and \$15.9 million. Project disbursements from USAID for Telecom I, II, and III began in 1981/82 and concluded in 1991/92.

Institutional Development

In 1980, the Egyptian telecommunications sector was restructured and strengthened with the creation of the Arab Republic of Egypt National Telecommunications Organization. ARENTO dramatically improved its physical plant and institutional capacity, and with the support of various donors, increased the capacity of Egypt's existing telecommunications system. USAID's technical assistance programs were implemented as part of this ongoing expansion providing ARENTO with valuable experience and the necessary expertise to effectively plan and manage the operation of the continually growing, sophisticated and complex telecommunications system. ARENTO was able to successfully upgrade exchange systems in the two largest Egyptian metropolitan areas (Cairo and Alexandria); this management and technical activity should not be underestimated as it involved difficult simultaneous cut-overs of three switching systems. (If done improperly, telecommunications services could be cut off for days with difficulty determining exactly where the technical problems existed.)

ARENTO became effective at operating the new, USAID-financed electronic exchanges in Cairo and Alexandria without further direct US supplier assistance; additionally, ARENTO effectively supervised the construction and installation of a new 30,000 line electronic switching system and the associated outside plant cables for the Abassia exchange area of Cairo without the usual intense level of expatriate advisor involvement. As telephone service improved, ARENTO substantially increased its tariffs, rates and installation fees.

Principle Beneficiaries of USAID Assistance

The initial beneficiaries of Telecom I, II, and III were the individuals who already had service with ARENTO, namely, the wealthier citizens of Cairo, Alexandria and Port Said. The initial USAID and ARENTO focus was to improve access and service to those individuals who could pay their bills. The received payments could then be used for a critical need: reinvesting in ARENTO so that the network and business could capture new customers and revenues. This cash flow could then provide the means to support broader objectives such as providing new access to the poor and residents of informal settlements. Additionally, because service quality had improved as a result of the new ESS technology, ARENTO was able to raise customer rates, thereby resulting in higher revenue streams from this strong market base.

177 Project Assistance Completion Reports, Telecommunications I, II, and III, May 1993.

Direct beneficiaries of the USAID assistance included all subscribers prior to the project implementation which included, but were not limited to, government offices, business agencies, and members of Egypt's middle and upper classes. Improved services resulted in the new and/or improved abilities to share information that most probably led to improved or faster transactions, innovations, and substitutes for the human movement of information.

Indirect benefits include the new jobs that were created as a result of the improved transactions and new innovations, and numerous Cairo citizens who relied on public call boxes or stations; these are areas where individuals could, for a small fee, use an "unofficial" public phone to make a call. Given the decrease in the density of these informal public phones, the implication is that a very large sector of the citizenry who could previously not obtain a line, now either had more direct access to a line or were able to obtain a private line in their home or business - especially as waiting lists to obtain phone service started to decrease.

Broad Outcomes from Improved Service Delivery

The chart below provides statistical indicators regarding the telecommunications sector prior to the launch of Telecom I, II, and III, and the direct effect as a result of the three USAID projects. One million new subscribers received telecommunications service, and teledensity increased three-fold. 280,000 lines, or 27.4 percent of the 1,020,276 new telephone lines made available in the years 1978-1989, were the result of USAID assistance.

Telecommunications Statistics 1978 - 1989

Description	1978	1989
	Start of USAID Telecom I	End of USAID Telecom III
Population (Millions)	39.7	50.8
Population Density/sq. km	42.1	54.75
GDP per Capita (\$ Current International)	903	2,171
Telephone Lines	374,000	1,394,276
Telephone Lines/1,000 People	9.42	27.45
Mobile Phone	NA	3,619
Mobile / 1000 People	NA	0.07

Source: MCIT Monthly Record of Achievements – November 2006; Central Agency for Public Mobilization & Statistics (CAPMAS) Year Book (1952 – 1983), Page 16, 1984; World Bank Database Statistics

Importantly, while USAID did not directly fund the mobile telecommunications business area, the increased focus by GOE, ARENTO and USAID helped Egyptian consumers to realize the practical, economic and social benefits of improved telecommunications service. Together, these organizations encouraged Egyptian citizens to allocate funds from their monthly budgets towards this utility with great multiplier benefits. USAID's investment in telecom provided great performance for consumers and

businesses directly through line growth and indirectly, by encouraging individuals to spend money in wireless technology, which has impacted their lives and businesses in multiple areas.

USAID's Legal and Regulatory Interventions

USAID played a primary role as an agent for institutional change and organizational restructuring via its support to ARENTO, within Telecom I – V. Telecom I – III focused upon ARENTO's need for assistance so that it could more efficiently manage and operate the nation's telecommunications system and improve service to customers. Managing the network and improving service are people-based skills: while quality products and engineering procedures must be in place, if managers are not able to effectively monitor and respond to network conditions, the service quality suffers. Further, ARENTO was unprofitable and part of this situation stemmed from an insufficient organizational capacity to monitor operations and maintenance costs, as well as customer billing systems. USAID's assistance in these areas directly assisted ARENTO as it began to restructure departments and the overall organization.

Telecom V provided consulting assistance which provided for procurement and installation advice and counsel, and staff-power development. As noted in the EMG report submitted in October, during Telecom IV, this study led to new and necessary organizational practices (and organizational design) for activities such as operations and maintenance practices and a focus on customer education to improve overall service quality and revenues. These USAID-funded activities directly supported ARENTO's business and organizational restructuring activities, and directly benefited bottom line revenues and overall customer satisfaction and service delivery.

Task 2 of Telecom V was directly related at assisting Telecom Egypt (the former ARENTO) to reorganize itself as a competitive, customer-focused company. At the time, market issues really began to "hit" Telecom Egypt and the operator/service provider belatedly realized how vital sales, customer service, and business development would be and how the organization needed to develop an active marketing department. USAID assisted by soliciting the services of a consultant to build and institute this modern function in the evolving institution, especially as Telecom Egypt experienced first hand that without such capabilities, their efforts to operate and sell new revenue enhancing services were seriously compromised. The efforts by USAID consultants to institute this new function (as well as related functions such as business development and quality of service - QOS) had great impact.

The former ARENTO was formally changed into an autonomous entity under the Government of Egypt (GOE) Law 153 of July, 1980. ARENTO still reported to the Ministry of Communications, however, this change gave ARENTO the authority to make modest improvements in its personnel, accounting and inventory systems. For example, ARENTO now could:

- Set employment quotas;
- Establish accounting and inventory systems;
- Appoint top managers;
- Discharge unproductive workers; and
- Comply with the USAID grant covenants.

This legal change gave ARENTO the ability to more effectively manage its *business operations*; e.g., the organization could now attempt to control its operating costs. By setting employment quotas, staffing costs could be more effectively managed, both in terms of the direct costs (loaded salaries) and indirect resource drains (unproductive staff management time, ineffective training, etc.). Through the ability to discharge workers, additional unproductive and counterproductive cost areas could be discharged as well.

By allowing ARENTO to appoint top managers, more effective systems and procedures for *corporate governance* could be put into place. As top managers generally establish an organization's vision, mission

and operations, the ability to select this top management team improved the overall implementation of the business strategy of the telecom entity.

A further example of quality cost recovery and financial management is that ARENTO revalued all of its assets based upon their market value instead of the purchase price. This appears to have been sensibly done according to the existing exchange rates at the time, valued less depreciation.

A tariff rate structure was submitted by ARENTO to the Egyptian Parliament; it was approved and implemented in January 1982. Throughout Telecom I, II and III subsequent modifications to specific tariffs for various subscriber classifications and use rates were implemented. While the tariff changes did not completely remove the subsidies (which represented financial drains to ARENTO and subsequently to the GOE), the GOE's pledge to eliminate subsidies to all but the most needy was an excellent example of steps toward quality cost recovery and financial management, and the reduction of the "government's hand" in this business sector.

Telecommunications tariff benefits derive from three primary sources: telephone subscriptions, completed calls and installation charges. Call rates sub-divide into local, national and international. By taking the total revenue and dividing it by the number of total system lines, average revenue per line can be obtained. This average revenue can then be multiplied by the number of lines introduced by the USAID financed projects to determine the total revenue that USAID projects added to ARENTO's bottom line. Using this methodology, it appears that revenues attributable to Telecom I, II, and III were 667.3 million EGP.

Year	Subscriptions	Telephone Calls			Installation	Total (million EGP)
		Local	National	International		
1983/1984	1.9	.9	.6	4.2	4.4	12.0
1984/1985	9.1	3.5	2.0	15.9	17.0	47.4
1985/1986	13.7	4.1	3.5	21.6	3.7	46.5
1986/1987	14.6	7.4	5.4	28.9	2.7	59.1
1987/1988	14.6	7.4	8.5	14.8	0	45.3
1988/1989	14.7	8.0	15.6	63.2	2.0	103.5
1989/1990	14.7	8.0	17.2	68.7	--	108.6
1990/1991	14.7	8.0	20.3	71.4	--	114.5
1991/1992	15.9	8.0	23.2	84.2	--	<u>130.4</u>
						667.3

Quality of Services

There are clear metrics that provide positive indicators regarding how USAID's institutional development activities have assisted ARENTO as a utility provider; this data follows. However, there also appears to be important concerns regarding the relative speed of implementation of some of the recommended institutional strengthening activities, particularly as Telecom I, II and III progressed.

As an example, at the beginning of Telecom I¹⁷⁸, ARENTO staff numbered approximately 50,000, having increased by approximately 2200 employees *per year* since the 1961 GOE mandate to reduce unemployment (the situation was not unique to ARENTO). While this hiring quota may have benefited

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those citizens out of work, their employment was unquestionably detrimental to the efficiency of ARENTO's operations. As employment efficiency in telecommunications is typically quantified by a staff to telephone line ratio, by 1972, ARENTO's average was 107.1 employees to 1000 lines. In developed countries, typical ratios exist of 8:1000 ranging to 30:1000. Yet, bloated as the organization was, ARENTO still faced acute shortages, especially of qualified engineers, technicians and craftsman. With the lack of other opportunities, low turnover rates prevailed, and with seniority, rather than performance dictating who held the highest positions, ARENTO's organizational structure seemed more like an upside-down pyramid, where the slightest push could topple the unstable business to the ground. It was to some degree testament to the organization's sheer will that the network worked at all, given the operator's unstable organizational structure. By 1977, the employee to line ratio was 127:1000.

ARENTO's past financial performance had been mixed prior to USAID involvement. In an IBRD appraisal report¹⁷⁹, ARENTO showed a financial rate of return on historically valued assets averaging 9.9 percent for 1973-1976. Importantly, ARENTO's revenue per main station averaged only US \$137 per year in the 1973-1976 period; comparatively, corresponding revenues for countries *at a similar stage of development* were Ghana, \$211; Pakistan, \$224; Ethiopia, \$236 and India, \$253. The low return stemmed mainly from the imbalances between staffing (bloated as noted above) and overall network development (low). The cost of the excess staff was estimated at amounting to 14 percent of the operating expenses and 8 percent of the operating revenues. Without this expense, the IBRD estimated that ARENTO's financial rate of return would have ranged from 10 to 19 percent on the historically-valued assets, averaging more than 12 percent.

After the enactment of Law 153, which gave ARENTO its autonomy, ARENTO began a thorough staff power assessment study and as a direct result, staffing started to decline, initially by 2,000 to 48,000. At the time, significant progress was also made by ARENTO in the collection of payments for services from Government institutions. Past due accounts were brought to the attention of the Ministry of Economy and Economic Cooperation. This focus improved the financial and operational performance of ARENTO, both by decreasing the organization's financial liabilities and by providing it needed cash flow to fund current and planned activities. Additionally, there was also a "Quick Fix" service improvement plan; while specifics of the nine sub-tasks associated with this plan could not be located, apparently, this program provided improved service delivery for ARENTO subscribers.

During Telecom I, II, and III, technical assistance was apparently provided to ARENTO under USAID/Egypt-financed contracts for institutional strengthening activities in the areas of fundamental planning, training, finance and administration, organizational structure, tariff rates, and computer systems and applications. Some of these activities were considered successful in that there was a recognizable improvement in service attributable to the new equipment. However, project documentation clearly indicated that continued involvement by USAID/Egypt was needed, to further the achievements made and to strengthen ARENTO's ability to more effectively manage and operate the telecommunications system then, and into the future.

Investigations by auditors indicated that USAID/Egypt was not taking all the necessary steps for ensuring that the project would be efficiently and effectively operated over the longer term; USAID documents indicated that more than half of the recommendations made by U.S. consulting and evaluating contractors, directed to strengthening operations of ARENTO's organization, had yet to be implemented. There are numerous references that ARENTO was slow to implement these organizational improvements.

USAID/Egypt looked into the situation at the time and made the point that resources were limited and therefore USAID/EGYPT and ARENTO agreed to implement only those recommendations considered critical to the current projects (Telecom I, II, or III), leaving the rest for "consideration by ARENTO".

179 IBRD Telecommunications Project Appraisal Report, No. 1756-EGT.

Sustainability of Facilities

A complete tour was taken of the El Kalaa Exchange and Communication (COM) center¹⁸⁰. The equipment was co-located on the same floor and overall, facility conditions were clean, maintained, organized, and operational. One concern was that the building was open in the main corridors to outside elements, and dust and humidity pervaded these passageways so that dust and dirt can cling to employees' clothing and shoes. However, the USAID-financed equipment is carefully contained in a sealed off area which is relatively free from dust. Inside this area, temperature controls were in place, along with HVAC systems. It would be better if shoes were removed or covered with sanitary wraps when employees and visitors walk into and through the facility, but this issue was minor, relative to the overall maintenance conditions.

This COM center services Lucent equipment; each COM center is dedicated to a sole vendor (e.g. Siemens, Alcatel, Nortel, etc.). Equipment documentation was easily available, and redundant systems were in place for operational, diagnostic and reporting equipment. The primary components of the COM are computers and software, which monitor the exchange, both troubleshooting in real time (with various levels of alarms to indicate real time and potential concerns) as well as the health of the switches. The most important element is network fault management, in addition to standard COM features such as network traffic management.

The COM manager appeared highly educated and familiar with these individual areas of equipment and data, and along with the managers at Telecom Egypt's offices, was extremely pleased with the Lucent equipment. **USAID emblems were clearly displayed on all equipment.** It appears that this USAID investment will continue to be maintained and serviced well, ensuring that it will provide numerous financial, economic and social benefits for at least its expected life cycle.

Economic Impacts of Service Improvements

The Telecom I, II and III service improvements had a direct impact on the economy. At the time, significant progress was made by ARENTO in the collection of payments for services from Government institutions. Past due accounts were brought to the attention of the Ministry of Economy and Economic Cooperation. This focus improved the financial and operational performance of ARENTO, both by decreasing the organization's financial liabilities and providing needed cash flow to fund current and planned activities. As a result, more lines could be put into the network, allowing individuals to share information leading to transactions, innovations, and savings of valued time, effort and resources as telecommunications networks serve as a substitute for the human movement of information.

During the time period of Telecom I, II and III, regulatory changes (privatization, competition) would have been premature as Egypt's investment climate, telecommunications operating environment, and regulatory infrastructure was not mature enough to open the sector to competition. However, USAID's key assistance in 1980 helping the Egyptian telecommunications restructure into ARENTO was a key launch point for these later activities.

Macroeconomic Impacts

Prior to the USAID program, American telecommunications suppliers had not aggressively marketed products or services in Egypt, nor were they extremely familiar with the unique characteristics of doing business in the Middle Eastern region. The USAID program gave a number of large US suppliers (for example, AT&T Network Systems (now Lucent Technologies), HP, General Dynamics, InfoComm, etc.) a major boost into the market, both via the creation of a secured revenue stream (in US dollars and without foreign exchange fluctuations) by which to introduce their goods and services, and by providing

180 Visit to Exchange and meeting with Adel Hamed, Director, by Di Landau, September 10 2006.

Egyptian “customers” (ARENTO) an equally low risk, low cost way to learn about American products and their related support processes and technologies.

While marketing efforts were not overtly implemented by the vendors or USAID, in many ways it was a good “silent sell” for American business and U.S.-based products and firms. Top Egyptian managers and decision-makers learned about the quality of U.S. goods and services, and US managers and firms learned that they were capable of successfully conducting business in a culturally and geographically distant market. This mutual learning curve had massive macroeconomic benefits; today US companies in Egypt ranging from Hyatt to Hilton to Nike to Cisco to Microsoft have all benefited from the positive product and cultural impressions, and trading relationships that were launched as much as 30 years ago.

On a macroeconomic level, the U.S. is currently Egypt’s second largest foreign investor, with investments in the oil and gas sector, information technology, consumer goods, automobile production and financial services. The market is also one of the largest for U.S. exports of wheat and agricultural machinery.¹⁸¹ Opportunities abound with projects in 2006 in the medical field, construction, tourism, and petrochemical fields, to name a few.

The positive working and trade relationships that the USAID utility infrastructure project birthed has blossomed into a robust trading relationship which has led to an increase in GDP for both countries, in addition to the creation of numerous jobs, innovations and positive experiences not only for Egyptians and Americans, but for the numerous subcontractors and global citizens who have also participated and benefited as well.

Impacts on Public Health

While telecommunications does not benefit individuals’ health in the direct way that clean water or sanitary facilities can help to prevent disease, the ability to place a telephone call can literally mean the difference between life and death, i.e. individuals can get critical medical assistance when needed, thereby reducing stress and saving lives. Additionally, during the time of Telecom I - III, telephones were used to dial fax machines which could send critical information regarding health and medical procedures. This data distribution - an early form of point-to-point broadcasting - provided extensive public health data for citizens as well as information regarding public health services.

Further, both power and telecommunications are necessary tools for businesses to run effectively. If a hospital has better communications, doctors can respond more quickly to an emergency. If a business better manages its inventory through a real time data system, consumers can get products they need on an expedited basis. If those products are pharmaceutical goods or basic good such as safe, bottled water, an individual’s health is improved.

Lessons Learned

For the telecom sector, the proper sequencing of investments was dependent upon the relative maturity of the telecommunication network (e.g. its development relative to population needs, in terms of number of lines and service offerings and quality), the incumbent operator’s effectiveness at meeting sector or Ministry-defined goals, and the relative interplay between sector organizations such as suppliers, service providers, associations, the regulator(s), and the government. One must view the goals of a project in order to determine the best order in which to implement policy changes, institutional reform and/or construction projects.

In an ideal world, one could establish the framework to do business (e.g., *policy*), build the appropriate organization (e.g. *institution*) and then implement a project (e.g. *construction*). However, it is rare that

181 www.buyusainfo.net/docs/x_6236415.pdf

such an “open field” is available and more typically *and especially with high technology industries, it is most often the case that organizational and policy infrastructures are usually a step behind the technological innovations that they must manage*. Additionally, it is easier for an organization to grasp and implement needed institutional and/or regulatory changes once they can “see” the reality of a changed infrastructure (e.g. construction and/or network installation). For these reasons, it is very difficult for any country to ensure that its institutional and policy infrastructures are fully established and operational prior to the launch of construction or a network installation.

In Egypt’s case, the project order was logical and appropriate for the time. The initial problems that ARENTO and subsequently its subscribers faced were technical. As identified herein, call completion rates were dismal. Access to the network was limited to the lucky few from the highest economic classes. It was vital to replace the outdated equipment with modern technologies (of the time) and generate immediate customer satisfaction and revenue; institutional and/or policy changes were not the most appropriate mechanism to correct the financial and network stability challenges of ARENTO in the 1970s and 1980s.

Also, as noted within the project documents, hardware implementations are generally easier and more readily accepted than institutional changes such as organizational restructuring. Almost every nation in the world has a sound human capital base of electrical engineers; it is far more difficult to find the state-of-the-art management talent that is needed to support, at the highest levels, high technology industries, where it is most often the case that organizational and policy infrastructures are usually a step behind the technological innovations that they must manage.

After the acute financial and technical challenges were met and time progressed, the need for institutional, managerial (training) and policy changes became more apparent, especially as ARENTO moved into “modern times” in its implementation of new service offerings, corporate governance, and public accountability. Importantly, USAID did become aware of these concerns – especially as the funding organization migrated funds from construction (Telecom I, II, III, and IV) to a policy and institutional reform focus (Telecom V).

Contractual Arrangements

Relative to contractual arrangements, the number of organizations involved in providing an overall service should be minimized to reduce the needs for coordination, which is a natural obstacle and condition of international projects. In Telecom I, II, and III, the engineering consulting, exchange construction, and outside plant construction contracts were combined into one contract resulting in a substantially shorter implementation schedule and below budget costs. Moreover, three additional ESSs were financed with less than the originally planned funds allocated for only seven ESSs.

A consultant evaluating USAID’s telecom assistance projects in the 1980s wrote that “USAID/Egypt was not taking all the necessary steps for ensuring that the project would be efficiently and effectively operated over the longer term”¹⁸². This judgment seemed to arise from an unrealistic baseline perspective as to what was achievable, both in terms of context and time, for two organizations working together with modern technologies in a changing organizational and policy context. Given all the competing demands of the era and ARENTO’s *limited staff resources for the modernizing tasks (despite its excessive staff)*:

- USAID (or the Consultant preparing the recommended project timeline and scope) appeared ambitious in its implementation timeline for management activities within Telecom I, II and III. As noted earlier, hardware and engineering-type activities have *faster implementation timelines* than management and institutionally based activities;

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- There is a natural *learning curve* when organizations meet and work together; USAID does not appear to have left time for this learning curve delay within project timelines. This necessary baseline - which can accelerate the work team's outputs later – may not have been considered when USAID incorporated the *human based activities with its ambitious (technical) network expansion plans*; (Note: The same learning curve applies to assistance to the regulator, NTRA. The regulator needs time to ascend the learning curve and realize what its role should be since regulation is often understood as control rather than setting guidelines.
- While the funding aspects for the training programs may have been in place, the *institutional strengthening program required a human resource outlay by ARENTO*. It is unclear if USAID considered this important concern in its funding plan, e.g., if ARENTO's staff for managing Telecom I, II or III were already allocated to network installation activities, how could the organization afford to *remove management teams from USAID-funded operational tasks in order to place them in USAID training programs*? The technical and service goals – which were the immediate and visibly accountable aspects of the project – would have clearly suffered.

In 1982 a USAID telecoms consultant provided 147 recommendations to ARENTO. USAID/Egypt and ARENTO were wise to limit the implementation of those recommendations to those considered “critical to the current project”. While undoubtedly eager to support the project and ARENTO, this list (which appears to have lacked a ranking) created an insurmountable set of tasks.

An amendment to the Consultant's contract authorized a second phase of the institutional strengthening project, in which “certain of the Phase I recommendations were selected by USAID/Egypt and ARENTO as most necessary for AID-financed consultant assistance to ARENTO.” However, apparently no specific timetable was established for disposing of all of the recommendations, although it was apparently recognized that “at least some of the remaining would be appropriate for consideration in a follow-on project financially supported by USAID/Egypt.”

As a result of these vague contracting procedures, a later (consultant's) review of 121 of the 147 total recommendations indicated that from May 1982 to August 1985, only 44 had been fully adopted. Thus, 77 (or 64%) of the 121 recommendations had either not been implemented or only partially implemented over three years later; there were no records regarding the remaining 26.

Compounding the challenge, a second U.S. firm was hired in May 1984 to consider ARENTO's abilities to satisfy public telephone service demand, given the anticipated high growth rate over the next fifteen years. This team made 48 recommendations including a *first recommendation that ARENTO consider the previous consultants' 147 recommendations*.

This means that within two years, ARENTO received at least 195 recommendations from USAID consultants. To their credit, in their secondary review, ARENTO appeared to have fully implemented 20 of the 48 new recommendations, 5 “partially”, and the remainder had yet to be adopted. (At the time, three recommendations could not be accounted for or were perhaps merged with other recommendations.)

As the consultants' contracts expired in fiscal year 1986, ARENTO lost the skills and services of the remaining 26 consultant specialists who were advising in the areas of fundamental planning, contracts administration, construction supervision, operations and maintenance, fault reporting, transmissions, station installations, financial systems, computer systems, and stores and purchases. At the time, the final project auditor's recommendation was that USAID/Egypt should continue working to implement recommendations to strengthen the ARENTO organization. It was also noted that neither the Consultant nor ARENTO had prepared an analysis of the necessary work-force skills or a realistic plan for obtaining and retaining such skills in the organization.

In the future, it would appear to benefit USAID and the local organization if training programs were developed as an integrated project component along with construction-related activities. General skills

development is critical, and it is important that individuals who will operate, maintain and/or manage new equipment receive training prior to, during and after the new equipment installation.

It also appears that there was such an intense focus on new equipment installations that the institutional strengthening goals were made secondary; as time and efforts intensified “on the ground”, less and less attention was able to be given to staff development needs *that may have directly tied to the project goals and implementation success*. It did not appear that USAID’s approach changed over time (during Telecom I, II, and III); rather, more consultants arrived to further evaluate the progress regarding recommendations.

In retrospect, the funds allocated for the second Consultant review team to assess the status of the implemented recommendations (which were already documented as incomplete) could have been used to pay for additional US-based staff to manage the network, while the ARENTO staff attended the needed training and institutional strengthening programs.

Other examples of areas where the lack of training and inability to focus on all of the recommendations impacted the utility program’s goals included:

- Improved financial awards (or penalty systems) were suggested to ensure the availability of a well-trained, stable work force at the national and international toll centers;
 - These awards and/or penalties did not get developed.
- An inter-utility committee was suggested to coordinate digging activities to prevent unnecessary disruptions and damages to outside plant;
 - This committee did not get developed; in addition to assisting with outside plant concerns, the committee could have also focused efforts to ensure that minimal environmental damage took place, which was/is a USAID project concern.
- The exchanges did not have enough trained personnel to form an adequate maintenance staff;
 - Over time, this could lead to unnecessary equipment damage and network problems.
- Attendance difficulties at training sessions hampered project goals. Four specific reasons were cited:
 - ARENTO counterparts were not relieved of normal daily duties and therefore could not attend;
 - There did not appear to be a “train-the-trainer” program so ARENTO and the overall USAID project were fully reliant on expatriate resources which were costly and therefore had limited time/availability;
 - Training programs were not translated into Arabic, therefore marginalizing their utility, especially for less educated ARENTO staff who assisted with maintenance aspects of the network;
 - Training equipment was apparently delayed.

Relative to the last point, for future programs, USAID may wish to:

- Provide staff to cover needed functions so local managers can attend training. USAID may also wish to relocate critical training classes so they are near to telecom facilities (e.g. less lost time for ARENTO (organizational) staff);
- Implement “train-the-trainer” programs so technology transfer can occur and local expertise and educational capabilities can be developed;
- As much as possible, translate written materials into Arabic. If this is too costly, invest in digitally recording the training program, with translation. This way local staff can watch and listen to the translated program via podcast, and take notes in their native language at virtually no additional cost to the USAID program.

USAID commissioned a review of the environmental impact of the Telecom projects as telecommunications installations can create some degree of environmental impact in that cables require placement under the ground, which leads to excavation in streets, and after completion of the modernization program, restoration. Dust naturally occurs (especially in Egypt with its arid climate) as does noise, especially when heavy construction equipment is utilized and when generators must initiate or reinitiate as a result of power outages.

In Egypt, it became apparent that work practices provided more potential damage to citizens than any environmental impacts. Unsafe practices such as excavating in the streets with open ditches with no barriers, a lack of warning lights in pedestrian areas, and the operation of public vehicles near work sites endangered workers and the public. Suggestions were provided to ARENTO to decrease these risks. Also, efforts were put in place to ensure that generators were placed in location that would least affect employees (with their noise). Additional ideas including designing purchasing specifications for vehicles with less polluting components, and instituting driver training, potentially leading to more efficient vehicle operations (e.g. better fuel-air ratios and less noise (honking)). Finally, as dust affects sensitive communications equipment, suggestions for better housekeeping and pride in outdoor landscapes and indoor areas were documented.

Rating: Met Expectations

Telecom IV

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0177	Telecom IV	1988-1996	81,676,000	80,000 new lines to four new geographies; remote switching modules, host modules, OSP and hvac; centralized operations and maintenance center launches; consulting assistance for procurement and installation; staff-power development; the initial development of a Centralized Operations and Maintenance Center. Asynchronous Transfer Mode and Network Operations Center projects.

The Egyptian telecommunications network as of 1989 and the end of Telecom III was comprised of 1.4M lines, with a teledensity of 0.26. GDP per capita had now increased from a 1976 baseline of \$680 to \$2171 - a more than three fold increase.

Direct and Indirect Outputs

Originally, the September 1988 Telecom IV contract consisted of construction (e.g. network installation) of 60,000 lines within two new digital telephone exchanges, and related outside plant (connections to subscriber premises) in the Bab-El-Khalk and Pyramids West areas of Cairo. Transmission facilities to connect the exchanges to the Cairo national and international telephone system and relevant training (technical assistance) completed the contract. Estimated at \$40M with a Government of Egypt (GOE) contribution of 21M EGP, specific project parameters included:

- Consulting engineering services for the procurement and installation of the two digital telephone exchanges and related outside plant;
- Design, engineering, equipment, installation and maintenance services for the digital systems and related outside plant;

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- Training of engineers and technicians in the operation and maintenance of the two digital telephone systems and related outside plant.

The contract was then amended twice. In the November 1991 amendment, there was a change to the geography of the planned network installations (with no modification to the contract value), namely:

- The Pyramids West and Bab-El-Khalk 60,000 line network installation was changed to 70,000 lines and the related outside plant network for the El Kalaa and Al Marioteyah areas of Cairo;
- A 20,000 line DSS was added for Heliopolis;
- Heating, ventilation, and air conditioning (HVAC) for Al Marioteyah and associated exchanges; and
- Outside plant (OSP) was added for Mokattam. The OSP consisted of cable interconnections between the telephone exchanges and the subscribers, as well as transmission facilities to the Cairo national and international telephone system.

In the second amendment (May 1992), the original contract value was nearly doubled to \$82 million, with a GOE total contribution of 31 EGP. Additionally procured equipment and services included:

- Four 20,000 line DSS exchanges for Giza, Ramsis, Opera, and Pyramids for a total of 80,000 lines;
- 4,000 lines for host modules (known as remote switching modules or RSMs) for Mokattam and Maadi;
- Host equipment at El Kalaa for two RSMs;
- OSP for the Mokattam, Heliopolis, Giza, Auto and Pyramids Exchanges; and
- Initial development of a Centralized Operations and Maintenance Center.

Additionally, USAID financed:

- Consulting engineering services for the procurement and installation monitoring of the DSS, OSP network, host equipment and RSM, HVAC, and other related equipment;
- Design, engineering, equipment, installation and maintenance services for the above equipment;
- Training of engineers and technicians in the operation and maintenance for the above equipment; and
- Consulting services for a Cost of Services Study and an Operations and Maintenance Study.

Total USAID contracts eventually reached \$82 million, with a GOE contribution of 52 million EGP. If in-kind contributions (land, buildings, equipment and outside plant conduits and cables) are counted, the GOE contribution climbed to 144 million EGP. Project disbursements began in September 1989 and concluded in 1996.

Principal Beneficiaries

The project provided increased telecommunications services to the 12 to 14 million people then living in Cairo, and significantly decreased the waiting list in the Bab-El-Khalk and Pyramids West areas of Cairo¹⁸³. Service quality was improved for over one million residents. Additionally, the citizens and overall economy of Egypt benefited in that the original contract between ARENTO and AT&T International was amended to include the additional 10,000 lines as well as additional outside plant and related technical components. This accelerated the overall network development as well as the ability to add subscribers to the network. Each new subscriber also added the possibility of more innovations,

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transactions and social benefits, especially as phone lines were becoming increasingly used for fax as well as voice communications.

The chart below provides statistical indicators regarding the telecommunications sector prior to the launch of Telecom IV and the direct effect as a result of the USAID Telecom IV project investments and activities. From 1989 to 1996 (the period of Telecom IV), 1.63M new subscribers received telecommunications service, and teledensity doubled. Of these new subscribers, 205,000 or 12.6 percent were attributable to USAID interventions.

Importantly, while USAID did not directly fund the mobile telecommunications business area, the increased focus by GOE, ARENTO and USAID helped Egyptian consumers to realize the practical, economic and social benefits of improved telecommunications service. Together, these institutions were encouraging citizens to allocate funds from their monthly budgets towards this utility, with the resultant multiplier benefits. The USAID projects provided great performance for consumers and businesses directly through the line growth and indirectly, by encouraging individuals to spend money in wireless technology, with its multiple positive impacts.

By 1991, Telecom Egypt removed the last of the 1AESS (analog) switches as the carrier successfully migrated to a fully digital network. This is another excellent example of how USAID's support helped to provide more advanced and better quality services for the network subscribers.

Telecommunications Statistics – 1989-1996

Description	1989	1996
	End of Telecom III	End of Telecom IV
Population – M	50.8	59.31
Population Density / sq. km	54.75	58.78
GDP per Capita (\$ Current International)	2,171	2,910
Telephone Lines	1,394,276	3,024,947
Telephone Lines / 1,000 People	27.45	50.99
Mobile Phone	3,619	25,207
Mobile / 1000 People	0.07	0.43
Internet Users	NA	40,000
Internet / 1000 People	NA	0.67
PC's	NA	350,000
PC / 1000 People	NA	5.9

Source: MCIT Monthly Record of Achievements – November 2006; Central Agency for Public Mobilization & Statistics (CAPMAS) Year Book (1952 – 1983), Page 16, 1984; World Bank Database Statistics

USAID's Legal and Regulatory Interventions

Telecommunications tariff benefits came from three primary sources: telephone subscriptions, and call and installation charges. Call revenues further sub-divided into local, national and international. By taking the total revenue from ARENTO statistics and dividing it by the number of total ARENTO system lines, average revenue per line is obtained. This average revenue can then be multiplied by the number of lines introduced by the AID financed projects to determine the total revenue that USAID projects added to ARENTO's bottom line. Using this methodology, it appears that revenues attributable to Telecommunications IV were 512.5M EGP.

Year	Subscriptions	Telephone Calls			Installation	Total (million EGP)
		Local	National	International		
1991/1992	2.4	2.7	8.0	13.8	14.9	41.8
1992/1993	4.2	4.5	13.6	23.4	10.4	56.1
1993/1994	5.6	6.1	18.3	31.4	8.7	70.1
1994/1995	7.9	8.6	25.8	44.2	13.9	108.4
1995/1996	10.1	11	33	57	13.9	125.0
1996/1997	10.1	11	33	57	--	111.1
						512.5

* Benefits estimated at 1991/1992 prices.

Quality of Services

During Telecom IV, a study was commissioned to evaluate ARENTO's operations and maintenance practices and procedures for USAID-financed equipment and materials provided under the preceding four projects, and to recommend any needed improvements¹⁸⁴. The study evaluated the response of the equipment contractors to their contractual obligations covering work programs, maintenance and training requirements.

In general, it appears that contractors had fulfilled their responsibilities providing O&M procedures, training and spare parts. There was notation that additional training could be utilized with additional courses and facilities. Importantly, installed facilities appeared to be in line with expected conditions, based on the age of the equipment. New technologies were being introduced, particularly in the subscriber loop testing. The most serious recommendations were:

1. An urgent need for USAID/ARENTO to investigate, diagnose and solve serious network problems. When this was done, it turned out that numerous network disruptions were due to *subscribers*. Telephone sets needed maintenance or, for example, numbers were only partially dialed (resulting in incomplete calls). Receivers were not replaced properly, causing lines to be left open overnight. Monthly performance summaries indicated that these false starts amounted to 24 percent of the originating traffic.

Public education on the use of the telephone was recommended.

2. Due to the growth of the network, ARENTO should immediately consider the provision of network management facilities, with a network management center to be installed in Cairo.
 - a. A study made of the need for centralized operations and maintenance centers (COM) in order that the COMs can be used efficiently and effectively.

USAID funded the launch of an initial centralized operations and maintenance center, and in Telecom V, funded the Network Operations Center (NOC).

3. Technical Concerns:
 - a. Transmission links between switching centers should be assessed;
 - b. A quality of service program should be developed so that ARENTO's service performance can be measured against a standardized set of performance metrics.

184 Operations Maintenance Study – Final Report. Volume I and II, August 1993 (Telecommunications IV).

USAID funded additional transmission equipment to improve switching center communications, and funded a quality of service program as was recommended.

4. Training needs to be increased and decentralized for the switching, outside plant, hvac, repair centers and overall operations and maintenance organization (for the USAID funded equipment).

USAID funded a quality of service program in Telecom V, as well as additional outside plant equipment. Additional training was added to the program as well.

Relative to the institutional development impacts on the financial performance and operational performance of utility providers, USAID's support of ARENTO helped it to transition into Telecom Egypt: a company with 6 million fixed lines and a sales revenue of U.S. \$600 million in 1999 and US\$ 1 billion in 2000, and the largest telecom operator in Africa.¹⁸⁵

In the early 1990s, there were concerns that facilities for the 1AESS were not maintained as well as required; dust, heat and humidity entered the areas, which can damage the sensitive equipment. However, the 1AESS apparently were utilized for their entire life cycle and only removed when it was evidently time to migrate the network to be fully digital.

Lessons and Best Practices

As noted earlier, for the telecom sector, the question of infrastructure investments and their proper sequencing is *context specific*, and depends upon the relative maturity of the telecommunication network (e.g. its development relative to population needs, in terms of number of lines and service offerings and quality), the incumbent operator's effectiveness at meeting sector or Ministry-defined goals, and the relative interplay between sector organizations such as suppliers, service providers, associations, the regulator(s), and the government.

In Egypt's case, the order of USAID's project assistance was logical and appropriate for the time. The initial problems that ARENTO and subsequently its subscribers faced were technical. Hence, USAID focused its projects and investments towards activities in construction, generating revenues for the ailing operation, while improving access and quality for subscribers. As the network and sector matured, USAID shifted its focus towards institutional, legal and regulatory support.

As evidence of the wisdom of this approach, in 1994, the GOE agreed to a program for reforms such as market pricing, cost recovery, and fiscal autonomy. Until 1998, all of Egypt's telecommunications services (including operation and regulation) were provided by one organization - ARENTO. In 1998, by GOE law, ARENTO was replaced by two independent entities: (a) Telecom Egypt which provided telecommunications services and was incorporated as a stock company, and (b) the National Telecommunications Regulatory Authority (NTRA) which was established as an independent regulatory body.

Rating: Met Expectations

185 <http://www.huawei.com/news/view.do?id=369&cid=42>

Telecom V

Project Number	Project Title	Project Period	Funding (1,000 \$)	Project Purpose
263-0223	Telecom V	1993-2006	281,900,000	Construction; Institutional Development, and Legal and Regulatory Reform, including 355,875 "lines" installed; a new Quality of Service (QOS) focus; and the building of a Network Operations Center; ATM Project.

Telecom V involved a range of sub-project activities that supported the USAID construction and initial institutional, and legal and regulatory reform activities from Telecom I, II, III and IV, as well as Telecom Egypt's other network growth initiatives. Known as the Telecommunications Sector Support Project or TSSP, project goals included:

1. supporting the orderly expansion and modernization of telecommunications systems to make them more efficient and enhance the profitability of all sectors of the Egyptian economy, particularly the industrial sector;
2. enhancing previous policy successes in the telecommunications sector; and
3. further enhancing ARENTO's project management skills and technical and organizational capabilities that had evolved through the implementation of the previous and present AID-financed telecommunications projects.

In essence, Telecom V would focus on policy/institutional reforms and infrastructure development (commodities and equipment). The Telecommunications Sector Support Project within Telecom V authorized network development in seven sub-projects. The projects are identified below, along with the USAID financing component and number of lines and sites.

Telecommunications V

Project	U.S. \$	Number of Sites	Number of Lines
Outside Plant I	17,080,327	8	116,800
Outside Plant II	42,571,208	13	355,875
Digital Switching System I	23,603,043	8	101,000
Digital Switching System II	15,396,943	3	79,000
Digital Switching System III	36,965,748	15	310,000
Network Operations Center	50,635,862	n/a	n/a
Asynchronous Transfer Mode	17,838,698	1333	n/a
Training and Related Studies	77,808,168	n/a	n/a
Total:	\$ 281,889,997		962,675

Of the approximately \$200M provided to ARENTO, the GOE (via ARENTO) contributed approximately \$100 million EGP in equipment and installation services (e.g. labor)¹⁸⁶

Direct and Indirect Outputs

The Outside Plant Facilities contracts (OSP I and II) added local network facilities to 12 different exchanges in Cairo, Alexandria, and Port Said, in addition to redistributing existing local cable facilities and therefore freeing up cable pairs. Completed as part of this work were:

- site surveys, engineering and final design;
- installation of multiple duct conduit system and all related civil works;
- furnishing, placing, splicing, testing; and
- commissioning and maintenance of primary and secondary cables and their associated hardware.

The OSP II project also included furnishing, installing, testing, commissioning and maintaining wireless local loop facilities and training personnel the associated facilities' operation and maintenance. Nortel Networks was the selected vendor.

The digital switching system (DSS) contracts resulted in the installation of 380,000 digital lines, although 5,000 were not actually "lines" as they were wireless."¹⁸⁷ The network growth transpired in Cairo (Ramsis, Nozha II, Manshiet Nasser, El Sherouk I, El Obour I, Mukattam II, Tagaamoa, El Sherouk II, El Obour II, 10th Ramadan City and 6th October City), Alexandria (El Haremein, El Ibrahimia, Carmouz) and Port Said. Technology transfer (institutional reform) activities complemented the construction build-out with in-country and off shore classroom training for 112 Telecom Egypt engineers in eight disciplines (DMS equipment hardware and software; COM center equipment; inventory, security and HVAC systems; batteries and rectified systems, standby (diesel) equipment; and fire alarm system).

The Network Operation Center (NOC) project was (and still is) perhaps one of the most exciting construction and developmental aspects of all of USAID's support to the telecom sector. The NOC improved management of the nation's telecommunications system, especially needed as this had become increasingly complex. Workshops and training sessions were conducted for 153 upper management and working-level staff of Telecom Egypt, with intensive training provided to NOC operator staff. Primary elements of the installation include the two floor facility that is located in a MCIT building include the NOC room, computer room with the network management equipment and UNIX servers, and the situation room transCOM. An additional 1.91 million Egyptians received improved services due to completion of the USAID funded NOC.

Relative to the Asynchronous Transfer Mode (ATM) network, core, edge and access switches were used to complete the major construction and network expansion installation, with complementary training in these technologies and Nexus and Oracle software (inventory system). The project commenced in January 2005 and was completed in August 2006. Three core switches were provided at the Ramsis (Cairo), Suez and Auto (Alexandria) exchanges, with 16 edge switches spread over 5 regions to cover all of Egypt and the 1,334 access switches in Egypt's 26 governorates (which access the 16 edge switches).

A total of 28,240 ports were created for customers; this was particularly germane in 2005/2006, as customers were requiring multi media communications and needed a network that was capable of handling current and future applications. An ATM network has the advantages of integrating various

186 *Telecommunications Sector Support Project*, 263-0223, Summary and Recommendations. Provided to USAID Contractor as part of project documents for Telecom V from USAID Cairo.

187 The term "line" becomes somewhat inappropriate when the transmission means becomes via radio frequency or wireless local loop.

services and applications (voice, fax, data, cable TV and future applications), standardizing network components, is scalable, and has a guaranteed quality of service (QOS).

At Telecom Egypt's request, additional training was requested for 35 more trainees. The Telecommunications Sector Support Project (TSSP) was conceived, which focused on legal and regulatory reforms, management and organizational reforms, planning and operation services, and improving Egypt Telecom's financial performance.

Task One focused on Legal and Regulatory Reform. This program assisted by developing the first National Telecommunications Policy (NTP), ensuring it was accepted by the GOE committee that was established for that purpose. Key language from the NTP was then utilized in the National Plan for 1996/1997, which encouraged private sector participation in telecommunications. Aspects that then flowed down into the market included the competitive pricing of VSAT services, the provision of Internet services by private entities, the deployment of GSM, the initiation of tenders for private payphone services, and the beginning of the process to privatize GSM services. Many of these initiatives were developed with the active participation and encouragement of the USAID contractor.

The USAID contractor (Booz Allen and Hamilton) also assisted with the separation of operations from regulation (Ministerial Decree No. 46 of May 5, 1995), providing core legislation and seminars to assist with the process and staff selection. While the contractor was very clear that the full functioning of the telecommunications regulator was limited by questions of legal standing and mandate, they also recognized that this issue rested with the Minister of Telecommunications. USAID also financed studies for the Ministry related to WTO, the liberalization of regulations and the licensing of the third cell phone operator (3G).

With regard to legal changes, the USAID contractor worked with ARENTO to increase compensation for staff and to bring about necessary organizational changes within the frameworks of the laws of the time. From a financial standpoint, as a direct result of USAID-funded activities in Telecom V, the GOE received EGP 115M¹⁸⁸ in taxes on profit from ARENTO in fiscal year 1996/1997, as a result of an agreement that the Ministry of Telecommunications brokered between ARENTO and the Tax Authority. The decision to stop "general" financial transfers and broad capital investments and allow ARENTO to plan and manage its business, and pay taxes based on those activities, gave ARENTO the freedom to grow its operations in a fiscally sound manner, and via a timely and needed market oriented approach.

Task Two was directed at enabling Telecom Egypt to organize itself as a nimble, competitive, customer-focused company, dedicated to the satisfaction of its customers and the professional development of its employees. It called for drafting a strategic plan, organization reform plan and marketing plan, and the strengthening of key departments at Telecom Egypt, including marketing and customer service, human resources, training and technology. A long range training program (known as the Leadership Development Program or LDP) complemented these core organizational restructuring and developmental activities.

Task Three focused on Improved Planning, Operations, and Services. It funded needed improvements in business and network planning, operations (support to construction activities), and maintenance and computerization. Significant change could not come to the above areas without the widespread automation of systems; this project focus was pivotal for enhancing broader and deeper changes within Telecom Egypt.

At this key time, the USAID contractor brought a "hands on, applied technology focus" to the needs of Telecom Egypt; project work also centered on quality of service (QOS) initiatives, infrastructure

188 ARENTO Institutional Development Project, Final Report. Telecommunications Sector Support Contract 263-0223-C-00-5048-00, prepared by Booz Allen & Hamilton, Inc., August 31, 1997, Cairo Egypt. Provided to USAID Contractor as part of project documents for Telecom V from USAID Cairo.

provisioning, and general teledensity growth planning concerns. While the network installations had been greatly accelerated, the contractor focused on Telecom Egypt's ability to preside over the build-out of the impressive infrastructure, given the challenges of competing for market share on a competitive basis.

As QOS issues were new to Telecom Egypt, the Contractor wisely provided copies of QOS standards in use in other telephone operating companies. As the regulator would dictate QOS for the sector, the USAID Contractor worked to develop closer working relationships between the Telecom Regulatory Authority and Telecom Egypt, as it could not (should not) be a consultant's ongoing responsibility to bridge this working relationship within the sector. Examples of network management/customer concerns that QOS improvements would focus upon including documenting and responding to the:

- Length of time from a service request to actual service;
- Trouble with initial service in the first 30, 60, or 90 days;
- Dropped calls¹⁸⁹, noise on the line, other parties on the line, unannounced number changes, etc.;
- Time to repair a service from initial report to restored service;
- Number of repeat troubles.

Prior to the QOS focus by the USAID Contractor, few of these customer service issues were tracked by Telecom Egypt and consequently had not received much management or operational focus.

Slightly different concerns transpired relative to network provisioning, and especially relative to advanced services (e.g. intelligent network (IN), integrated services data network (ISDN), the precursor to today's triple and quadruple play terminology and network features, etc.). In some ways, as Telecom Egypt attempted to become more "market focused", they purchased advanced services (as was suggested by select vendors). Unfortunately, the organization was ill-equipped to manage or market these revenue enhancers, especially as Telecom Egypt still needed to build the internal functions (customer service, marketing, maintenance, billing, collection, etc.) to support these potential sales. In these cases, there was some degree of waste of the limited staff resources and finances, as the services remained unutilized and often became obsolete. It is unclear whether USAID funds were used for these purchases, or if perhaps, these were efforts by competitors as they fought the strengthening US-foothold in the opening market.

Relative to teledensity growth, there were issues as the Ministry provided general direction to Telecom Egypt ("increase density by 1M lines per year") but lacked the operational involvement to understand Telecom Egypt's challenges associated with that request. Telecom Egypt had difficulties managing the waiting list for the new lines, planning and provisioning departments were not integrated with that list, and there were apparently unclear responsibilities on installation decisions (especially as a sequential interpretation of the waiting list could not feasibly be addressed - by the nature of how networks are installed, they are fundamentally geographic and must be developed in specific neighborhood or area pockets). The USAID Contractor responded by providing documents and case examples to show how planning was done and created joint work groups so that integrated efforts might go forward. Presentations were also made by the contractor to the Vice Chairman of Telecom Egypt on this topic.

New software and database systems were brought into Telecom Egypt in order to assist with general ledger, accounts payable and inventory control. These computerization systems were supplied by Oracle in 2000, and provided live data, and helped the financial and inventory systems. However, without reengineering of basic work processes, the Contractor noted that it was hard for Telecom Egypt to take advantage of the software's full benefits. The Contractor further noted that additional outside vendor

¹⁸⁹ A dropped call refers to the situation when callers are unduly disconnected, e.g. a caller does not intentionally "hang up" the receiver to disconnect the open circuit/line.

support would be needed if Telecom Egypt decided to continue using the software systems for Phase 2 of the computerization project.

Finally, efforts were begun to address issues involved with unbundling the “local loop”, which means that the physical copper pair that runs between a local exchange and a subscriber premise becomes accessible to independent providers to provide and compete in services. USAID supported the study for this example of deregulation and stimulation of free enterprise through the “digital subscriber loop” or DSL project. The DSL project outlined an unbundling strategy, pricing plan for the unbundled local loop, market size, potential, and the technical issues related to the implementation.

Principle Beneficiaries

In Telecom V, the primary beneficiaries of this USAID assistance were:

- Telecom Egypt, which benefited immensely from efforts to improve operational and financial performance, service standards and delivery and the management of their business as a viable, commercial enterprise. USAID’s investments in this area were instrumental in securing the foundation for Telecom Egypt to endure into the future as a self-sustaining, modern business, capable of reaching out to its public while answering to regulatory requirements that stem from the goal of providing affordable and consistent communications access to all sectors and classes of Egypt’s population.
- The GOE, who received EGP 115 million in taxes on profit from ARENTO in fiscal year 1996/1997, as a result of an agreement that the Ministry of Telecommunications brokered between ARENTO and the Tax Authority. This was a direct result of work by USAID-funded consulting activities; previously, ARENTO was financially disadvantaged as it was required to (a) install 1M lines per year; (b) continue a level of internal government financial transfers; and (c) pay a large retroactive tax liability. The exhaustive capital investment coupled with double-payment requirements to the government drained ARENTO of any ability to reinvest in its core business while it was also forced to use its revenues to subsidize other GOE activities. The decision to stop the transfers and broad capital investments and allow ARENTO to plan and manage its own business, and to pay taxes based on those activities, gave ARENTO the freedom to grow its operations in a fiscally sound manner, and a timely and needed market oriented approach.
- The outside plant project benefited 355,875 lines and potentially even more subscribers as multiple parties often share access to a phone line (wired or wireless). The redistribution of existing local cable facilities which freed up cable pairs provided access to new subscribers (e.g., extended the reach of current exchange facilities). Telecom Egypt managers and installers benefited from training in nine disciplines, including OPS engineering, cable construction and color coding, cable fault location, subscriber loop testing, fiber optic cable splicing and installation, and wireless telephone systems (specifically CDMA).
- The DSL project benefited Telecom Egypt, ISP and DSL service providers and ultimately, all users of telecommunications services, due to the range of services that would become more affordable and accessible. The first service introduction was estimated at 10,000 subscribers, expected to grow to 100,000 subscribers in five years.

Quality of Services

Telecom Egypt’s interest in and support of local loop unbundling is an excellent example of an outcome from a USAID supported study. By providing service information and a market forecast with an associated pricing strategy, Telecom Egypt received the range of information it required to make a sound business decision that provided new and more affordable services to consumers and businesses.

The chart that follows provides statistical indicators regarding the telecommunications sector prior to the launch of Telecom V and the direct effect as a result of the USAID Telecom V project investments and activities. 7.5 million new subscribers received telecommunications services, and teledensity tripled from 0.051 to 15 percent. From 1996 to 2006, telephone lines increased by an astonishing 7,675,053 lines with USAID's assistance contributing to 355,875 lines or 4.6% of that total increase.

Mobile phone penetration grew from approximately 25,207 users to 15.5 million, while Internet use similarly grew at an astounding rate from 40,000 users at the end of Telecom IV to 5.5 million by 2006. Importantly, while USAID did not directly fund the mobile telecommunications business area, the increased focus by GOE, ARENTO and USAID helped Egyptian consumers to realize the practical, economic and social benefits of improved telecommunications service. Together, the organizations encouraged citizens to allocate funds from their monthly budgets towards this private sector utility with resultant multiplier benefits. The USAID projects provided great performance for consumers and businesses directly through the line growth and improved quality of services, and indirectly, by encouraging individuals to spend money in these technology areas that impacted their lives and businesses in many positive ways.

Telecommunications Statistics – 1996-2006

Description	1996	2006
	End of Telecom IV	End of Telecom V
Population – M	59.31	3 .71
Population Density / sq. km	58.78	70.7
GDP per Capita (\$ Current International)	2,910	4,211
Telephone Lines	3,024,947	10,700,000
Telephone Lines / 1,000 People	50.99	150
Mobile Phone	25,207	15,500,000
Mobile / 1000 People	0.43	217.4
Internet Users	40,000	5,500,000
Internet / 1000 People	0.67	77.1
PC's	350,000	2,980,000
PC / 1000 People	5.9	41.8

Source: MCIT Monthly Record of Achievements – November 2006; Central Agency for Public Mobilization & Statistics (CAPMAS) Year Book (1952 – 1983), Page 16, 1984; World Bank Database Statistics

USAID's Legal and Regulatory Interventions

Task 1 of Telecom V focused on *Legal and Regulatory Reforms*. It called for implementing the National Telecommunications Policy (NTP), which:

- Separated operations from regulation;
- Enhanced Telecom Egypt's autonomy by establishing their tax liability, having them pay regular taxes on their income rather than via the system of "transfers" that had been in effect for a decade;
- Established a compensation plan free from the constraints of the public sector; and
- Set telecommunications tariffs on the basis of cost.

During Task 1, the Contractor (GTE Telecom) realized that one hindrance to implementation was the lack of active planning. Planning was needed between the Ministry and the new Telecommunications Regulatory Authority (TRA), as the latter was chartered to implement the new NTP. So GTE wisely reviewed and updated the NPT and Strategic Plan for the TRA with ARENTO and the Ministry.

The Telecommunications Regulatory Authority was formed under the aegis of the Minister of Telecommunications and an executive board was formed. The TRA began to meet regularly and made important licensing, spectrum allocation and tariff decisions and it was noted that “for the first time” it could be said that “there was a Regulator in the Telecommunications Sector in Egypt.” The Ministry attempted to assist this process by hiring a full time, hands-on consultant to implement new tasks but his efforts were apparently hampered by the lack of qualified staff and the organization’s inability to pay the consultant market wages.

Additionally, there was a similar inability of the authorities to attract and retain the caliber of Egyptian staff needed to staff the TRA. This situation has been noted in numerous countries (including the U.S.); as regulatory work must ideally be at the forefront of the industry, the types of professionals who would be best suited for this task are often courted by the private sector – which generally can pay higher salaries and more attractive total compensation packages than their public sector counterparts. Hence, the TRA was left to handle a range of new and challenging concerns on its own, namely, licensing, spectrum management, tariffing, consumer protection, establishing technical standards, and administration.

However, while the TRA worked with these challenges, it was supported to a degree by the appointment of a new Minister of the newly-combined Ministry of Communications and Information Technology. This was a major step forward as a new strategic vision was communicated. Complementing this, a U.S. consulting firm developed a sector master plan, and a unified Telecommunications Law was prepared by a group of law firms in Cairo and presented to the Peoples’ Assembly. Overall, it had become apparent that numerous players – with a range of perspectives and roles – were now involved in defining key issues and solutions for the telecommunications sector, utilizing a combined business and government perspective. This, in and of itself, was a major leap forward.

A DSL market study¹⁹⁰ showed that if Telecom Egypt provided an unbundled local loop to internet service providers (ISPs) and DSL service providers at a (then) reasonable price of 40 EGP, the providers could be able to price the DSL service to end users at reasonable market rates. By providing substantiating data for how revenue shares would be split between Telecom Egypt and ISPs, important guidelines were provided for forming business partnerships; the study wisely noted the need to review training, trials and experimentation prior to a full local loop unbundling.

While data is not available for all years, according to USAID documents,¹⁹¹ the telecommunications sector revenues have exceeded operations and maintenance costs. The following chart shows the percentage of operations and maintenance costs (excluding capital replacement) covered by revenue for the years from 1999 to 2004

Operations and Maintenance Costs Covered by Revenue 1999-2004

Year	Actual Percentage	Target Percentage
1999	149	n/a
2000	138	150
2001	139	152

190 Digital Subscriber Loop DSL in Egypt, June 2002. Prepared by Infocom Technology, Inc.

191 *Sustainability of USAID-Financed Utility Infrastructure Activities in Egypt*, (Report No. 6-263-05-001-S), Submitted from Regional Inspector General/Cairo David H. Pritchard to Director, USAID/Egypt, Kenneth C. Ellis, October 31, 2004, page 10.

Year	Actual Percentage	Target Percentage
2002	130	153
2003	115%	120
2004	133	125

Source: Sustainability of USAID-Financed Utility Infrastructure Activities in Egypt, October 2004

A small concern arises with the decline that begins in 2001; it appears that one probable cause was a planned expansion of services at the time when the worldwide economy experienced a severe downturn. As the considerable expansion in the number of telephone lines over thirty years means that a larger portion of the customer base would more recently be among those with lower incomes, these individuals would most quickly react to faltering economic times and tough financial times by reducing their calling and/or overall bill payments, which probably led to the declining percentages that have recently started to reverse. Other causes for the decline could also derive from the deterioration of the Egyptian pound and the increased cost of imported goods, combined with the decision to maintain a constant fee for local services.

Quality of Services

Overall, the impact of USAID assistance on financial performance in the telecommunications sector was positive. As an example, the Telecommunications Sector Support Project (TSSP) appears to have been conceived in the spirit of USAID's accomplishments in Egypt's telecommunications sector over the preceding 15+ years. USAID wanted to ensure that the funds that had been spent for equipment and related technical services were well spent and realized that the initial construction investments needed the complementary investment in strengthening management practices.¹⁹²

A quality measure of those years of success was USAID's decision to stop assistance after the TSSP; similarly, other agencies such as the German Bundesbank, World Bank, French Treasury and Japanese Overseas Economic Cooperation Fund had already decided that the telecommunications sector was capable of sustained development without the provision of soft loans, and had already exited. (During the life cycle of Telecom I, II, III, approximately 360,000 lines and associated training and equipment for the Cairo, Alexandria, and Delta areas was financed through \$750 million in subsidized credits from a European consortium. Japanese suppliers financed exchange systems in the Canal cities.)¹⁹³

Task 2 of Telecom V was directed at enabling Telecom Egypt to organize itself as a nimble, competitive, customer-focused company, dedicated to the satisfaction of its customers and the professional development of its employees. Challenges endured but overall, positive outcomes were undoubtedly derived from these investments. Relative to the strategic plan, it was difficult for Telecom Egypt as a newly-defined organization (which at this time, was mostly a name change) to elicit interest in needed processes to collect data and integrate it to develop a broad organizational plan. Yet, the USAID contractor was able to work with Telecom Egypt's senior management to create a strategic vision which through today, appears relevant and timely:

"Telecom Egypt will be a profitable, market-driven, provider of high-quality telecommunications services, dedicated to the satisfaction of its customers and the professional development of its employees."

¹⁹² It is important to note that this is not atypical; telecommunications providers in developed countries have experienced many of the same difficulties in migrating operators into a commercial, customer-focused organizational structure and cultural mindset.

¹⁹³ USAID Telecom Report #19, *Digital Subscriber Loop Services in Egypt - Market*

Given where the organization had been just 12 years before and the operational, financial and institutional challenges it faced, the strategic vision seemed to place the organization's direction on the appropriate and future-oriented trajectory.

Relative to marketing, including business development, sales and customer service, it appeared that more progress occurred during the last six months of the Telecom V project than in the preceding four and one half years. Apparently, market issues really began to "hit" Telecom Egypt and the operator/service provider belatedly realized how vital sales, customer service, and business development would be and how desperately they needed a marketing department. Efforts quickly ensued to solicit the service of a consultant to build and institute this modern function in the evolving institution, especially as Telecom Egypt experienced first hand that without such capabilities, their efforts to operate and sell new revenue enhancing services were seriously compromised. The efforts by USAID Consultants to institute new functions such as marketing, business development, QOS and related business operations that are vital to any enterprise - and especially one that is competing for business - had great impact.

Under Telecom V, training was delivered to over 3,000 participants and special activities included the upgrade of the training function within Telecom Egypt. Distance learning was initiated, as was a self-paced training center, training sector website, and related staff development support systems. The human resources department was consolidated, and new information systems were put into use on a pilot basis, including demonstrations by vendors (which showed the value of real-time data). Briefings were provided to management along with examples (from Telecom Egypt and elsewhere) that discussed the absolute necessity of making human resources a high priority for Telecom Egypt. Efforts appeared to be so successful that the finance and information technology departments began to move forward in these shared purposes and initiatives.

A sub-contract of Telecom V addressed inter-related cost, information technology systems, and efficiency concerns even more directly. In addition to the widespread automation of financial systems, accounting processes were reengineered, a treasurer was appointed, and a capital budgeting process began with an estimate of what Telecom Egypt could afford, as opposed to budgeting via a process that was mandated by the Ministry.

As the most visible financial and operational benchmark, in October 2000, 20 percent of Telecom Egypt's shares were offered to the public; this brought unprecedented scrutiny of the "service provider" by outside investors. Financial resources were henceforth audited by an external commercial auditor, and the Capital Market Authority required quarterly financial statements. USAID assisted with this activity greatly, as the Contractor had spent three years preparing Telecom Egypt for these major changes, including producing summaries, in Arabic, of the international and Egyptian accounting standards that were required at the time for joint-stock companies in Egypt, and the requirements of the external auditor in a commercial environment; an Arabic-English glossary of financial terms; and a discussion of alternate sources of finance in a commercial environment.

Additional financial support activities included drafting core financial tools (such as a chart of accounts) and training Telecom Egypt financial staff on financial modeling. The Contractor noted, however, their serious reservations about Telecom Egypt's abilities to simultaneously earn a profit, pay taxes, pay dividends, and generate a level of funds needed for their ambitious capital expansion programs.

Physical and Financial Sustainability of Facilities

As noted in the discussion of Telecom III, a complete tour was taken of the El Kalaa exchange and Communication (COM) center and it appears that the investment will continue to be maintained and serviced well, ensuring that it provides numerous financial, economic and social benefits for at least its expected life cycle.

The tour of the Network Operation Center (NOC)¹⁹⁴ showcased a state-of-the-art network management center, with consoles and space to accommodate the additional staffing positions and work areas that additional network management will require over time. Computer equipment was securely housed and maintained with a modern data processing system for entry to the facility (ID card swipe) and a system that only allowed one person to enter per “swipe”. Inside the facility, the area was immaculate, with constant temperature monitoring and modern HVAC systems in place. On the floor above, where staff could work at advanced network controllers, a sophisticated and focused atmosphere was present. It was evident that a future perspective was taken in designing the NOC, so that both Egypt - and USAID’s investments in the NOC and Telecom Egypt - would provide services for the network of today, but also for the network(s) of tomorrow.

Economic Benefits

A primary reason that USAID supported the DSL study was to support Egypt’s goals to embark on a national and economic plan to modernize and strengthen the information technology sector (e.g., a macroeconomic focus). As part of this, the goal was to open the internet service provider (ISP) market to competition and for the government to ideally offer “free internet”. In 2002, Egypt hoped to build an IT economy that would employ 80,000 professionals and produce U.S. \$3.0 billion in export revenues by 2010.

Also, as shown earlier, as a result of Telecom V, 7.5 million new subscribers received telecommunications services, and teledensity tripled from .051 to 15 percent. Mobile phone penetration grew from approximately 25,207 users to 15.5 million, while internet use similarly grew at an astounding rate from 40,000 users at the end of Telecom IV to 5.5 million by 2006. The Asynchronous Transfer Mode project implementation had an impact across all of Egypt and will help in increasing the capacity of the Telecom Egypt network to transmit data, with the attendant benefits for Egyptian economic growth.

The USAID projects provided great performance for consumers and businesses directly through the line growth and improved quality of services, and indirectly, by encouraging individuals to spend money in these technology areas that impacted their lives and businesses in many positive ways. The multiplier effects of these technical investments show themselves in increases in transactions, other investments and the overall economy.

Cost Recovery

ARENTO was becoming a company of increasing profitability during Telecom V, partly as a result of three core factors: a continuation of the low levels of compensation paid to employees (11% of gross operating revenues, when in an operating telephone company at the same time in the U.S., this rate would be approximately 33%), high tariffs for international calls, and tariff increases that were leading to a healthy growth in local telephone revenues.

For the financial years of 1994/1995 and 1995/1996, ARENTO’s international revenues grew by approximately 9 percent annually, while local revenues grew by an average of 34 percent. The result was an impressive growth in profits, with some *80 percent of internally generated funds retained for its own use*. This latter point (retention of revenues for capital expansion) was critical as prior to the provision of USAID’s institutional strengthening support, ARENTO had no ability to keep its profits, let alone invest in its network growth, maintenance or organization.

As noted earlier, the GOE received EGP 115 million in taxes on profit from ARENTO in fiscal year 1996/1997, as a result of an agreement that the Ministry of Telecommunications brokered between

194 Di Landau toured Telecom Egypt’s Network Operations Center and met with Director Adel Hosny Mahdy on September 10, 2006

ARENTO and the Tax Authority. This was a direct result of work by USAID-funded consulting activities; previously, ARENTO was financially disadvantaged as it was required to (a) install one million lines per year; (b) continue a level of internal government financial transfers; and (c) pay a large retroactive tax liability. The exhaustive capital investment coupled with double-payment requirements to the government drained ARENTO of any ability to reinvest in its core business while it was also forced to use its revenues to subsidize other GOE activities. The decision to stop the transfers and broad capital investments and allow ARENTO to plan and manage its business, and pay taxes based on those activities, gave ARENTO the freedom to grow its operations in a fiscally sound manner, and a timely and needed market oriented approach.

The USAID contractor also worked to address the real “problem child” (their words) in the financial area: the fact that the public sector had been the largest area of outstanding liabilities (e.g. unpaid bills). As termination of service was not an option, USAID helped to communicate the financial implications to these customers. Therefore, while the public sector remained the problem child in terms of management time and effort, the good news is that eventually the collective arrears were minimized to a “tolerable” five percent of total operating revenues.

Assistance was also provided to consider modifications to the international settlements scheme, as callback systems, prepaid cards and other more “realistically priced” international calling methods were being made available in the market, rendering ARENTO’s inflated pricing for international calls increasingly obsolete.

Extent of Privatization of the Sector

During Telecom V, an extensive amount of regulatory and privatization activities happened; in fact, this is the period when true competition entered the telecommunications sector. Regulatory reform allowed new technologies and services to be offered to Egypt’s citizens, in addition to the investments that arrived from countries such as China, Sweden, Germany and the US.

The chart below identifies key reform milestone such as:

- The separation of the regulator and operator (1998)
- Establishment of the new Ministry of Communications and Information Technology (1999)
- Egypt’s signature (commitment) to the WTO Basic Telecom Agreement (2002)
- The establishment of the National Telecommunications Regulatory Agency (2003)
- The financial restructuring of Telecom Egypt and issuing of bonds of 2B EGP (2004)
- The floating of 20 percent of Telecom Egypt’s stock and generation of 5.1 EGP (2005)
- Licensing of 3rd 2G/3G Mobile Network (2006)

These sector changes - most of which USAID funding supported (as identified in the preceding descriptions of Telecom I - V) - helped Egypt’s telecommunications sector to migrate from a state-run, bloated and inefficient monopoly provider to a sector characterized by an independent regulator, future-looking Ministry, modern and customer-focused primary operator (Telecom Egypt) competing with private sector suppliers, an interplay between associations, customers, suppliers and other stakeholders. In other words, a sector in which the customer became the focus and business incentives were created for providing ongoing high-quality, reliable and productive communications goods and services.

Rating: Exceeded Expectations

Lessons and Best Practices

USAID's sequencing of its telecom infrastructure investments was determined by the relative maturity of the telecommunication network, e.g. its development (in terms of number of lines and service offerings and quality) relative to population needs. Sequencing was also affected by the incumbent operator's effectiveness at meeting sector or Ministry-defined goals and the relative interplay between sector organizations such as suppliers, service providers, associations, the regulator(s), and the government.

In Egypt's case, the project order was logical and appropriate for the time. The initial problems that ARENTO and subsequently its subscribers faced were technical. Hence, USAID focused its projects and investments towards activities in construction, generating revenues for the ailing operation, while improving access and quality for subscribers. As the network and sector matured, USAID shifted its focus towards institutional, legal and regulatory support.

As evidence of the wisdom of this approach, in 1994, the GOE agreed to the program for reforms such as market pricing, cost recovery, and fiscal autonomy. Until 1998, all of Egypt's telecommunications services (including operation and regulation) were provided by one organization - ARENTO. In Telecom V, the focus on numerous activities – such as the separation of the regulator and operator, establishment of the new Ministry of Communications and Information Technology, establishment of the National Telecommunications Regulatory Agency, and financial restructuring of Telecom Egypt and issuing of bonds of 2B EGP all spoke to the appropriate timeliness of focusing on institutional and policy reforms, following construction programs.

Extremely importantly, during the time of Telecom I – V, there appeared to be a consulting mindset and methodology that consultancies were designed *for* the client (e.g. ARENTO/Telecom Egypt) as opposed to *with* the client. This had detrimental effects as solutions were created without a corresponding organizational input to the process, and therefore, had unrealistic expectations about how quickly an organization could absorb concepts for implementation (e.g. *the diffusion and absorption timeframe*). Unfortunately, due to seniority systems that provided those with the most years and not necessarily the most competence to top positions at ARENTO and Telecom Egypt, consultants noted that many executives with whom they dealt could not make the recommended decisions or implement them.

Second, as noted above, there were concerns about the organization's (Telecom Egypt's) ability to integrate new and modern products (advanced services), as was suggested by vendors. As Telecom Egypt was still in the process of building needed internal functions (customer service, marketing, maintenance, billing, collection, etc.), there was some degree of financial and precious staff time waste, as the services remained unutilized and often became obsolete. It is unclear whether USAID funds were used for these purchases, or if perhaps, these were efforts by competitors to the strengthening US-foothold in the opening market. As a lesson that reinforces the previous point, it is important to sequence all activities, to the degree that is feasible, *with* the client (e.g., not *for* the client).

There seemed to be great energy and spirit in proposing new initiatives but perhaps less of a focus by USAID on the continuing support that such initiatives would require, e.g. the *human resource and staff development requirements* of local entities seemed to be put on the back burner relative to the desire of the top management of USAID and the local entities (or GOE or the Ministry) to aggressively grow the network. Yet, in fairness to USAID, the staff development needs were part-and-parcel of the network development, as many of the activities related to the new network components. In the future, USAID might favor slowing down construction activities, understanding that there is a lag in supporting the needed local professionals with specific training, particularly when there are limited numbers of capable staff for modern projects in a developing and/or emerging economy, and for that limited number, they generally have their time and spirit stretched to the limits. (In all fairness to USAID, the Leadership Development Program was initiated to specifically train managers at Telecom Egypt to do a better job, given all the changes that were taking place. It cost \$6 million over a period of 3 years.)

In the financial area, this concern was again echoed; as noted above, “The Contractor noted, however, their serious reservations about Telecom Egypt’s abilities to simultaneously earn a profit, pay taxes, pay dividends, and generate a level of funds needed for their ambitious capital expansion program.” This concern seemed to stem both from the numerous initiatives that Telecom Egypt was expected to absorb **and** manage simultaneously, while learning and managing these activities under new and evolving organizational structures. The task would be immense for any organization in any country, and especially for one going through transitions such as Telecom Egypt in the changing Egyptian political, economic and commercial context.

During the OSP II contract, the contractor identified that it would expedite contract procedures if a dispute resolution board was established upon project commencement, as opposed to waiting until a dispute arose. The fact that a dispute resolution board was not created until a problem arose apparently directly affected the ability of the contracting parties to reach an early amicable resolution.

Also, as was noted with other USAID-supported projects, there were problems in work schedule sequencing. The lack of timely issuance of construction permits and the timely completion of new buildings hindered network installation projects and overall coordination between multiple organizations. Also, with the tight project schedule, it was difficult to coordinate 15 teams working all over Egypt. However, it was also noted that this concern was beyond the client organization (e.g., Telecom Egypt), but that perhaps Telecom Egypt might have exerted more pressure on the appropriate government authorities.

APPENDIX VIII: PROJECT STATEMENT OF WORK

BACKGROUND

USAID's assistance in helping develop Egypt's water/wastewater, power, and telecommunications sectors is recognized as one of the agency's most outstanding successes worldwide. Since 1975, the U.S. Government has contributed approximately \$5.8 billion – equivalent to more than 20% of all assistance to Egypt – to improve water and wastewater services, electric power, and telecommunications for the Egyptian people.

The United States and the Government of Egypt have a long history of collaborating to improve the utilities sector, due to its central importance. Reliable utilities are critical for sustaining economic growth as well as meeting the needs of Egyptian citizens. It is currently estimated that combined, the utility sector work has benefited nearly half of the country's population across all social and economic strata. This is paving the way for increased industrial and commercial development throughout Egypt.

Strategic Plan

The Mission's Strategic Plan for 2000-2009 was the basis for the Mission's Special Objective 18 (SpO 18): "Access to Sustainable Utility Services in Selected Areas Increased." The objective is measured by three Intermediate Results reflecting the three areas in which USAID has focused its assistance:

1. **Construction** (IR 18.1) – "Utility Service Increased" measures the increases in capacity and quality of services resulting from the construction and rehabilitation of physical infrastructure and associated networks. Most of USAID's investments have been associated with these kinds of activities.
2. **Institutional reform** (IR 18.2) – "Commercialization of Utilities Enhanced" measures the institutional development of utility providers, which aimed to improve the operations of water and wastewater utilities to make them more efficient. Besides making them more efficient, institutional reform activities were also intended to make utilities more responsive to changing consumer demands, and better able to meet keep up with the growth of the economy. Institutional reform activities were aimed at increasing the sustainability of American investments in physical infrastructure, and were intended to generate enormous cost savings for the Egyptian utilities. Less extensive efforts, such as the recent Leadership Development Programs, have assisted with power and telecommunications utilities management training.
3. **Legal/regulatory reform** (IR 18.3) – "Legal and Regulatory Framework for Municipal Water, Power, and Telecommunications Sectors Established" addresses issues such as tariff reform and creating conditions for long-term financial sustainability and private sector participation. USAID began to direct Egyptian efforts to introduce wide-ranging and critically-needed sector reform only in the last decade after building on the successes of the utility-based assistance. USAID has provided assistance in the establishment of regulatory agencies in water/wastewater, power and telecommunications sectors (telecoms assistance has been delivered primarily under the Information and Communications Technology Project under the Economic Growth program (SO 16).

Summary of Activities by Sector

Water: By the end of FY 2006, interventions sponsored by USAID-Egypt will have either expanded access or improved the quality of drinking water and wastewater services for more than 22 million people. Since 1975, USAID has invested more than US \$3.4 billion in thirteen water/wastewater projects. In the earliest years of the program, wastewater infrastructure was constructed to relieve flooding of raw sewage in Cairo and Alexandria. During this same period, water and wastewater infrastructure in the war-damaged cities along the Suez Canal was rehabilitated or replaced. Since the mid-1990s, the program focus has shifted to smaller urban areas in the Delta, South Sinai, and Middle and Upper Egypt. The most recent focus of the program is on developing the institutional capacity of water and wastewater facilities.

Power: By the end of FY 2006, more than 20 million people will have benefited from USAID-funded expansions of Egypt's capabilities to produce and distribute electricity. The first activity was initiated in 1973 and 13 projects have been carried out in this sector to date. In total, USAID has funded \$1.8 billion in upgrades to the power grid, which account for nearly 35 percent of the increase in total power capacity since the mid-1970s. USAID's investments have been on a national scale and included the Aswan Dam, Cairo, Alexandria, Middle Egypt, and the city of Ismailia along the Suez Canal.

Telecommunications: By the end of FY 2006, USAID assistance in the telecommunications sector has improved services for well over 10 million people. The first activity was initiated in 1978, and a total of five projects have been carried out to date. USAID investments of more than US \$604 million have led to the installation of more than 800,000 telephone lines (roughly 15 percent of all new telephone lines), institutional strengthening for Telecom Egypt, and improvement and expansion of telecommunications networks in Cairo, Alexandria, and Port Said. Developing the telecommunications sector has been important to Egypt's ability to increase trade and investment.

Summary of Levels of Funding by Sector, and Intervention Type

	Construction	Institutional Development	Regulation/ Sector Reform
Water/Wastewater	Major	Major	Major
Power	Major	Moderate	Minor
Telecommunications	Major	Moderate	Moderate

Exiting Strategy & Close out of SpO 18

USAID/Egypt plans to close out its utility infrastructure program by September 30th, 2006. The Mission's Strategic Plan emphasizes that SpO 18 should implement a number of activities to provide for a "... logical graduation strategy for a mature program. . . protecting USAID's substantial investments." One recommendation from an audit conducted by the Regional Inspector General's Office in 2004 was to prepare an evaluation that thoroughly documents the impacts and outputs of USAID's infrastructure investments.

Close Out Report: In addition to a final evaluation, the team will also prepare an SpO 18 Close-out Report, In accordance with ADS 203.3.11 (guidelines are attached as Appendix C and Mission Order No 202-4 Close Out of Strategic Objectives , Projects and Programs will be provided as a reference to the successful offeror.) In completing this SOW, the team should collect sufficient information to draft the close-out report.

TITLE

Evaluation of USAID/Egypt's Utility Projects

OBJECTIVE/PURPOSE

a. Objective

Provide the Infrastructure Special Objective 18 (SpO 18), the Productive Sector Development (PSD) Office, with a team to conduct a comprehensive evaluation of USAID/Egypt's substantial investments in water/wastewater, power, and telecommunications. The overarching objectives of this evaluation are to document (a) the impacts and outputs of mission's infrastructure investments in Egypt, and (b) the lessons learned from completing these utility projects for use in future Mission/Agency infrastructure activities. Note: The Infrastructure Program was developed as a Special Objective (SpO) in the USAID/Egypt Strategic Plan because it was scheduled to close out at the end of the strategy period.

b. Purpose and use of the evaluation

A principal reason for doing the evaluation at this time is that SpO 18 is scheduled to close by September 30th, 2006, marking a significant scaling back of USAID/Egypt's infrastructure programs. An evaluation of the Mission's 30-year infrastructure program, one of USAID's largest, is needed to assess the impacts of the programs to date. Assessments thus far have consisted primarily of self-evaluations in which the implementing contractors assessed their own, individual programs. USAID/Egypt also completes intermittent monitoring reports on on-going activities, but a comprehensive, historic evaluation to assess outcomes of the water/wastewater, power and telecommunications programs has never been conducted. Additionally, the completion of a Strategic Objective (SO) Close Out Report, as required by the USAID Automated Directives System (ADS) Section 203.3.11, is also included in this scope of work. Detailed requirements of the Close Out Report, which are similar to those of the final evaluation, are incorporated herein as Appendix C. It is important to note that the Mission plans to fund a limited activity for small scale infrastructure improvements in underserved urban and rural governorates.

c. Audience for the evaluation

The audience for this evaluation includes several stakeholder groups:

- USAID/Egypt mission management, other US Government departments and US general public, and Government of Egypt counterparts are interested in learning about the overarching accomplishments of USAID's investments in Egypt's utilities.
- **Other USAID missions and other donors** engaged in infrastructure development programs will be interested in best practices and lessons learned from programs implemented through SpO 18.
- **Private sector investors** will benefit from new, comprehensive information about Egypt's utility sector which may catalyze greater, and much-needed, investment.
- **The Egyptian general public** is unaware of the scale of U.S. Government investments in the sector and this evaluation may greatly improve public perception of the USAID program.

d. Evaluation oversight

This evaluation process will be overseen by the USAID/Egypt's Productive Sector Development Office, Mission staff and USAID Washington infrastructure specialists will participate as members of the team, offering analytical support as needed.

STATEMENT OF WORK

The primary objective of this assignment is to carry out an assessment of USAID/Egypt's utility programs to determine (a) the impacts and outputs of the Mission's infrastructure investments in Egypt, and (b) the lessons learned from completing these utility projects.

Research Questions:

Over-arching Question: Since 1975, to what extent have USAID interventions in Egypt's utility sectors enhanced the delivery of water/wastewater, power, and telecommunications services and, as a result, improved the lives of the Egyptian people?

The evaluation will answer the five key research questions below, which cut across all three utility sectors. In several cases these questions are followed by more specific questions that USAID would like to have addressed. The evaluation team may propose additional questions, as it sees fit.

1. As a **baseline**, what was the state of each utility sector (water/wastewater, power, and telecommunications) prior to the implementation of USAID-funded activities?
 - a. What were the major infrastructure problems to be addressed?

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- b. How were the programs identified and designed, and who were the targeted beneficiaries (geographic distribution, income, etc.)?
 - c. What are the Government of Egypt's policies and strategies in infrastructure, and how have USAID programs supported these policies? What was the counterpart's role in identifying and designing USAID-sponsored infrastructure activities?[2]
 2. What have been the direct and indirect **outputs** of USAID's construction, institutional development, and regulatory interventions in all three utility sectors?
 - a. How much did USAID's construction activities expand utility networks and how many new people were served by these expanded networks? In terms of context, how did USAID's investments compare with those from other sources? What fraction of the different infrastructure systems were impacted by USAID's interventions.
 - b. Who were the principle beneficiaries of USAID-funded improvements to Egyptian utilities – did they include the poor, and residents of informal settlements, Egyptian firms and GOE-owned utilities engaged in the construction industry who may have benefited from the introduction of international contracting and project implementation procedures?
 3. What broad **outcomes** have resulted from improved service delivery, and what impacts have these activities had upon the quality of life of the Egyptian people - both those who receive the services directly and those who might benefit indirectly?
 - a. How well are Egypt's telecommunications, electricity and water/sewerage sectors performing in providing services to consumers and businesses?[3]
 - b. Have USAID's legal and regulatory interventions improved regulation, cost recovery and corporate governance? What are the current levels of cost recovery in the three target sectors?[4]
 - c. How good are services in the three sectors compared to (i) customer expectations; (ii) international benchmarks? What were the impacts of USAID institutional development activities on the financial performance and operational performance of the utility providers? How do the service standards of USAID-assisted providers in Egypt measure up to global standards and comparators?
 - d. Are infrastructure facilities supported by USAID projects being physically and financially sustained? Is there evidence that they are being maintained sufficiently? What are the prospects that these impacts will be sustained in the long-term?[5]
 - e. What impacts have service improvements had on the economy? Do Egyptian businesses have the reliable utility services needed to support their long-term growth?[6]
 - f. Since infrastructure is critical to growth and development, what have been the macroeconomic impacts of the program over its lifespan?[7]
 - g. What impacts have service improvements had on public health? To what extent, for example, have improved water and sanitation services reduced the spread of infectious diseases?
 - h. How is the Government of Egypt planning on dealing with the cost recovery challenges in each sector? What is the Egyptian government doing to address the following financial sustainability issues: (i) mobilizing capital for each sector; (ii) adjusting prices toward cost recovery levels; and (iii) dealing with the problems associated with non-performing public sector loans to service providers. Is there a plan to mobilize additional non-donor resources to replace capital and expand services in the future?

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- i. To what extent has the infrastructure sector been privatized and/or opened up to competition since USAID began to offer supporting interventions in the early 1970s? How has USAID assistance facilitated any changes that have occurred over this period?
 4. What **lessons and best practices** may be gleaned from USAID programs which may be applied to future programs, both in Egypt and elsewhere?
 - a. Were infrastructure investments sequenced correctly in Egypt? For example, which should come first - regulatory reform, institutional reform, or construction?
 - b. Two areas of particular interest are: (1) What kinds of contract mechanisms were used to carry out the work? Was the mix of US and Egyptian firms appropriate? Did we make efforts to strengthen/succeed in strengthening local private sector Egyptian companies? Did USAID's approach change over time? and (2) Environmental rules and regulations in USAID (and probably in Egypt) have changed from the 1970s to now – what processes did USAID use to examine environmental impacts and mitigate any negative impacts? What kind of civil society consultation processes were employed? How did these processes change over time?
 5. What are the prospects for **future investment** in Egyptian utilities, both by international donors as well as private investors?
 - a. What are the greatest opportunities and constraints that the various utilities face?
 - b. What is the economic environment in the utility sector, might it attract private investment, and does the sector have access to private financing? Does the GOE have adequate plans to ensure future financial and operational viability of utilities, and to encourage and to encourage opportunities for private sector participation in financing and service delivery (e.g. contracting prospects in billing and/or management, build operate transfer, etc.). Is the public sector company model appropriate for utilities? What are the prospects for future donor participation, in addition to USAID?
 - c. Considering USAID's exit strategy for SpO 18 (DCA, institutional development, etc.), are there gaps in this sector that need to be considered in USAID's possible follow-on programs? Are there needs/opportunities within USAID's regional program for an emphasis on infrastructure?
 - d. Is there a plan to mobilize additional non-donor resources to replace capital and expand services in the future?
 - e. How are USAID infrastructure activities supporting broader U.S. policy objectives in Egypt and the Middle East? For example, to what extent are USAID's infrastructure activities supporting the principles that underlie the Middle East Partnership Initiative (MEPI)? Should MEPI have a greater emphasis on infrastructure? To what extent are the infrastructure activities fulfilling the US Government's commitment to meeting the water goals that were laid out in Johannesburg?

METHODOLOGY:

The Contractor will provide a team to conduct the evaluation tasks to answer the research questions outlined above and address the issues required by the Close Out Report (see Appendix C. NB. Mission Order No 202-4 Close Out of Strategic Objectives , Projects and Programs will also be provided to the successful offeror as a reference). The evaluation will rely upon a combination of secondary data (existing project reports and evaluations, sector studies, utility reports, other donor reports) and a small number of

interviews with key Egyptian officials and sector specialists. The evaluation methodology should clearly describe:

- (1) The approach to establishing a “before” and “after” comparison of each sector’s service levels and capacity using secondary data;
- (2) A plan for interviews with Egyptian senior utility managers, officers, and policy makers.

Secondary Research: Review of existing activity documents will be a principle means of answering all research questions. USAID/Egypt has gathered several documents which will be ready for the evaluation team to review.[8] These documents will provide information on the goals of various activities, which will be particularly important for the oldest USAID projects.

Examples of USAID documents and reports that may be reviewed include:

- **Project Implementation Documents (PID), Project Papers, and Results Package Approval Documents** detail the initial project concepts as they were presented to the Government of Egypt.
- **Sector assessments** are background documents that provide comprehensive data on a given sector as a whole, and are not limited to the parameters of specific USAID interventions. These documents were not always necessarily prepared for USAID.
- **Project Assistance Completion Reports** are close-out documents that document the accomplishments of each USAID-funded activity.
- **Project evaluations** were often carried out, on individual bases, by implementing partners as part of their close-out activities.
- **Other evaluative assessments and reports** were completed during the course of each activity and will be made available the evaluation team. These documents may include interim reports, the last available monthly report (when final reports are not available), and other assessments. Of particular importance is the 1993 CDIE assessment of the USAID/Egypt infrastructure program.
- **Contract office files** in the mission will have information on procurement approaches, contract types, contractors, subcontractors, and source/origin information.
- **Mission/ANE Bureau environmental officer files** will have information on environmental processes applied, and types and scope of environmental assessments performed, including level of public consultation.

The consultant is expected, however, to search for and review documents available from the key Egyptian ministries, the World Bank, and other donors working in these sectors.

The universe for the sample is all USAID infrastructure projects listed in Appendix A.

To answer each of the five research questions highlighted above, it is anticipated that the following methodology/tasks will be employed:

1. Gather information to establish a baseline of service conditions in each of the three sectors.
2. Review the performance of USAID infrastructure programs using interviews and secondary documents to identify outputs of the programs, including facilities constructed, utility services produced, and population served.
3. Assess lessons learned from the activities and best practices.
4. Identify and recommend opportunities for future investments in Egypt’s infrastructure program.
5. Conduct a workshop to discuss draft evaluation results with key USAID and Government of Egypt stakeholders.

6. Prepare final report.

Prior to coming to Egypt, the Contractor shall meet for consultation with representatives from the following USAID/Washington offices: EGAT/I&E Office & ANE/TS. The contractor, in coordination with the CTO, may seek advice from EGAT& ANE on work products. This includes: data collection guides, site selection plan, preliminary findings of the site visits and sector reviews, and conclusions and recommendations.”

EMG’s proposal is hereby attached as Appendix D and made part of the Statement of Work.

August 11, 2006

Ms. Amani Said

Senior Acquisition Specialist

USAID/Egypt

Reference: RFTOP No. 263-06-0034 under SEGIR Privatization II IQC No. AFP-I-00-03-00029-00
- Urban Infrastructure Final Evaluation and SO Close Out Report

Dear Ms. Said:

In response to your request of 10 August to revise our technical proposal to reflect the changes in our e-mails of 07 and 09 August, we are pleased to submit to you a revised technical proposal in response to RFP No. 263-06-0034 - Egypt Urban Infrastructure Final Evaluation and Strategic Objective Close-out Report. ***The attached technical proposal submission supersedes and replaces our July 24, 2006 submission.***

As discussed by telephone with you on 03 August and via our exchange of emails of 07 and 09 August, the reduced level of effort and period of performance of this assignment necessitated by USAID’s budgetary constraints will entail a qualitative revision to the scope of the evaluation and close-out reports that EMG’s evaluation team will be able to produce. Our revised technical proposal addresses all of these issues. Nevertheless, within these limitations, we are confident that our team can produce for you deliverables that are useful to you.

We propose to mobilize our team per the performance schedule below. We assume for the purposes of scheduling that an award can be made effective as of 16 August 2006. On this assumption, we propose the following timeline for the presentation of project deliverables:

- 1) Work Plan: A comprehensive project work-plan will be delivered not later than 24 August;
- 2) Interview Plan: we will submit an Interview Plan concurrently with the Work Plan;
- 3) Mid-Course Briefing: we propose to combine the mid-course briefing with the Draft Reports and Briefing Workshop;
- 4) Draft Reports and Briefing Workshop: as discussed with you by telephone on 03 August, the 15th of September falls on a Friday, which in Egypt is not a normal business day. We agreed with you therefore that the Briefing Workshop should be held on Sunday, 17 September. We will deliver the Draft Reports in the form of a power-point presentation and summary notes at this workshop, and use the opportunity of the workshop for delivery to you of a Mid-Course Briefing. We will solicit your feedback and guidance on the direction of our analyses and reports at this juncture for incorporation into the final reports;

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- 5) Final Draft Evaluation and Close Out Reports: we will present the Final Evaluation and Close Out Reports not later than 30 September 2006. Per your earlier written guidance of 13 July, the evaluation team will be available to receive comments from USAID for incorporation into final versions of these reports through 30 October 2006.

The reduced level of effort resulting from USAID's budgetary constraints will pose limitations on our evaluation team's data-gathering and analysis methodologies, and on the level of detail of our team's analysis in preparing the evaluation and close-out reports. The abbreviated performance schedule of this assignment requires that our evaluation team rely solely on project-specific and SO-specific documentation that USAID will provide or otherwise make directly available to the team, and on a limited number of stakeholder interviews, not to exceed three interviews per sector being evaluated (water/wastewater, power, and telecommunications.) We will also schedule up to two site-visits for each of the three sector experts, to examine first-hand the results of USAID's investments in Egyptian infrastructure. These visits may be scheduled to coincide with stakeholder interviews.

The RFP enumerated five research questions that the evaluation team is instructed to answer in the evaluation report. In several cases, these five questions were followed by more specific questions that USAID would like to have addressed. In this instance, the limitations on the team's level of effort and period of performance with which we are confronted compels us to interpret these more specific questions as guidance for our team's analysis, rather than as questions that must be addressed directly and explicitly in the team's reports. Additionally, at the level of the five main research questions, and in particular for Research Question #3, "What broad outcomes have resulted from improved service delivery", our reliance upon secondary data provided by USAID rather than primary data will inevitably constrain our analysis.

Press coverage and public perception of USAID's investment in Egyptian infrastructure will not be an explicit focus of our evaluation per se, but we will attempt to assess the public's perception of the success of the program informally and through anecdotal evidence, to the extent it presents itself during the course of our site visits and interviews.

Per your earlier guidance, we understand that the reference in the original RFP to the addition of one economist provided by ANE, and of three sector specialists and a utility finance specialist from EGAT, is no longer valid. We make no provision for incorporating these USAID-provided professionals into the work of the evaluation team.

As relates to the SpO 18 Close-Out Report, the evaluation team will rely on USAID/Cairo's active support in making available, in English, all relevant and necessary documentation for the completion of the report; and making available for interview the staff and stakeholders whose input will be required for the timely and satisfactory completion of the SpO 18 Close-Out Report. We believe USAID's support, especially for obtaining stakeholders' participation, will help to ensure their availability.

Sincerely,

Teresa B. Mastrangelo

Director, Business Development and Marketing

A. FOREWORD – PURPOSE AND SCOPE

Over the past three decades, the United States and Egypt have collaborated closely to improve the lives of the Egyptian people. Since 1975, US economic assistance to Egypt through USAID programs has amounted to almost \$26 billion, of which \$5.8 billion - nearly one-fourth of all assistance to Egypt - has been used to develop and strengthen the water and wastewater, power, and telecommunications sectors. The increased reliability of utility service in Egypt has improved the health and welfare of Egyptians, protected the environment, attracted investors and increased economic output. No other USAID program has reached so many Egyptians across all social and economic strata - nearly half of the population has benefited - and it is recognized as one of the agency's most outstanding successes worldwide. The evaluation of USAID's infrastructure program will document these successes and facilitate communication of the program's achievements to the broad community of stakeholders, and their emulation in other USAID country programs.

EMG has assembled a multi-functional team of Egyptian and US experts to conduct a comprehensive evaluation of USAID assistance to Egypt's infrastructure. This team, detailed in Attachment 1 of this proposal, brings extensive industry experience and a history of success in design, management, and evaluation of infrastructure programs in a development context. More importantly, they bring first-hand knowledge of USAID's activities and an extensive network of contacts within the Egyptian government and utility companies that will be leveraged for this evaluation.

The team will approach the evaluation and close-out reports with a view to delivering a product that is useful to its varied audiences. These reports will effectively present information that meets USAID's multiple objectives of: informing constituents and stakeholders about USAID's impact in the Egyptian infrastructure sector; drawing lessons-learned about program design and implementation for application in other countries; and identifying additional opportunities for high-value investments in the Egyptian infrastructure sector.

It is important to note at the outset that it is not the intention of the evaluation team to assess the outcomes of any specific projects in particular, nor to assess the performance of specific implementing organizations. Rather, the evaluation team will assess and analyze USAID's urban infrastructure program *as a whole*, identifying and documenting its hallmark achievements and drawing lessons learned relating to project and program design that can help increase the productivity of future USAID program investments in infrastructure programs.

B. ASSUMPTIONS, CONSTRAINTS AND LIMITATIONS

The approach and methodology presented here are based on an assumed period of performance of approximately 7 weeks, with just 3 weeks in-country by the expatriate team. This assumption derives from a project start date of 16 August and a submission deadline of 30 September for Final Draft Evaluation and Close Out Reports. In addition, several days will be left available after 30 September for the Evaluation Team to respond by 30 October to USAID comments on the team's Final Draft Evaluation and Close Out Reports. This revised project timeline is necessitated by the reduced project budget and USAID/Egypt's need for deliverable submission by 30 September.

Our methodology employs the review of existing project documentation and other materials provided by USAID as the principal source of data for analysis and evaluation, augmented by a limited number of site-visits and stakeholder interviews, as discussed below. We assume that USAID will provide access to the full range of project- and SO-related documentation at its disposal necessary for the completion of this evaluation. In addition to the documentation referred to in the RFTOP, our team will benefit from receipt of relevant Strategic Objective Agreements (SOAGs), Memoranda of Understanding (MOUs), or other exchanges of letters between the USG, USAID, and Egyptian stakeholders.

Primary data-collection will not exceed three interviews and up to two site visits (which may coincide) per sector and will provide only an anecdotal complement to the data collected and collated from the USAID-provided documentation.

C. METHODOLOGY

The evaluation team's methodology is designed to overcome the temporal and data-accessibility constraints inherent in this assignment. We will draft an evaluation and close-out report that provide a concise summary of the successes of USAID's infrastructure program, highlights key lessons learned during project implementation, and identifies opportunities and prospects for future infrastructure investments in Egypt.

The evaluation team's familiarity with a large volume of relevant documentation and extensive knowledge of key infrastructure and institutional issues in the water/wastewater, power, and telecommunications sectors has guided the development of our methodology. As the evaluation will involve the review of past project reports and project evaluations, the EMG Evaluation Team will examine key documents provided by USAID, particularly reports that contain data of recognized high quality, data sequences collected over time using the same methodology (trend analysis), data validated using recognized quality control processes, and data collected using rigorous research designs (randomized sampling of beneficiaries, control groups, and others). The review of the project reports and available data will be conducted within the framework of the Special Objective 18 performance objectives and indicators for the past five years and the previous SO performance monitoring frameworks for the utilities sector.

Key Evaluation Questions

EMG will approach the collection and analysis of data for use in addressing each of the identified key evaluation questions dependent upon the specific requirements of each question. We have adopted the five high-level questions contained in the RFP. Our approach to these key evaluation questions follows.

1. AS A BASELINE, WHAT WAS THE STATE OF EACH UTILITY SECTOR PRIOR TO THE IMPLEMENTATION OF USAID-FUNDED ACTIVITIES?

The Evaluation Team will establish a base-line for the condition of Egypt's urban infrastructure through a review of the available project documentation and data sources.

2. WHAT HAVE BEEN THE DIRECT AND INDIRECT OUTPUTS OF USAID'S CONSTRUCTION, INSTITUTIONAL DEVELOPMENT, AND REGULATORY INTERVENTIONS IN ALL THREE UTILITY SECTORS?

The Evaluation Team will focus on a review of USAID project design, status and evaluation documents. In addition to measuring increased access (a direct output), the Evaluation Team will attempt to quantify indirect outcomes through a review of evaluation reports and statistical data produced by USAID.

3. WHAT BROAD OUTCOMES HAVE RESULTED FROM IMPROVED SERVICE DELIVERY AND WHAT IMPACTS HAVE THESE ACTIVITIES HAD UPON THE QUALITY OF LIFE OF THE EGYPTIAN PEOPLE, INCLUDING BOTH DIRECT AND INDIRECT BENEFICIARIES?

This key evaluation question is perhaps most challenging, as it involves the attribution of identified outcomes to USAID interventions in the context of multi-donor investment in the utilities sectors. While precise quantification of the impact of USAID's investments in Egyptian infrastructure is not feasible due to the limitations of available data, many useful and plausible outcomes may be inferred through the establishment of correlations between USAID investments in particular locations and the growth in

economic activity and investment in these locations. For example, the assumption that improved access to telecommunications services and reliable electricity supplies spurs economic growth can be tested against data from areas which benefited from such service improvements resulting from USAID's investments in these areas.

4. WHAT LESSONS AND BEST PRACTICES OF USAID/EGYPT PROGRAMS MAY BE APPLIED TO FUTURE PROGRAMS, BOTH IN EGYPT AND ELSEWHERE?

The questions examined by the Evaluation Team in this part of the study will focus on the conceptualization of the design and implementation of activities, on normative issues related to identification of best approaches to similar programmatic interventions, and on a retrospective analysis of what worked well and what did not in the Egyptian context. Questions of this type are best addressed through project and literature reviews of interventions by USAID in different settings. Additionally, key participants in the design of the interventions will add greater insight and additional perspectives.

5. WHAT ARE THE PROSPECTS FOR FUTURE INVESTMENT IN EGYPTIAN UTILITIES?

The two dominant factors determining investment prospects in Egyptian utilities are 1) the current and projected demand for various utility services, and 2) the sources of available capital to fund the necessary investments to meet this demand. For assessing the current demand for utility services, the Evaluation Team will refer to data collected on existing service coverage and reliability, and identify the existing gaps (both geographical and temporal) in service coverage. With respect to future (projected) utility service demand, the evaluation team will examine the expectations of economic growth in Egypt for the sectors being evaluated, and examine the demand profiles of these sectors to approximate the need for investments in increased capacity. This analysis will serve as a basis for assessing the availability and adequacy of sources of finance – public and private - to meet these investment needs.

D. Mobilization and Implementation Schedule

The evaluation team will be comprised of seven Egyptian and expatriate specialists in their respective fields. Upon award, the EMG evaluation team will immediately mobilize to finalize a detailed implementation strategy and begin the process of data-identification and collection.

Consistent with the guidance provided in the RFP, the Team Leader can begin the process of data-identification and collection in Washington, D.C., a part of which will also include consultations with identified members of USAID's technical and regional offices in Washington. In parallel with the Team Leader in Washington, the team's Egyptian sector specialists will begin an analogous process of data-identification and collection in Egypt. These important initial mobilization activities will be coordinated and managed by Mr. Jonathan Ward and Mohsen Alashmoni in Washington, D.C. and Cairo, respectively.

The expatriate evaluation team experts will join their Egyptian counterparts on-site during week three of the evaluation, and will participate in consultations with USAID/Cairo, the review of documents, interviews, and the preparation of the draft final reports and the presentation workshop. Following the workshop, the team will retreat to complete the final evaluation and close-out report, following up with USAID and sector stakeholders as necessary.

The proposed mobilization and implementation schedule is depicted below:

Attachment 1: Personnel

EMG brings together a team with worldwide experience in conducting infrastructure program assessments paired with notable expertise in Egyptian infrastructure sector. The team consists of four expatriate utility- and infrastructure-sector and program evaluation experts, and four Egyptian utility-sector professionals specializing in the power, water/sewerage, and telecommunications industries. The EMG team's strength derives from a mixture of skills, experience, sector expertise, and detailed Egypt-specific knowledge that its members individually and collectively contribute. The team will make use of its wide network of key contacts and relationships with diverse stakeholders in the utility and infrastructure sector in Egypt to carry out the evaluation of USAID's urban infrastructure program. This web of contacts will be instrumental to quickly assimilating information critical to the success of the project and gaining insights into the present and future needs of infrastructure investments in Egypt.

Our expatriate utility-sector experts have proven track-records of successful program design, implementation, and evaluation in their respective technical areas in a development-assistance context – including in Egypt and the Middle-East. They are joined by three recognized Egyptian infrastructure-sector experts with detailed knowledge of the power, water/sewerage and telecommunications sectors amassed over several decades through a diverse mixture of industry and development-program engagements. The involvement of these Egyptian experts will be vital in ensuring access to, and appropriate interpretation of, critical information on the Egyptian infrastructure development and present condition. Their involvement will also ensure that the team's findings reflect an appreciation of the context in which USAID's infrastructure programs have been implemented over the life of SpO 18. As requested in the RFTOP, the technical experts have been paired into three sub-groups for power, water/sewerage, and telecommunication. Each sub-group will be led by the expatriate advisor and supported by the Egyptian expert.

The Team Leader will be responsible for leading the entire team, day-to-day project management, liaising with USAID and key counterparts, and producing the final report. The Team Leader will be supported by a Project Manager based in Cairo who will coordinate the various meetings and data-gathering efforts and will be responsible for all logistical arrangements in Cairo. The Team Leader will also be supported by the Home Office Project Manager who will be responsible for contract administration and compliance with USAID, and will play the important role of oversight for the entire assignment. Based in Washington DC, the Home Office Project Manager will be able to leverage a large base of resources from the EMG home office. The chart below shows the composition and organization of the evaluation team put together by EMG.

Evaluation Team Leader – Dr. Tejinder Minhas (Expatriate): The team will be led by Dr. Tejinder Minhas, whose experience over twenty-five years in multi-sectoral development project evaluation, appraisal, design and implementation render him imminently qualified to direct and coordinate the team's work. Dr. Minhas recently led a team of six senior Program Evaluators and sector experts to perform a program evaluation for a multi-sectoral (education, health, roads, water supply, energy, agriculture, and poverty reduction) program in Jordan. Dr. Minhas' achievements on the project included a comprehensive review of over 260 discrete development projects. The review provided an assessment of the relevance of the programs to Jordan's development goals and gauged the efficacy of these programs. Previously, Dr. Minhas served as Chief of Party on USAID's Egypt Privatization Program, and is thus intimately familiar with USAID's program portfolio in Egypt and the contours of Egypt's economy. Dr. Minhas maintains a network of Egyptian and donor-community contacts that he developed during this assignment, which will prove extremely useful in coordinating the collection of data required for the timely completion of the evaluation and SpO close-out report. Dr. Minhas also has several years of experience as a privatization advisor and in mobilizing private sector investment. He will be key in responding to the question on prospects for future investments in Egyptian utilities.

Project Manager – Mohsen Alashmoni (Cairo): Mr. Alashmoni is the founder of Progress 2, an Egyptian company offering a wide range of consultation services and project management including the USAID funded FM II and FM III projects. Mr. Alashmoni has over twenty-five years of experience with private companies and international organizations, and is intimately familiar with the development climate in Egypt. In coordination with Evaluation Team Leader Dr. Minhas, Mr. Alashmoni will oversee the rapid mobilization of the Egyptian members of the evaluation team at the inception of the project to commence data-gathering and to prepare for the arrival of their expatriate counterparts. Mr. Alashmoni will also be responsible for coordinating closely with Egyptian counterparts and key stakeholders. He has numerous contacts with key stakeholders and will play a critical role in accessing and gathering critical data and information for the evaluation and in organizing meetings with key officials at short notice.

Power Specialist – J. Michael Trainor (Expatriate): Mr. Trainor joins the evaluation team with a background in power-sector reform and development program design, implementation, and evaluation gained through his work as Senior Energy Advisor with USAID, serving in three USAID missions abroad and at USAID/Washington. Mr. Trainor's recently completed a comprehensive evaluation of USAID's energy-sector reform project in Bosnia-Herzegovina, including the documentation and validation of the program's successes and the development of recommendations for a second phase of USAID engagement in that country's energy sector. Mr. Trainor's broad sector knowledge, coupled with his background as a USAID Mission employee, will enable him to present an evaluation report that speaks directly to USAID/Egypt's requirements. Mr. Trainor's contribution to the evaluation report in this respect will span all three of the sectors being evaluated, although he will lead and focus on the power sector evaluation.

Power Specialist – Dr. Mohamed El Sobki (Egyptian): Dr. El Sobki is an expert in the power and electrical sectors in Egypt, and has worked as a consultant for major development agencies, including USAID, the World Bank, Danida, and the UNDP. Dr. El Sobki has prepared background reports and studies on the Egyptian power sector for various development agencies, including electricity pricing studies and a base-line survey of Egypt's energy sector for USAID. Dr. El Sobki has published dozens of papers in local and international journals and conferences, and currently lectures at Cairo University in the Department of Power Systems and Electrical Machines. Dr. El Sobki's thorough education in electrical power engineering provides him with many resources necessary for an objective and rigorous review of USAID development in the sector. His consulting work has given him practical experience to supplement his in depth academic training. Dr. El Sobki's position as a professor in the Department of Power Systems and Electrical Machines at the Cairo University has kept him in the midst of work and discussion of the power sector in Egypt, and his connections at the University and from his former positions in the Egyptian Electric Utility and Consumer Protection Regulatory Agency provide him the resources necessary to gather information to benchmark the sector and contribute to the evaluation team's analysis.

Water/Sewerage Specialist – George Kinias (Expatriate): Mr. Kinias is an institutional assessment specialist with over fifteen years of experience in the assessment and evaluation of infrastructure development programs with a focus on the water sector. He brings worldwide experience in infrastructure and has particular experience both with Egypt and USAID in his capacity as team leader on a variety of Egyptian assessment, operation and maintenance, evaluation, and reporting projects. Mr. Kinias has conducted thorough reviews of the Egyptian water, air, sewerage, power, and telecommunications sectors in the past ten years, and is deeply familiar with USAID requirements and standards. The inclusion of Mr. Kinias on this project will capitalize on his career-ranging evaluation skills, particularly in the relevant sectors. His extensive evaluation and assessment skills will supplement the skills of our team by providing focused, informed, and diligent data collection and analysis of the Egyptian power, water, and telecommunications sectors. Mr. Kinias has conducted over a dozen evaluation and assessment projects for USAID, and as such is intimately familiar with the data collection and analysis, benchmarking, and final reporting necessary for a comprehensive report. His background work makes him an invaluable addition to the team and to USAID objectives. Given his extensive

experience with the Egyptian infrastructure sector, Mr. Kinias will have the main responsibility for drafting the SpO 18 Closeout Report.

Water/Sewerage Specialist – Mahmoud Morsi (Egyptian): Mr. Morsi brings four decades of experience in the Egyptian water and sewerage sectors to the project. As an expert water-sector and mechanical engineer, Mr. Morsi's experience includes the operation and maintenance of a water desalination plant, a wastewater treatment plant, and multiple engagements on projects involving pumps, water treatment systems, reverse osmosis systems, and desalination, brackish water, and sewage treatment plants. Mr. Morsi specializes in the operation and maintenance of water purification and processing facilities, and has provided project evaluations for USAID. As part of his work on USAID's ABB Susa project, Mr. Morsi was responsible for the extension and upgrading of the Alexandria and Middle Cities wastewater treatment plants. Over his extended career in the Egyptian water sector and on donor-sponsored projects, he has accumulated unrivalled expertise and knowledge of the intricacies and nuances of Egypt's water sector and has contributed to numerous project evaluation reports for USAID. Mr. Morsi maintains a network of key sector contacts through which critical data and the wealth of the sector's institutional memory will be accessible to the evaluation team.

Telecommunications Specialist – Di Landau (Expatriate): Ms. Landau is an expert in international telecommunications and information technology. Ms. Landau has in-depth experience in telecommunications policy and sector analysis, and has conducted a number of evaluations and assessments of telecommunications and information technology systems for private-sector clients and for multi-lateral and bilateral donor agencies, including USAID, USTDA, the World Bank, and Asian Development Bank. Ms. Landau's experience as a project evaluator gives her first-hand knowledge of the data collection and review required for a thorough, defensible evaluation, and her experience with government telecommunications ministries equips her well to ask pertinent interview questions to obtain necessary data for evaluation. Ms. Landau possesses an acute awareness of the components necessary for a successful telecommunications industry development strategy, and will apply her insights and experience in the evaluation of Egypt's current telecommunications sector and the successes USAID's program has yielded for its development.

Telecommunications Specialist – Taha Shendy (Egyptian): Mr. Shendy is an information technology and telecommunications expert with over thirty years of experience building and managing information structures and networks. While serving a variety of posts in government ministries and cabinets, Mr. Shendy built internal networks in the North and South Sinai, Red Sea, and Alexandria governorates. Mr. Shendy built and managed the Ministry of Telecommunication and Information Technology's information structure, and evaluated the achievements of the National Telecommunications and Information Technology Plan. Earlier Mr. Shendy served as the Deputy Head of Decision Support Sector for the Cabinet Information and Decision Support Center. In this role, he conducted research to analyze and correlate data to provide the Cabinet with indicators and alternatives, in the course of his work building and managing the national level of Egyptian information structure. Mr. Shendy is fully versed in the goals and requirements of Egyptian telecommunications development projects and is experienced in their implementation and management. As a critical member of the evaluation team, Mr. Shendy will use his wealth of practical experience, sector knowledge, and evaluation skills to provide USAID with an insider's view of the efficacy of its projects.

Project Manager – Jonathan Ward (Washington): Mr. Ward has over ten years of experience as a project manager for numerous USAID projects, including in utility finance and privatization and in the water, power, and telecommunications sectors. He recently managed a two-year USAID-funded energy reform project in Romania, with three sub-contractors and 40+ consultants, which prepared a state-owned generation plant for privatization and delivered an intensive schedule of privatization-focused training to the Romanian electricity and gas regulators. Mr. Ward will manage the timely mobilization of the evaluation team, ensure that the team is adequately resourced and supported administratively from

Washington, confirm the on-schedule completion of project deliverables and achievement of critical milestones, and provide quality assurance of the project deliverables. Based in Washington DC, Mr. Ward will be responsible for providing project backstopping and contract administration support to the team leader. He will provide continuous logistical support to the team and will play an important role in organizing the stakeholder workshop. He will also have access to the broad base of EMG's worldwide resources which he will leverage as and when required for the success of the project and for providing oversight.

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