

Wastewater: From Waste to Resource

The Case of New Cairo, Egypt

Successful PPP to Increase Wastewater Coverage and Foster Wastewater Reuse

Context

The Arab Republic of Egypt is a water-scarce country. Most of the country is desert, with the exception of the corridor of urban development along the Nile River and Mediterranean Sea. Population growth in Egypt's main urban areas prompted the Government of Egypt (GoE) to encourage the growth of new urban centers to alleviate overcrowding and pressure. Out of necessity, these new centers were located further away from the Nile River. The harsh environmental conditions of the location, combined with the low level of infrastructure present in these areas, have created a potential barrier to successful establishment of the new cities. One avenue to address these concerns is the rationalization of water use in the new cities, such as by recycling wastewater for use as irrigation for agriculture.

The city of New Cairo was one of the newly planned urban areas. New Cairo was expected to grow from a population of 550,000 to approximately 4 million by 2026. The existing infrastructure could not support

PHOTO 1. New Cairo Wastewater Treatment Plant



Source: Aqualia.

this population growth and its pressure on water supply; as a result, sanitation and untreated wastewater was being discharged directly into the river. The Egyptian government also faced pressure to reduce its public expenditures on infrastructure projects. To increase wastewater coverage and efficiency of water use and reduce public cost of the development of infrastructure, the GoE sought to build a new wastewater treatment facility involving the private sector. The facility would treat wastewater to be used in agriculture and drainage to the Nile River. These uses

CHALLENGE
Egypt is a water-scarce country with overcrowded urban areas
Increase availability of drinking water in new cities
Reduce the discharge of untreated effluent to the Nile River
Implement cost-effective solutions and reduce pressure on public finances and at the same time ensure that the right technologies are used
Mobilize private sector financing, encourage transfer of knowledge and technology and minimize risks for the public sector
Complete first PPP in Egypt and provide replicable model for future PPP
OBJECTIVE
Increase available freshwater and decrease threats to public health and environment.

would allow more freshwater to be used for drinking and other uses while also reducing pollution of the river and thereby increasing public health and environmental quality.

A lack of public financing options made a public-private partnership (PPP) structure an attractive option. Moreover, if done right, a PPP could potentially bring into the country the latest know-how and technology, ensure that the construction was made in a timely manner, increase the efficiency of the operations and lower the risks for the public sector, among other. However, at the time there were no legal or regulatory structures for handling PPP projects. Government planners faced a lack of PPP-specific laws and limited experience in dealing with PPPs. Additionally, recent failures of private provision of public services in the energy sector in Egypt made the government hesitant about this approach. To ensure that the project was a success, the GoE partnered with outside advisers to develop appropriate governance and tender processes.

Solution

The solution was to construct the New Cairo Wastewater Treatment Plant (WWTP) through a PPP.

Wastewater Treatment Plant Design

The WWTP can process up to 250,000 cubic meters of wastewater per day, serving the satellite cities of New Cairo, Madinaty, and El Mostakbal. The treated water is directed to agricultural operations, reducing the demand for freshwater for agriculture and allowing that supply to be used by the city. The compost from the wastewater sludge is currently being sold to the cement industry in the region to be used as fuel (replacing coal and therefore reducing greenhouse gas [GHG] emissions). For the consortium, this is an extra revenue stream, although small, and it also avoids considerable sludge transport costs. The quality of the sludge is suitable to be used as agricultural fertilizer. Moreover, the plant reduces the volume of polluted water discharged into the river, representing a significant improvement to human health and environmental quality. Close to 3 million people in New Cairo and the surrounding area will benefit from the project at its full capacity. The biological treatment process used in the WWTP is conventional and did not require any major innovations.

PPP and Governance Issues

As the first PPP in Egypt, initially the project faced significant governance issues, since there was no legal or regulatory structure to handle PPPs. The solution was to use the process of the New Cairo WWTP to design a model for future PPPs in Egypt and eventually approve a PPP law in 2010. To ensure that the first project was a success, outside advisors were enlisted to assess and evaluate broad options for PPP structuring. The GoE worked with the International Finance Corporation (IFC) and the World Bank Group's Public Private Infrastructure Advisory Facility (PPIAF) to create a conceptual framework and transaction model.

To facilitate the PPP process, a PPP Central Unit was created to act autonomously within the Ministry of Finance. Following the success of the project, the GoE has created a set of laws and regulations that will govern future PPP projects in the country, drawing on lessons learned from the New Cairo WWTP project.

Financial and Contractual Agreements

The IFC, the PPP Central Unit, and the Ministries of Finance, Investment, and Housing decided to structure the project as a 20-year concession for design-build-finance-operate-transfer (DBFOT) contract. A tender process was designed to evaluate technical capacity and economic efficiency as measured by lowest net present value. The tender process attracted five bids from consortia composed of local, regional, and international firms. The winning bid was made by a consortium of Orascom Construction Industries, an Egyptian firm, and Aqualia, a Spanish firm with

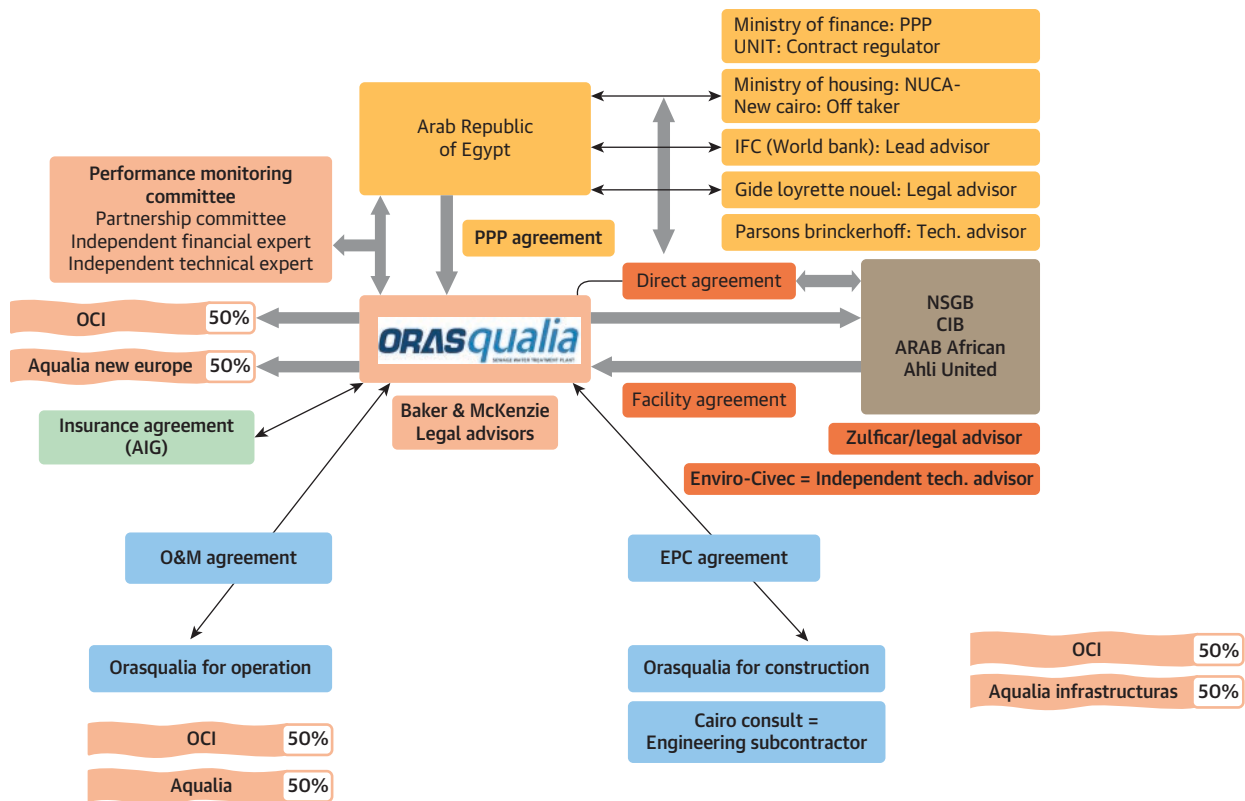
Total private investment: US\$140 million	
Project finance without recourse	US\$100 million
Equity	US\$40 million

international experience. The bid was submitted under the auspices of a special purpose vehicle (SPV) composed of the two firms, called Orasqualia, which passed the technical stage and presented the lowest financial bid and was awarded the US\$482 million contract in June of 2009.

In addition to winning the tender process, Orasqualia brought two unique skillsets to the table. The consortium provided the technical know-how associated with Aqualia, an international firm operating various water infrastructure projects around the world, and Orascom's knowledge of the Egyptian market, labor, and political conditions.

Project details. Build-design-finance-operate-transfer (BDFOT) 20 years: construction two years and operation 18 years.

FIGURE 1. Project Stakeholders



Source: Aqualia.

- **Contracting authority:** New Urban Communities Authority (NUCA)
- **SPV:** Orasqualia (Aqualia, 50 percent, and Orascom Industries, 50 percent)
- **Payment guarantee:** Sovereign guarantee by the government
- **Payment method:** Sewage treatment charge (STC): fixed payment and variable payment
 - Capacity charge that is a fixed payment covering the total investment in the plant and its capital expenditure over its operating period; debt service costs; return on equity; and insurance
 - Fixed operating charge covering the operating costs unrelated to the volume of treated wastewater
 - Variable operating charge that covers the operating costs of treating effluent per cubic meter
 - Pass-through charge to reimburse the cost of electricity up to the maximum consumption proposed in the accepted bid

Benefits

For the city and the environment

- Up to 3 million people will benefit from the improved infrastructure and improved service quality
- Increased availability of drinking water due to substitution of treated water for irrigation and urban green areas in place of freshwater
- Reduction of pollutants discharged into the Nile river
- Improved public health

For the private partner

- Some risk elements were taken by the GoE, including risks relating to inflation, interest rates, credit worthiness, and the supply of utilities
- Reference case in the region (project has received several international awards)
- Knowledge transfer and higher visibility (for local private partner)

For the utility and government

- Risk transfer (financing, construction, and operations and maintenance [O&M] risk taken by the private partner. Foreign Exchange (ForEx) risk was also assumed by the private sector.
- As the first PPP in Egypt, project serves as a model for future PPP arrangements and promotes foreign investment
- Public budget pressure reduction
- Institutional strengthening (PPPs)
 - Project led to new laws and regulations within the GoE to support future PPPs
 - Experience for the dedicated PPP Central Unit within the Ministry of Finance
- Improved efficiency by bringing in the private sector
- Knowledge transfer

For the agricultural sector

- Alternative source of irrigation water allows for potential increase in production in the surrounding area
- Treated sludge (biosolids) can be used as fertilizer

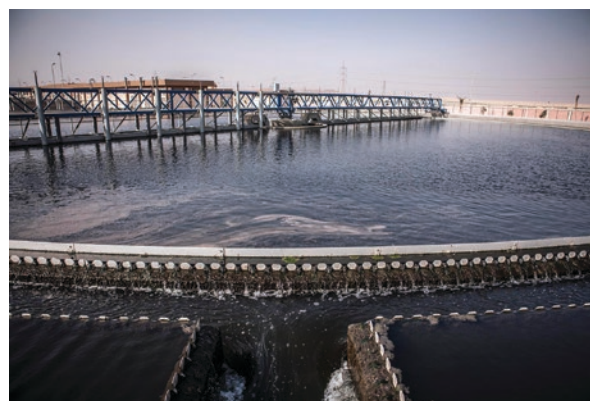
Key Factors for Success

- Emphasis on creating sound governance arrangements
 - Use of outside advisers to gain best practices
 - Establishment of dedicated PPP Central Unit in GoE
- Strong stakeholder participation
- Establishment of governance committees to provide oversight and guidance
- Dialogue and transparency in procurement
- Detailed risk analysis and allocation

Since the technology being used was not particularly novel, many of the key factors of success in this project are attributable to **sound governance strategies** in the early stages through completion. **Strong stakeholder participation** and coordination on the part of the GoE and the Ministry of Finance ensured that the project was stewarded from inception to completion. The **establishment of the PPP Central Unit** enabled coordination within the government. The **transparency of the procurement process** enabled strong stakeholder participation, and the **use of external advising** from PPIAF and the IFC contributed to success. In the prebidding phase, bidders met with NUCA to discuss the tender documents and ways to improve the process in the future. Several suggestions have been incorporated into the tender design for future projects. Strong due diligence also engendered trust throughout the process. The establishment of two **governance committees** for the PPP allowed for oversight over the project and dispassionate advice for unforeseen events through the duration of the contract. Another key factor for success was the creation of the SPV combining an international and a local firm. The international firm brought years of experience and know-how. The **inclusion of a strong local partner** in the successful bid allowed the project to navigate the complex and unstable circumstances surrounding the Egyptian revolution in 2011. Despite the unrest, the project experienced minimal delays.

Other factors for success: (a) the final contract was clear; (b) **all risks were carefully analyzed**; and (c) the owner for each risk was clearly identified. Provisions in the final contract addressed numerous issues that allowed investors to feel more comfortable with the inherent risks associated with the project. Key risks included inflation, interest rates, credit worthiness, demand risk, and supply of utilities such as water and electricity. The Ministry of Finance agreed to underwrite NUCA to ensure that there would be no missed payments. A series of clauses allowed for the private operator to request re-examination of the sewerage charges to adjust for unforeseen changes in costs and revenue.

PHOTO 2. New Cairo Wastewater Treatment Plant



Source: Aqualia.

PROFILE
NAME
New Cairo Wastewater Treatment Plant
LOCATION
New Cairo, Egypt
SIZE
250,000 m ³ /day average daily flow
MAIN INNOVATION
Treated wastewater reused for irrigation
Sludge is sold to cement industry—extra revenue stream—and could potentially be used as a fertilizer in agriculture
First successful PPP in Egypt
Project led to changes in law and regulations that draw lessons from the project to facilitate future PPPs
Bidding process was designed with advice from external and international advisers
Business strategy of private partners included creation of an SPV that enabled both firms to complement their competitive advantages and access local financing
TECHNOLOGY
Line of water with four lines of treatment in pretreatment and primary decantation, six lines in activated sludge treatment, 10 lines in tertiary treatment (micro-screening), and chlorine disinfection.
Line of sludge with: six lines of thickening (three for primary sludge and three for secondary sludge), four lines of anaerobic digestion, and eight lines of dewatering.

Finally, provisions in the contract transparently laid out the protocol and compensation in case of unforeseen major events.

Lessons Learned

With strong and consistent support from the GoE, issues of water scarcity and environmental quality were successfully addressed for New Cairo WWTP through a PPP project. The inclusion of a local partner in the winning bid consortium provided additional stability that allowed the project to continue to succeed despite the force majeure of civil unrest in the late stages of completion. Major private financing and expertise were mobilized to fund the construction and O&M phases of the project, which enabled the relatively cash-strapped government to achieve its public policy objectives of increasing water supply, decreasing pollution, and improving service provision without putting unneeded stress on public funds. Finally, the success of the project served to blaze a trail for

future PPP ventures in Egypt by providing new legal and regulatory mechanisms and critical experience for government entities to enable future stewardship of PPPs.

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