



# Increasing supply thru NRW

## Bangkok, Thailand

### Results

- Saved 165 million liters per day (MLD) of water, equal to the volume needed to serve an additional half a million inhabitants
- Avoided capital expenditure on alternative water supply sources. Using typical benchmark costs, a new supply of 165 MLD could cost around \$170 million (compared to the NRW-PBC cost of \$56 million)
- Replaced more than 550 kms of mains
- Reduced operating costs per unit of water sold (lower energy and chemical costs per unit of water sold) because a higher percentage of water produced was sold
- Generated additional revenue from the sale of the water saved
- Established more than 235 NRW reduction zones, called District Metering Areas (DMAs)
- Repaired more than 150,000 leaks

In the late 1990s, the city of Bangkok was losing about 40 percent of water production. To reduce the losses and meet demand from a growing population, the Metropolitan Waterworks Authority (MWA) hired contractors to reduce non-revenue water (NRW) under performance-based contracts (PBCs), increasing the water supply to the city's six million inhabitants.

In 2000, MWA decided to implement NRW-PBCs in three of its 14 service areas. The contracts were competitively bid. One contractor submitted successful bids for two service areas, and another contractor submitted a successful bid for the third service area. The contracts lasted four years.

The contractors were remunerated in part through a performance-based management fee, which means payment was linked to outputs (actual water savings achieved), not inputs (time spent or work done). The performance-based management fee covered overheads, profits, and salaries of foreign specialist staff. The cost of carrying out leak reduction activities was covered through a fixed fee (for local labor) and reimbursables (for outsourced services, materials, and works performed in the field). The table below summarizes the components of remuneration and indicates which were performance-based.

## Lessons Learned

### Contract and Commercial

#### Incentives

Incentives were strong because the management fee was performance-based, linked to actual water saved.

#### Cost-effectiveness

Having two contractors engaged simultaneously under three different contracts allowed for some useful benchmarking. One contractor saved nearly three times as much water for half the unit cost as the other (US\$246,000 per MLD compared to US\$470,000 per MLD).

#### Performance measurement

The NRW-PBC highlighted the importance of using simple and commonly recognized formulas for calculating payment. In this case, the contract documents included two contradictory formulas, which generated disagreement between the contract parties over the amount owed to the contractors.

#### Who pays

Most project costs—including leak detection, pipe repairs, mains replacement, and installation of hydraulic equipment—were reimbursable. This means MWA did not transfer all risks to the private sector. This case shows that a risk-sharing approach can achieve good results and be cost-effective.

## Technical

### Capital-intensive program

- A comparison of the two contractors shows that intensive programs can sometimes be more cost-effective than less capital-intensive programs. The contractor that achieved greater NRW reduction for a lower unit cost:
- Conducted more than three times as many leak surveys (15km of leak surveys per km of pipe compared to 4km of leak surveys per km of pipe)
- Replaced more than three times as many mains (18 percent of mains compared to 5 percent).

### Takeaways

- NRW-PBCs were used to bring in private firms to help Bangkok save 165 MLD of water.
- Performance-based incentives are effective, particularly when they are linked to the actual water loss reduction achieved.
- NRW-PBCs can achieve good results at a low cost when risks are shared between the private and public sectors.

Component of Remuneration	What the Component Covers	Performance-based
Management Fee	Overheads, profits, and foreign specialist staff	P
Fixed Fee	Cost of local labor	X
Reimbursables	Outsourced services, materials, and works performed in the field	X

Source: Bill Kingdom, Roland Liemberger, and Philippe Marin. "The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries. How the Private Sector Can Help: A Look at Performance-Based Service Contracting." Water Supply and Sanitation Board Discussion Paper Series, Paper No. 8. December 2006. The World Bank: Washington DC.