



Ensuring water supply

Kuala Lumpur, Malaysia

Results

- Reduced NRW by 198 million liters per day (MLD), equal to 10 percent of total water production for the city at the start of the contract
- Repaired more than 11,000 leaks
- Replaced 119,000 customer meters
- Avoided capital expenditure on alternative water supply sources. Using typical benchmark costs, a new supply of 198 MLD could have cost around \$200 million (compared to the NRW-PBC cost of \$110 million)
- Earned additional revenue from the sale of the water saved
- Reduced operating costs per unit of water sold (energy and chemical costs) because a higher percentage of water produced was sold
- Established more than 220 NRW reduction zones, called district metered areas (DMAs)

In 1998, Kuala Lumpur, the capital of Malaysia and home to 1.5 million people, was running out of water. Water was rationed for five months. To end this crisis, the State Waterworks Department hired a contractor under a performance-based contract (PBC) to reduce non-revenue water (NRW).

The NRW-PBC project started with a pilot phase (phase 1) to test the validity of the concept. The pilot was successful, so the contractor received its payment and was awarded phase 2. In phase 2, the NRW reduction target was 10 times as large as in phase 1.

	Phase 1	Phase 2
Length of Phase	18 months	9 years
NRW Reduction Target	18.5 MLD	198.9 MLD
Payment for Achieving Target	\$4.5 million	\$105 million

Lessons Learned

Contract and Commercial

Incentives

- Incentives were strong in both phases because the contractor was paid for results.
- In Phase 1, the contractor had an incentive to exceed the target because it wanted to be awarded the Phase 2 contract.
- In Phase 2, there were no incentives to exceed the target. While the contractor did exceed the target, it is likely that the contractor would have reduced NRW levels by even more, if payments had been linked to actual loss reduction achieved, rather than being a lump sum.

Cost-effectiveness

The contractor paid for all NRW reduction work—leak detection and repairs, pressure reducing valves, establishment of DMAs, identification of illegal connections, and meter replacement.

Performance measurement

The contract included simple performance indicators (MLD saved) and clearly described the measurement methodology and procedure, improving its enforceability.

Who pays

Both contracts were awarded by negotiation, without competition. This was justifiable for Phase 1, as it was an innovative, high-risk concept. However, for Phase 2, the cost could have been lower if it had been tendered competitively.

Technical

Establishing the baseline

- The use of pressure-reducing valves helped regulate the operation of the network, even in very low-pressure situations.
- The contractor's freedom to choose NRW reduction zones anywhere in the network was important for the contract's success. The contractor chose the parts of the network with a good potential for cost-effective physical loss reduction (high level of physical losses or high pressure or both). At the same time, this freedom to choose NRW reduction zones was not ideal. This led to newly improved portions of the network being scattered across the whole system, meaning some of the water savings were lost in the (yet unrepaired) neighboring areas.

Takeaways

- An NRW-PBC was used to bring in a private firm to reduce NRW by 198 MLD (10 percent of total production), thus helping to stave off a water crisis in a city of 1.5 million people.
- Incentives for meeting targets are effective, and incentives for exceeding targets should also be considered.
- The contractor should be given considerable freedom to design the project, but the utility should ensure the works done are consistent with a long-term plan to improve the network.

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.
