This note presents contract modalities introduced to improve urban water supply and sewerage services in South Asia with support from the Asian Development Bank (ADB), including through performance-based construct and operate contracts and design-build-operate contracts. The note was prepared based on a review of six contracts in Bangladesh and India. As most of these contracts are still being tendered or at the implementation stage, lessons extracted here refer essentially to the design and tender phases.

INTRODUCTION

Public–private partnerships (PPPs) are increasingly seen as a mechanism to improve the performance of utilities and generate efficiency gains in the delivery of water services, even though their potential for leveraging private financing is much lower than was originally expected. In recent years, ADB, together with other development banks, has supported the design and implementation of contract modalities that allow participation of the private sector to generate efficiency in design, construction, or operations of facilities, or a combination thereof, while relying on public funding. These contracts can be seen as a “soft” introduction to PPPs, with the aim to ensure investments’ sustainability and effectively improve the delivery of water services for beneficiary populations.

1 This note was prepared with the assistance of Goufrane Mansour, Consultant, and Sophie Trémolet, Director, of Trémolet Consulting Limited, London. The authors wish to thank the concerned staff of Urban Development and Water Division, South Asia Department, Asian Development Bank, including Norio Saito (Deputy Country Director, Viet Nam Resident Mission), Manoj Sharma (Principal Urban Development Specialist) and Neeta Pokhrel (Senior Urban Development Specialist), who have contributed source materials/information on the cases featured in the paper and peer-reviewed this note.

THE CHALLENGE OF DELIVERING IMPROVED WATER SERVICES

Despite large capital investments in urban water supply and sewerage systems over the last 20 years, hundreds of cities in Asia still suffer from low levels of water services. Typically, large capital investments have increased bulk water supply and extended utilities’ service areas and their customer bases. However, the level of services in terms of pressure and hours of service per day have not improved substantially, remaining at 2–4 hours per day in many cities. This perpetuates a downward spiral where poor services mean that customers are unwilling to pay, which leads to insufficient revenues for system maintenance, resulting in worsening services.

In India, for example, increased funding for the water sector has been made available in recent years. Between 2006 and 2013, about $15 billion was allocated to water supply, sewerage, and drainage projects in major Indian cities through government and development partner funds. However, no city in India currently meets the government’s targets for continuous pressurized safe water supply with full coverage and full operation and maintenance (O&M) cost recovery. With urbanization rapidly expanding, urgent drainage projects in major Indian cities through government and development partner funds. However, no city in India currently meets the government’s targets for continuous pressurized safe water supply with full coverage and full operation and maintenance (O&M) cost recovery. With urbanization rapidly expanding, urgent solutions are needed to meet the rising demand for adequate water supply. In many Indian cities, however, municipal corporations that are responsible for water supply often lack the technical capacity to oversee infrastructure development or to operate the system efficiently.

On the regulatory side, many countries still lack the political will to apply cost-recovering tariffs. India’s tariffs are notoriously low—an average household pays $0.15 per cubic meter on a combined basis for water and wastewater services, while many water service providers fail to apply any tariffs.

BRINGING IN PRIVATE SECTOR EXPERTISE FOR IMPROVING URBAN WATER SUPPLY

Overview of Main Contract Models

In a bid to improve the outcomes of public sector investments in urban water supply, where private sector financing is not forthcoming, ADB is supporting the introduction of contract models to bring in private sector expertise in challenging institutional and regulatory contexts. These contracts, which leave responsibility for capital investments to the public sector, are in line with current global PPP trends, with a recent surge in performance-based contracts, in which the main private operator is called in as a “specialist contractor.” To balance risks, these contracts introduce performance incentives through penalties and performance-based fees. ADB supported the introduction of a contract modality that can be referred to as a performance-based construct and operate contract (PBCOC). This type of contract can be used to strengthen and modernize the management of water services by establishing long-term management practices that will put municipal departments and public utilities on the path to cost recovery. In addition, ADB is supporting the design and tender of design–build–operate (DBO) contracts, both for bulk water and distribution projects, in the context of greenfield and brownfield projects. Such contracts aim to ensure that contractors deliver quality investments as their future remuneration will depend on their later performance during the operations phase.

These contracts, developed for at least five Indian cities (Bhagalpur, Cossipore, Gaya, Ilkal, and Tonk) and Dhaka (Bangladesh), differ in the ways in which responsibilities are divided between the public and the private sectors: while DBO contracts allocate design, construction, and operations responsibilities to the private operator, PBCOC allocates only construction and operations responsibilities to the private operator. The PBCOC differs from the performance-based management contract (PBMC) that was introduced with support from the World Bank in the state of Karnataka in India (Box 1). As shown in Figure 1, while the PBMC gives the private sector responsibility for designing and operating the system and overseeing the construction, the PBCOC leaves design risks to the public sector by means of ordinary engineering design consultancy contracting. Figure 1 provides a summary of these contracts’ key features.

The Performance-Based Construct and Operate Contract Model

ADB initiated a water supply project with Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) for the small town of Ilkal (estimated population 51,000), involving a contract in which the private operator is directly responsible for construction as well as operations. KUIDFC had already tested the PBMC approach (Box 1) and was keen to test an alternative approach that would give the private operator direct

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5 Footnote 2.
7 KUIDFC is a financial intermediary set up by the Government of Karnataka to formulate projects for infrastructure in urban areas, mobilize funds, and implement the projects. KUIDFC also provides technical and financial assistance (e.g., through loans) to urban local bodies for development schemes.
### Figure 1: Summary of Contracts’ Main Features

<table>
<thead>
<tr>
<th>Projects</th>
<th>Contract Model</th>
<th>Responsibilities</th>
<th>Financing</th>
<th>Remuneration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilkal Gaya</td>
<td>PBCOC</td>
<td>Design</td>
<td></td>
<td>• Fixed during construction, with potential early completion bonus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Fixed and performance-based during operations</td>
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<tr>
<td></td>
<td></td>
<td>Build</td>
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<tr>
<td></td>
<td></td>
<td>Operate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karnataka “Three cities”</td>
<td>PBMC</td>
<td>Design</td>
<td></td>
<td>• Fixed during design and construction, with potential bonus based on savings from capital expenditure</td>
</tr>
<tr>
<td>pilot</td>
<td></td>
<td></td>
<td></td>
<td>• Fixed and performance-based during operations</td>
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<td>Build</td>
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<td></td>
<td></td>
<td>Operate</td>
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<td></td>
</tr>
<tr>
<td>Bhagalpur Cossipore</td>
<td>DBO Contract</td>
<td>Design</td>
<td></td>
<td>• Fixed during design and construction, with potential bonus for early completion</td>
</tr>
<tr>
<td>Dhaka Tonk</td>
<td></td>
<td></td>
<td></td>
<td>• Fixed with potential penalties during construction or performance-based remuneration</td>
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<td></td>
<td></td>
<td>Build</td>
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<tr>
<td></td>
<td></td>
<td>Operate</td>
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</tbody>
</table>


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#### Box 1: Karnataka’s Prior Experience with the World Bank–Supported Performance–Based Management Contract

In the context of a project supported by the World Bank, Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) introduced a performance-based management contract (PBMC) in pilot zones (covering about 10% of the population of each city) of three cities (Belgaum, Gulbarga, and Hubli-Dharwad). The objective was to test private sector participation in water services management in order to bring water supply services to pressurized 24x7 standards. The private operator was recruited as an “operator-consultant,” as its responsibilities included the detailed engineering design for extending and improving the distribution system with associated investment planning before operating the system over 2 years (including billing and collecting tariff proceeds on behalf of the municipalities). The private operator was not directly in charge of construction works, but procured them separately on behalf of KUIDFC, acting as its procurement agent. In terms of remuneration, the private operator received a fixed fee during the design phase, with a bonus linked to capital expenditure savings, if any. During the operations phase, the remuneration was a combination of fixed fees (60%) and performance-based fees (40%), with performance indicators related to nonrevenue water reduction and continuous supply. The PBMC model implemented in Karnataka was successful: by 2010, Veolia (the contracted private operator) had supported an increase in domestic coverage from 50% to 100% and brought service levels to 24x7 standards in the pilot areas. In 2014, KUIDFC and Hubli-Dharwad municipality initiated a bidding process for scaling up the water supply improvements under a similar PBMC.

responsibility during the construction phase. In the contract proposed by ADB, the public sector retained responsibility for the detailed design (through the procurement of an engineering consultant). The private operator carries out the construction works based on detailed engineering designs provided by the public sector and operates the system over 4 years before transferring responsibility back to the public authority. As in the World Bank-supported PBMC, Ilkal’s PBCOC includes a mixed remuneration structure during the operating period, with 40% of the fees being performance-based. Box 2 presents the main features of Ilkal’s PBCOC.

Currently in the operations phase, Ilkal’s PBCOC is proving to be a suitable model. ADB is supporting the tender of a similar PBCOC for the city of Gaya in Bihar, although the performance fee is only 20% of the total remuneration during operations.

The Design–Build–Operate Contract Model

In addition to the abovementioned contracts, ADB has been supporting the tender of DBO contracts. These contracts involve the delegation of the whole process from design to operations. Such contracts allocate the system’s design and operations to the same private operator with the aim to incentivize innovative design for cost efficiency gains during operations. Although DBO contracts are more suitable for greenfield projects, ADB has also tendered DBO contracts for brownfield projects, i.e., for the rehabilitation of a distribution system. In addition, although a “classic” DBO usually involves a long operating period (20 years and over), DBO contracts can be designed with a shorter operations period (Box 3).

In the state of Rajasthan (India), ADB supported in 2015 the design and tender of DBO contracts for urban water supply and sewerage service improvements for the cities of Tonk (165,000 estimated population) and Pali (230,000 estimated population). These contracts include responsibilities for improving the distribution system based on the district metering area (DMA) approach for nonrevenue water reduction and 24x7 water supply as part of capital investments along with a 10-year operations period. These contracts also combine greenfield and brownfield features, as the private operator is required to rehabilitate the existing distribution system along with expansion of services in new areas. In order to ensure adequate rehabilitation, the contracts introduce a performance-based payment system whereby construction progresses along the ring-fenced DMAs with part of the payment to the private operator linked to achieving contractually stipulated levels of nonrevenue water in the newly built or rehabilitated DMAs.

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8 These DBOs in Pali and Tonk are components of a large ADB loan ($500 million) to the Government of India for the state of Rajasthan. ADB expects to launch the tenders of six DBO contracts with similar features as a part of the project.
and continuity of supply. However, depending on the context, the clear indicators to be measured, e.g., non-revenue water reduction and, more crucially, performance-based remuneration based on completion or for savings on available capital expenditure budget, operational efficiency targets are not met, bonuses for early This can take the form of penalties when performance can be enhanced with the use of a “carrot and stick” approach. However, DBO contracts can also be tendered with a short operations period, e.g., 3 to 10 years. In 2014, Dhaka Water and Sewerage Authority started tendering a large DBO contract for bulk water supply, in a multidonor project involving ADB, Agence Française de Développement, European Investment Bank, and the Government of Bangladesh. The scope of the DBO contract includes a new intake, a water treatment plant, and 22 kilometers of main transmission lines. With a 3-year operations period, the contract carries the risk of reduced benefits from efficiency gains linked to an optimum design, as the private operator only has responsibility for operations for a short period of time. To remedy the issue, the contract requires the private operator to guarantee the operating costs for the whole 30-year operations life cycle. If during the first 3 years of operations, operating costs (in terms of energy consumption and use of chemicals) are higher than what has been bid for, the anticipated additional operating costs can be taken off the private operator’s payment. This “guarantee-penalty” system provides a strong incentive for the private operator to design a long-term cost-efficient system.

Operations period. DBO contracts commonly involve a long operations period, so as to maximize the benefits from design efficiencies. However, DBO contracts can also be tendered with a short operations period, e.g., 3 to 10 years. In 2014, Dhaka Water and Sewerage Authority started tendering a large DBO contract for bulk water supply, in a multidonor project involving ADB, Agence Française de Développement, European Investment Bank, and the Government of Bangladesh. The scope of the DBO contract includes a new intake, a water treatment plant, and 22 kilometers of main transmission lines. With a 3-year operations period, the contract carries the risk of reduced benefits from efficiency gains linked to an optimum design, as the private operator only has responsibility for operations for a short period of time. To remedy the issue, the contract requires the private operator to guarantee the operating costs for the whole 30-year operations life cycle. If during the first 3 years of operations, operating costs (in terms of energy consumption and use of chemicals) are higher than what has been bid for, the anticipated additional operating costs can be taken off the private operator’s payment. This “guarantee-penalty” system provides a strong incentive for the private operator to design a long-term cost-efficient system.

KEY LESSONS

The successful tender and implementation of alternative contract modalities for water supply and sewerage service improvement requires an environment that is ripe for modernizing water services management. On the institutional side, public bodies must be willing to engage in reforms that aim at higher recovery of at least O&M costs and the provision of transparent subsidies for other service costs that cannot be borne through tariffs (such as capital investment costs). In order to increase willingness to pay for piped water services, contractual obligations should include outreach activities to local populations to explain the ongoing reforms and the need to pay for water services. The introduction of modern water management practices, such as the DMA approach, that were introduced in several contracts can contribute to building a positive relationship between water service providers and the local population.

The private sector can be called upon to provide key expertise in technically complex infrastructure. The private operator’s performance can be enhanced with the use of a “carrot and stick” approach. This can take the form of penalties when operational efficiency targets are not met, bonuses for early completion or for savings on available capital expenditure budget, and, more crucially, performance-based remuneration based on clear indicators to be measured, e.g., nonrevenue water reduction and continuity of supply. However, depending on the context, the allocation of risks needs to be carefully designed so as to attract the private sector, while limiting undue risks on the public side.

The PBCOC holds great potential for improving water supply services in challenging institutional and regulatory contexts, as attested by the ongoing experience in Ilkal. A PBCOC is well suited to situations where the public sector has reasonable capacity to prepare detailed engineering design. However, the public sector must provide reasonably accurate engineering information to attract the private sector.

DBO contracts are well suited to environments where the public sector has an appetite for delegating operations for a longer period of time. By binding design with operations over a number of years, such contracts can incentivize efficient design. However, the model also comes with some limitations:

- DBO contracts require a technically complex tender procedure, which can significantly delay the start of the works. When in-house design experience is available (and supported, if necessary, by external engineering consultants), it could be preferable to tender only the construction and operations, as in a PBCOC; and
- DBO contracts are better suited for greenfield projects, where there are no “black boxes” for the private operator, and which are therefore perceived as less risky. Where significant risks are perceived, as in brownfield projects, private operators can bid premium prices to cover their risks.
## Annex: ADB Projects Overview

<table>
<thead>
<tr>
<th></th>
<th>Ilkal (Karnataka)</th>
<th>Gaya (Bihar)</th>
<th>Bhagalpur (Bihar)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project name</strong></td>
<td>NKUSIP</td>
<td>Bihar UDIP</td>
<td>Bihar UDIP</td>
</tr>
<tr>
<td><strong>Contract start date</strong></td>
<td>January 2013</td>
<td>Not yet started</td>
<td>July 2014</td>
</tr>
<tr>
<td><strong>Current status</strong></td>
<td>Operations phase</td>
<td>Bidding process not yet started</td>
<td>Design phase, construction to start end of 2015</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>51,000</td>
<td>468,000</td>
<td>419,000</td>
</tr>
<tr>
<td><strong>Funders</strong></td>
<td>ADB and GOI</td>
<td>ADB and GOI</td>
<td>ADB and GOI</td>
</tr>
<tr>
<td><strong>Service provided</strong></td>
<td>Water distribution</td>
<td>Water distribution</td>
<td>Water distribution</td>
</tr>
<tr>
<td><strong>Brownfield/greenfield</strong></td>
<td>Brownfield</td>
<td>Brownfield</td>
<td>Brownfield</td>
</tr>
<tr>
<td><strong>Contract type</strong></td>
<td>PBCOC</td>
<td>PBCOC</td>
<td>DBO</td>
</tr>
<tr>
<td><strong>Contract scope</strong></td>
<td>Rehabilitation + construction + operations</td>
<td>Rehabilitation + construction + operations</td>
<td>Design + construction + operations</td>
</tr>
<tr>
<td><strong>Duration (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>1.75</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Operations</td>
<td>4</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Public signatory</strong></td>
<td>Karnataka Urban Infrastructure Development and Finance Corporation</td>
<td>Bihar Urban Infrastructure Development Corporation</td>
<td>Bihar Urban Infrastructure Development Corporation</td>
</tr>
<tr>
<td><strong>Private signatory</strong></td>
<td>Veolia India</td>
<td>Bidding process not yet started</td>
<td>Ranhill/Pan India Limited (JV)</td>
</tr>
<tr>
<td><strong>Bid parameters</strong></td>
<td>Lowest bid price</td>
<td>Lowest bid price</td>
<td>Lowest bid price</td>
</tr>
<tr>
<td>Remuneration and incentives</td>
<td>Fixed (60%) and performance-based (40%) for O&amp;M services</td>
<td>Fixed and performance-based</td>
<td>Fixed and performance-based</td>
</tr>
</tbody>
</table>

Despite the limited risks involved in the contracts under review, the context in South Asia (and in India in particular) is such that international private operators remain wary of bidding for such contracts. Indeed, although most contracts under review have been successfully tendered (or are on the path to a successful tender), most international firms that have won the contracts have generally mobilized local staff rather than international experts. This is contributing to the development of local expertise in water supply services management but reduces the potential benefits from bringing in state-of-the-art expertise from other countries.

Finally, the benefits of private sector participation are more likely to be maximized when such contracts are associated with a package of technical assistance to improve the policy and institutional framework for urban water services, with a particular focus on improving governance, building capacity, and rationalizing tariffs.
### Annex: ADB Projects Overview

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Contract Start Date</th>
<th>Current Status</th>
<th>Population</th>
<th>Funders</th>
<th>Service Provided</th>
<th>Brownfield/Greenfield</th>
<th>Contract Type</th>
<th>Contract Scope</th>
<th>Duration (years)</th>
<th>Public Signatory</th>
<th>Private Signatory</th>
<th>Bid Parameters</th>
<th>Remuneration and Incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilkal (Karnataka)</td>
<td>January 2013</td>
<td>Not yet started</td>
<td>51,000</td>
<td>ADB and GOI</td>
<td>Water distribution</td>
<td>Brownfield</td>
<td>PBCOC</td>
<td>Rehabilitation + construction + operations</td>
<td>1.75</td>
<td>Karnataka Urban Infrastructure Development and Finance Corporation</td>
<td>Veolia India</td>
<td>Lowest bid price</td>
<td></td>
</tr>
<tr>
<td>Gaya (Bihar)</td>
<td>Not yet started</td>
<td></td>
<td>468,000</td>
<td>ADB and GOI</td>
<td>Water distribution</td>
<td>Brownfield</td>
<td>PBCOC</td>
<td>Rehabilitation + construction + operations</td>
<td>3</td>
<td>Bihar Urban Infrastructure Development Corporation</td>
<td>Ranhill/Pan India Limited (JV)</td>
<td>Cost of design and build + net present value of O&amp;M</td>
<td></td>
</tr>
<tr>
<td>Bhagalpur (Bihar)</td>
<td>Not yet started</td>
<td></td>
<td>419,000</td>
<td>ADB and GOI</td>
<td>Water distribution</td>
<td>Brownfield</td>
<td>PBCOC</td>
<td>Design + construction + operations</td>
<td>4</td>
<td>Bihar Urban Infrastructure Development Corporation</td>
<td>Pan India Jiangxi Construction (JV)</td>
<td>Fixed and performance-based</td>
<td></td>
</tr>
<tr>
<td>Tonk (Rajasthan)</td>
<td>July 2014</td>
<td>Contract awarded</td>
<td>165,000</td>
<td>ADB and GOI</td>
<td>Bulk water supply and distribution</td>
<td>Brownfield + Greenfield</td>
<td>DBO</td>
<td>Design + construction + operations (focus on nonrevenue water)</td>
<td>3</td>
<td>Rajasthan Urban Infrastructure Development Corporation</td>
<td>Not yet awarded</td>
<td>Minimum 30% of total for performance fees</td>
<td></td>
</tr>
<tr>
<td>Dhaka (Bangladesh)</td>
<td>Not yet started</td>
<td>Second stage of the two-stage bidding</td>
<td>10,700,000</td>
<td>ADB, AFD, EIB, and GOB, DWASA</td>
<td>Bulk water supply</td>
<td>Greenfield</td>
<td>DBO</td>
<td>Design + construction + operations</td>
<td>4</td>
<td>DWASA</td>
<td>Not awarded</td>
<td>The lowest whole life cost including 30 years of operation</td>
<td></td>
</tr>
<tr>
<td>Kolkata (Kolkata)</td>
<td>Not yet started</td>
<td>Unsuccessful tender process</td>
<td>165,000</td>
<td>ADB and GOI</td>
<td>Distribution</td>
<td>Brownfield</td>
<td>DBO</td>
<td>Design + works supervision + operations (focus on nonrevenue water)</td>
<td>10</td>
<td>Kolkata Municipal Corporation</td>
<td>Not awarded</td>
<td>Fixed, subject to penalties</td>
<td></td>
</tr>
</tbody>
</table>

ADB Water and Sewerage Authority, EIB = European Investment Bank, KEIIP = Kolkata Environmental Improvement Investment Program, PBCOC = performance-based construct and operate contract.
About the Asian Development Bank
ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to half of the world’s extreme poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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