Public Private Partnerships in Urban Water Supply

Potential and Strategies
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This report has been prepared with support from the British High Commission, through its Prosperity Fund, India Programme
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ACKNOWLEDGEMENTS

This report would not have been possible without the cooperation of experts and practitioners of Public Private Partnerships in the Urban Water Sector of India. Their willingness to share their experiences has helped us ground this report in practical insights.

In particular we would like to thank all the participants at the ‘National Conference on Public Private Partnerships in Urban Water Sector’, held in Chennai on 20th March, 2012. These include, Dr. K.P. Krishnan, Secretary, Economic Advisory Council to the Prime Minister of India; Mr. Suresh Prabhat Prabhu, Member of Parliament & Former Chairman, Task Force for Interlinking of Rivers; Mr. S. Krishnan (IAS), Secretary to Government, Finance Department (Expenditure), Government of Tamil Nadu; Prof. Ashwin Mahalingam, Assistant Professor, IIT Madras; Mr. R. Raghuttama Rao, Managing Director, ICRA Management Consulting Services Ltd.; Prof. V. Srinivas Chary, Director, Centre for Energy, Environment, Urban Governance, Administrative Staff College of India; Mr. K.. Rajivan, IAS (Retd.), Former Managing Director & CEO, Tamil Nadu Urban Infrastructure Financial Services Ltd.; Mr. A. Rajagopal, Project Director, PRIA Foundation for Research & Development; Mr. Anand Madhavan, Head – Urban and Infrastructure Finance, ICRA Management Consulting Services Ltd.; Mr. Gourishankar Ghosh. IAS (Retd.), Former Executive Director, Water Supply and Sanitation Collaborative Council, WHO, Geneva; Mr. VibhuNayar, IAS, Project Director, Irrigated Agriculture Modernization & Water Bodies Restoration and Management and Ex-Officio Secretary, Public Works Department, Government of Tamil Nadu; Mr. R. Ragu Nathan, Chairman, Indian Water Works Association, Chennai Centre; Mr. Madhu Krishnamoorthy, Head – Business Development, Water Health India Private Limited; Ms. Aparna Rajkumar, Member, Siruthuli, Coimbatore; Ms. Thangam Sankaranarayanan, IAS (Retd.), Chairman, New Tirupur Area Development Corporation Ltd.; Mr. Raman, IAS, Former Chairman and Managing Director, Ennore Port Ltd.; Mr. K.A. Joseph, Regional Director, Veolia Water India Pvt. Ltd; Mr. J. Venkatesh, Deputy General Manager, Fitchner Consulting Engineers India Private Ltd.; Mr. L.V. Keshav, Director, Ion Exchange Envirol Farms Ltd. and Mr. Pranab Kumar Majumdar, General Manager, VA Tech Wabag Ltd.

We would also like to thank Mr. M. J. R. Chowdary, Zonal Manager, Veolia Water India Private Ltd. and Mr. K.S.N. Rao, Vice President (Projects), Vishwa Infrastructures.
METHODOLOGY

This study began with extensive research on existing literature concerning different facets of the urban water sector in India. This encompassed the evolution of urban water supply and sewerage practices in India, the changes in the policy & institutional framework and the underlying problems in the sector, with special emphasis on the role of Public Private Partnerships in the delivery of urban water supply. In order to assess the challenges and opportunities associated with the use of Public Private Partnership models in Urban Water supply, a series of experts such as the private concessionaires, operators, financiers, academicians, transaction advisors and others were interviewed in addition to the collection and analysis of secondary information from previous case studies and documents. Further, to understand the potential and strategies for such public private partnership models in the urban water supply and sewerage sector, a national conference on ‘Public-Private Partnerships in Urban Water Supply’ was conducted on 26th March 2012 in Chennai. 25 experts including policy makers, private water management companies, consultants, financial institutions, and non-profit organizations presented their thoughts and shared their experiences in this sector. There were four panel discussions on different themes, focusing on policies and governance issues, financial sustainability of the project, relevance of community participation and project procurement and implementation issues. This report is an output of the various efforts described above.
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT</td>
<td>Build-Operate-Transfer</td>
</tr>
<tr>
<td>CPHEEO</td>
<td>Central Public Health Environment and Engineering Organization</td>
</tr>
<tr>
<td>DBFOT</td>
<td>Design-Build-Finance-Operate-Transfer</td>
</tr>
<tr>
<td>DSRF</td>
<td>Debt Service Reserve Fund</td>
</tr>
<tr>
<td>EPC</td>
<td>Engineering-Procurement-Construction</td>
</tr>
<tr>
<td>GoI</td>
<td>Government of India</td>
</tr>
<tr>
<td>GoK</td>
<td>Government of Karnataka</td>
</tr>
<tr>
<td>GoMP</td>
<td>Government of Madhya Pradesh</td>
</tr>
<tr>
<td>GoTnN</td>
<td>Government of Tamil Nadu</td>
</tr>
<tr>
<td>HPEC</td>
<td>High Powered Expert Committee</td>
</tr>
<tr>
<td>HUDCO</td>
<td>Housing &amp; Urban Development Corporation</td>
</tr>
<tr>
<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
</tr>
<tr>
<td>IRR</td>
<td>Internal Rate of Return</td>
</tr>
<tr>
<td>JnNURM</td>
<td>Jawaharlal Nehru National Urban Rural Mission</td>
</tr>
<tr>
<td>KMC</td>
<td>Khandwa Municipal Corporation</td>
</tr>
<tr>
<td>KUIDFC</td>
<td>Karnataka Urban Infrastructure Development Finance Corporation</td>
</tr>
<tr>
<td>KUWASIP</td>
<td>Karnataka Urban Water Supply Infrastructure Project</td>
</tr>
<tr>
<td>KUWSDB</td>
<td>Karnataka Urban Water Supply &amp; Drainage Board</td>
</tr>
<tr>
<td>Lpcd</td>
<td>Liters per capita per day</td>
</tr>
<tr>
<td>MLD</td>
<td>Million Liters per Day</td>
</tr>
<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MoUD</td>
<td>Ministry of Urban Development</td>
</tr>
<tr>
<td>NRW</td>
<td>Non-Revenue Water</td>
</tr>
<tr>
<td>NTADCL</td>
<td>New Tirupur Area Development Company Limited</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations &amp; Management/Maintenance</td>
</tr>
<tr>
<td>PCI</td>
<td>Per Capita Investments</td>
</tr>
<tr>
<td>PI</td>
<td>Priority Investments</td>
</tr>
<tr>
<td>PPCP</td>
<td>Public Private Community Partnership</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
</tr>
<tr>
<td>PSP</td>
<td>Private Sector Participation</td>
</tr>
<tr>
<td>SICS</td>
<td>Social Intermediation &amp; Communication Strategy</td>
</tr>
<tr>
<td>SLB</td>
<td>Service Level Benchmark</td>
</tr>
<tr>
<td>SPV</td>
<td>Special Purpose Vehicle</td>
</tr>
<tr>
<td>TACID</td>
<td>Tamil Nadu Corporation for Industrial Infrastructure Development</td>
</tr>
<tr>
<td>TADP</td>
<td>Tirupur Area Development Project</td>
</tr>
<tr>
<td>TAP</td>
<td>Transparency Accountability Participation</td>
</tr>
<tr>
<td>TEA</td>
<td>Tirupur Exporters Association</td>
</tr>
<tr>
<td>TMC</td>
<td>Tirupur Municipal Corporation</td>
</tr>
<tr>
<td>TNUUDF</td>
<td>Tamil Nadu Urban Development Fund</td>
</tr>
<tr>
<td>TWIC</td>
<td>Tamil Nadu Water Investment Company</td>
</tr>
<tr>
<td>UIDSSMT</td>
<td>Urban Infrastructure Development Scheme in Small and Medium Towns</td>
</tr>
<tr>
<td>ULB</td>
<td>Urban Local Body</td>
</tr>
<tr>
<td>WSPF</td>
<td>Water Shortage Period Fund</td>
</tr>
</tbody>
</table>
Public Private Partnerships in Urban Water Sector

Potential and Strategies

Public Policy Team, Athena Infonomics

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Saloni Ketan Shah

May, 2012
EXECUTIVE SUMMARY

Urban Water Supply in India

The state of the urban water sector in India is abysmal – a study undertaken by the Ministry of Urban Development (MoUD) on a sample of 28 cities observed that most cities received an average of 3.3 hours of water per day compared to a benchmark of 24 hours and also scored poorly on parameters such as coverage, quality and efficiency.

With urbanization rates expected to witness a steep rise, the problem of delivering reliable and affordable water supply services in urban areas is expected to further deteriorate. Observations from secondary research display that the number of urban households in India grew at a Compounded Annual Growth Rate (CAGR) of 3.92% between 2001 and 2011. The recently released National Sample Survey Organisation (NSSO)2011 data on household amenities shows that in order to meet the requirement of the additional households over the last decade, the provision of drinking water via different sources increased at a CAGR of 4.2 % for tap water, 1.69% for well water, 3.62% from hand pumps and tube wells and 4.9% from other sources. Even though the number of access points for tap water has exhibited a higher growth rate than the rate of growth of urban households, only 60-70% of the households in the urban areas have access to tap water. This implies that while the number of urban households has been growing at 3.9% per annum, on average the provision of drinking water grew by 3.6% per annum3, resulting in a growing deficit in the provision of urban drinking water supply.

Another standard indicator used to assess the state of urban water supply is the percentage of water produced that does not reach the end consumers also popularly known as Non-Revenue Water (NRW). On an average, the extent of non-revenue water (NRW) in India is 44.1%. This is much higher than the NRW of 15% in developed countries and the 20% that is set as the benchmark for Indian cities by the MoUD. These statistics, among others, point to the need for a significant intervention in the urban water supply sector, to improve resource allocation, enhance service delivery and alter the current management paradigm.

Institutional Initiatives

In India, the implementation of the water policy through programs and schemes identified by the central government, such as development of water infrastructure, operating, maintaining and regulating the water supply system and setting and collecting water tariffs, is carried out by the state governments and by parastatal agencies such as the Urban Local Bodies (ULBs). However the devolution of the responsibility for urban governance to urban local bodies has not happened to the extent desired, which has led to the performance improvement being limited or absent. This in-turn traces itself to the lack of adequate capacity building and the non-accountability of

---

3 Other sources of water include spring water, river/canal, ponds, lakes, private tanks and bottled water.

2 Source: NSSO Data (2011) MOSPI, GOI.
urban local bodies in implementing reforms successfully. While the central government has attempted to drive the necessary reforms through conditional allocation of funds through the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) program, a revised and upgraded JnNURM, with additional guidelines for ULB reforms that are aligned to the new Water Policy, currently in the draft form, would be necessary to provide a much needed impetus for achieving Service Level Benchmarks in water supply and sewerage.

Public Private Partnerships: An Alternate tool

Public Private Partnerships (PPPs) are complex arrangements involving multiple stakeholders with divergent interests. Before embarking on a project through the PPP mode, the project objectives must be set through a careful assessment of the current state of physical infrastructure and the level of service delivery and achievement of service level benchmarks in a phased manner must be planned in detail. Next, the roles of the different stakeholders in a PPP – government, private sector, community, financiers, consultants etc. - need to be clearly defined and enforced through an incentive and penalty structure that aligns with project objectives. Viability of the project and appropriate risk allocation and mitigation mechanisms must be put in place.

A successful PPP project in the water and sewerage sector would require that the entire capital costs, and as much of the operating costs as possible, be covered by central and state grants. Under the JnNURM, the total availability of funds depends on the size of the city. The deficit can be generated via user charges for those who can afford them. Anecdotal evidence suggests that the poor often pay much more for water, in absolute terms and in terms of opportunity cost, than the rich. A system that cross-subsidizes costs but provides uniform and high quality service, and is managed, governed and regulated by an urban local body, is necessary to eliminate such inequities.

Way Forward

Much work needs to be done to revamp the crumbling urban infrastructure in the country and provide universal access to basic services such as water and sanitation. PPPs in the urban water sector, if undertaken in a well-planned manner, and for the right reasons, is a viable alternative for solving some of the chronic problems faced by the sector.

PPPs, as has been emphasized in this report, are not appropriate for every situation and should not be implemented indiscriminately. Selection of the appropriate model of private sector participation – either through Engineering – Procurement – Construction (EPC) and management contracts or through Build – Operate- Transfer (BOT) Toll/Annuity models – is an important step in the project identification phase, but one that often does not receive the necessary attention. A detailed process of arriving at the appropriate model of private sector participation that includes exhaustive assessment of existing physical

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3 The policy framework governing the usage of water and development of the requisite infrastructure has evolved and broadened over the years. The current draft National Water Policy, broader in scope than earlier versions, recommends treating water as two distinct goods based on its usage – a minimum quantity per capita that is necessary for subsistence should be provided at a heavily subsidized rate or for free, while water over and above this is treated as a scarce economic good with a corresponding price.
infrastructure, current performance on service delivery benchmarks, and the technical, operational and financial capability of the ULBs, needs to be developed.

Further, realizing the potential of PPPs require a strong focus on execution from all the stakeholders. It is particularly important to undertake intensive capacity building of urban local bodies and implement reforms that make them accountable and responsible for achieving service level benchmarks in water supply and sewerage.

A programmatic approach that integrates planning for urban water supply and sewerage at the state level, which is further broken into targets and objectives for cities that are stratified according to their size, is the overarching method of implementing change. Full achievement of the service level benchmarks should occur in a phased manner, where intermediate targets are set, based on a number of parameters, such as the state of existing physical infrastructure, the technical and operational capacity of the ULBs and the private sector, availability of finance, etc.

The next phases of our research will develop an approach to identify the appropriate private sector participation model and develop guidelines for phase-wise implementation for PPPs at the urban local body level.
1. EVOLUTION OF URBAN WATER SUPPLY SECTOR

1.1 URBAN WATER SUPPLY SECTOR IN INDIA

India’s record of providing access to safe and reliable drinking water to its citizens has been very poor, even when compared with other developing countries. No major Indian city has a 24 hour water supply, and a sample of 28 cities averaged just 3.3 hours of water supply per day. Other quality metrics — accessibility, affordability, cost recovery, extent of metering, extent of non-revenue water — all underperform vis-à-vis the set standards by a considerable degree.

The reasons for such chronic underperformance are complex and deep-rooted. Without attempting to list the reasons exhaustively or solve them comprehensively, this report focuses on the potential of one particular mechanism – the Public Private Partnership – to solve some of the problems associated with the delivery of reliable and affordable urban water supply. The report begins by tracing the evolution of the institutional and policy framework governing urban water supply and then goes on to present a description of the trends in Public Private Partnerships (PPPs) undertaken over the years. In Section 2, the current status of urban water supply and sewerage in is presented through an assessment of Service Level Benchmarks (SLBs). We provide an analytical description of a few pressing problems that have the potential to be addressed through the PPP mechanism. In Section 3, we briefly describe the funding requirement for improvements in urban infrastructure and the different sources of funds, highlighting the deficit that would need to be addressed, in part through private sector financing. In Section 4, we present a framework for successful PPPs developed through our research and describe individual features that have specific relevance to the urban water supply and sewerage sector. We present three case studies in the Appendix and have drawn on them extensively to provide evidence for our arguments.

1.2 INSTITUTIONAL FRAMEWORK

Water is constitutionally a state subject, listed under Entry 17 in the State List, but with the provision for the center to intervene in case of management of inter-state rivers under Entry 56 of the Union List. Yet the understanding of water and its related issues has evolved considerably since the drafting of the constitution. While water, in the constitution, originally referred to the management of rivers and irrigation, it is now more broadly understood to include all water bodies, aquifers, ground water, urban and rural water supply, sewerage, sanitation, etc.

As such, currently in India, the central government is responsible for laying down the policy framework and for funding and monitoring schemes related to the provision and management of water resources.

The implementation of the water policy through programs and schemes identified by the central government, such as development of water infrastructure, operating, maintaining and regulating the
Public Private Partnerships in Urban Water Supply in India

Water supply system and setting and collecting water tariffs, is carried out by the state governments and by parastatal agencies such as the Urban Local Bodies (ULBs).

A brief outline of the role of the state and the central governments across different functions of the urban water sector is given in the table below:

**Exhibit 1.1: Institutional Framework of Urban Water Sector**

<table>
<thead>
<tr>
<th>Features</th>
<th>Central Government</th>
<th>State Government</th>
<th>Urban Local Bodies</th>
</tr>
</thead>
</table>
| **Policy & Regulation** | Ministry of Water Resources, Central Public Health Environmental & Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India | • Department of Water Resources (State Government)  
• State Level Water Regulatory Authorities (E.g., Maharashtra Water Resources Regulatory Authority & Uttar Pradesh Water Management and Regulatory Commission) | Not Applicable                                                                 |
| **Funding**       | Jawaharlal Nehru National Urban Renewal Mission (JnNURM) & Urban Infrastructure Development Scheme in Small & Medium Towns (UIDSSMT); Schemes under the Ministry of Urban Development, Government of India | Statutory Bodies of the State Government, such as the Infrastructure Development Corporations. E.g., Tamil Nadu Urban Finance & Infrastructure Development Corporation | Metropolitan Level Specialist Agency/ Specialist Municipal Undertaking |
| **Capital Works** | Not Applicable                                                                      | Public Health Engineering Department / Public Works Department (State Government) | Metropolitan Level Specialist Agency                        |
| **Operations & Maintenance** | Not Applicable                                                                      | State Level Specialist Agencies/ Metropolitan Level Specialist Agencies | Specialist Municipal Undertaking                            |

Source: Various Government websites & Athena Research

**Role of the Center**

Apart from laying down the policy framework, the central government provides funds for financing urban infrastructure development through various schemes and programs. The Jawaharlal Nehru National Urban Renewal Mission (JnNURM) is a central government sponsored urban modernization program with an allocation of over Rs. 1,00,000 crore spread over a period of seven years for 700 cities and towns. The JnNURM was introduced in 2005-06 and aims to provide grants-in-aid to urban local
bodies to increase the access of urban infrastructure to the people and the quality of the services delivered, with a special focus on the improvement of the livelihoods of the urban poor. Under the mission, 50% of the funds were to come from the Central Government and the other 50% was to be shared between the beneficiary states and the ULBs.\(^5\) However, in subsequent years the Central Government increased its share by over Rs. 16,000 crore to avoid any shortage of funds. Major sub-components of JnNURM are described in the following exhibit.

**Exhibit 1.2: Components of JnNURM**

<table>
<thead>
<tr>
<th>Components of JnNURM</th>
<th>Approved Project Cost*</th>
<th>Scope of the Sub-Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Infrastructure &amp; Governance (UIG)</td>
<td>60,704</td>
<td>Urban Infrastructure Projects relating to Water Supply, Sewerage, Solid Waste Management and Roads in 65 Mission cities.</td>
</tr>
<tr>
<td>Basic Services to the Urban Poor (BSUP)</td>
<td>13,498.61</td>
<td>Housing and Slum Development Projects in 65 Mission Cities.</td>
</tr>
<tr>
<td>Urban Infrastructure and Development Scheme for Small &amp; Medium Towns (UIDSSMT)</td>
<td>28,983.65</td>
<td>Urban Infrastructure Projects relating to Water Supply, Sewerage, Solid Waste Management and Roads in cities and towns excluded in the 65 Mission Cities</td>
</tr>
<tr>
<td>Integrated Housing and Slum Development Programme (HSDP)</td>
<td>10,997.35</td>
<td>Housing and Integrated Slum Development in non-mission cities and towns.</td>
</tr>
</tbody>
</table>

* The figures shown are as on 2011. Source: DMU Report – UIG, UIDSSMT, BSUP and HSDP, JnNURM, MOUD, (2011)

A disaggregation of the project cost based on the share of the central, state and the ULB shows that the share of the Central Government across the four sub-schemes varies between 46% (UIG) and 81% (UIDSSMT). The state government’s share ranges from 10% (UIDSSMT) to 32% (BSUP) while that of the ULBs lies between 9% (UIDSSMT) and 37% (UIG). On average, the share of the Central Government, state government and the ULBs in the entire four sub-schemes/components is 53%, 21% and 26%, respectively.

\(^5\)It is to be noted that the Central Government Funds under the JnNURM are released under the head of ‘Additional Central Assistance’ (ACA). Please see DMU – UIG/UIDSSMT (2011), JnNURM, MOUD for further details.
The UIDSSMT scheme under the JnNURM was introduced for those cities that were not covered under the UIG scheme. Allocations under the UIDSSMT scheme are shown in the figure below.

**Figure 1.1: UIG Funds Allocation**

![UIG Funds Allocation](image1)

Source: JnNURM – Status of Implementation of Projects (December, 2011)

Other than the JnNURM, external support agencies have also contributed funds for project development and capacity building in this sector. In the last decade (2001-10), World Bank funded one project worth USD 48 Million, Japan International Corporation Agency funded nine projects worth USD 2,195 Million and Asian Development Bank (ADB) funded six projects worth USD 1,307 Million. The ADB has also been working with the state and the central governments to fund the development of
PPP toolkits and guidebooks and to conduct capacity building workshops for ULB/State Government officials involved in drafting PPP contracts. A revision of the JnNURM, called as JnNURM Phase II is under formulation, and is expected to take over the Phase I from the beginning of the financial year of 2013 and would expand its scope to cover all the urban regions of the country.

Role of the States

The role of the states in governing water supply has also changed over the years. The 74th Constitutional Amendment Act (CAA), enacted in 1992, required the state governments to empower the Urban Local Bodies (ULBs) with ‘such powers and authority as may be necessary to enable them to function as institutions of self-governance’. The JnNURM stipulates certain mandatory reforms on the ULBs as ‘core municipal functions’ that includes water supply, drainage and sewerage and solid waste management. It requires the ULBs to own ‘the political accountability’ and to share the ‘technical, financial and administrative responsibility’ with others as appropriate.

Exhibit 1.3: Sample Institutional Structure of a State (Tamil Nadu)

Source: Athena Research

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Box 1.1: Regulatory Institutions

Only two states have a state level regulatory body for water management. Responsibilities are listed below:

**Maharashtra Water Resources Regulatory Authority**
- Determine, regulate and enforce the distribution of bulk water supply to various categories of use (agriculture, industries, power, drinking and sanitation)
- Establish water tariffs at a level which enables self-sustainable management of service delivery
- Review and clear water projects which meet the requirements of Integrated State Water Plan (ISWP, which implies efficient use of both ground and surface water)

**Uttar Pradesh Water Management and Regulatory Commission**

The commission will be responsible for the regulation of water resources, optimally allocating it for different purposes and for fixing water rates.

Source: Athena Research

1.3 Policy Framework

Over the last two decades, the concept of water supply and management has acquired greater meaning, as reflected in the various National Water Policies that have been formulated till date (Refer Exhibit 1.4). The first National Water Policy, formulated in 1987, had little emphasis or no mention of aspects such as interstate water distribution, pricing of water and private sector participation. The National Water Policy that was subsequently revised in 2002, retained the earlier emphasis on drinking water, modernization, quality and efficient use, with added emphasis on interstate water distribution and began recognizing the need for private sector participation and pricing mechanisms. A new Draft National Water Policy, 2012 is currently available for comments and suggestions from stakeholders and citizens. Though not without its critics, it has viewed water, over and above the minimum quantity required for sustenance of human life, as a scarce economic good that needs to be conserved, managed and priced to ensure efficient usage.
Exhibit 1.4: Broadening Scope of National Water Policy

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on Drinking Water</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Maintenance &amp; Modernization</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Interstate Water Distribution</td>
<td>No Emphasis</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Water Framework Law</td>
<td>No Emphasis</td>
<td>No Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Pricing &amp; Regulation</td>
<td>Weak Emphasis</td>
<td>Weak Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Private Sector Participation</td>
<td>No Emphasis</td>
<td>Weak Emphasis</td>
<td>Strong Emphasis</td>
</tr>
<tr>
<td>Efficient Use &amp; Quality</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
<td>Strong Emphasis</td>
</tr>
</tbody>
</table>

Source: Athena Research

Other notable additions in the draft National Water Policy, 2012 are:

**Water Framework Law**

A need for a national legal framework to lay down the general principles that could lead to the framing of suitable water laws, regulations and policies at the state level.
Regulatory Authority
Each state should have a water regulatory authority to fix and regulate water tariffs, monitor the operations, review performance and suggest policy changes.

Water Charges
Water charges should aim to recover at least the operation and maintenance cost of the water supply network. Cross subsidies through differential pricing should be incorporated into the water charges where necessary after considering the views of the beneficiaries. Further, the newly envisaged pricing system encourages the integration of the urban water supply system and sewerage system i.e., the water bills are directed to include sewage treatment charges.

Public – Private Partnerships (PPPs)
Appropriate use of PPP models by transferring water related services to a private developer and/or the community should be encouraged.

Shift in the Policy Framework to promote greater Private Sector Participation
With the policy framework gradually allowing private sector participation, the urban water sector has witnessed a gradual shift from public procurement to private sector participation in different forms. The private sector has been involved in all parts of the value chain by either financing projects, undertaking capital works or by operating the water supply and sewerage networks in cities and towns. In India, private sector participation in the urban water sector started with Engineering – Procurement – Construction (EPC) and service contracts. With an increasing number of PPPs in the commercial infrastructure sectors such as roads and ports, a similar approach was adopted in the urban water sector. PPPs in this sector began with long term Build – Operate – Transfer (BOT) projects, where in many cases the private sector was expected to finance more than 50% of the project cost. However, due to poor commercial viability of such projects, the focus shifted to management contracts where funds were provided by the government and the private sector brought in its expertise, along with the on-going EPC and service contracts.

1.4 Water Supply Value Chain
The value chain of urban water supply is broadly composed of three segments – (i) Sourcing, treatment and transmission, (ii) Distribution and (iii) Waste Water treatment.
Public Private Partnerships in Urban Water Supply in India

Exhibit 1.5: Value Chain of Urban Water Supply

<table>
<thead>
<tr>
<th>Sourcing, Treatment &amp; Transmission</th>
<th>Distribution &amp; Operations</th>
<th>Waste Water Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sourcing of Water from Natural Resources: Surface or Ground Water</td>
<td>• Distribution &amp; Storage of Water</td>
<td>• Waste Water/ Sewage Network, Collection, Treatment, Reuse &amp; Recycle.</td>
</tr>
<tr>
<td>• Treatment of water to potable standards</td>
<td>• Operations include - Metering of the connections, collection of the user charges, customer complaints</td>
<td>• Operations include - collection of sewage charges, redressing customer complaints</td>
</tr>
<tr>
<td>• Transmission of water includes supply to the service areas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each of the steps in the value chain have seen differing levels of private sector participation as will be discussed in the next section.

1.5 Chronicle of Public Private Partnerships in Urban Water Supply

To understand the evolution of different forms of public private partnerships – both, in terms of the segments of the value chain, as well as the role played by the private sector – we map out all the 18 PPP projects that have been undertaken in the urban water sector and have witnessed some degree of progress in implementation. This excludes projects that failed or were abandoned at an early stage of the project planning phase.

PPPs in the 1990s

In the 1990s, several PPP projects were planned based on long-term concession agreements that focused on bulk water supply. All projects initiated in this period were based on BOT/ Build-Own-Operate-Transfer (BOOT) models and were primarily funded by private sources. Efforts were made to implement such projects in Pune, Bangalore and Goa. However, over a period of time, most of these projects were abandoned for various reasons such as lack of commitment from the government, commercial non-viability and objections from the local community. Of the five PPP projects planned, only one could be successfully awarded. This was the Tirupur Industrial Water Supply project in 2000 with a project cost of Rs. 1,023 crore.
The Tirupur PPP was meant to supply water to over 1000 textile units and 1.6 million households. In order to be commercially viable, a cross-subsidization scheme charging higher user charges to industries and lower charges for households was embedded in the business model. In spite of being well planned, the Tirupur PPP project faced losses owing to the complex interplay of a number of factors such as reduced demand for water from textile industries after the recession and the shutting down of several dyeing units (which consumed a lot of water) due to environmental legislation. Factors leading to the Tirupur PPP have been further elaborated in the case studies given in Appendix I.

**PPPs under the Tenth Five Year Plan**

In the early 2000s, the primary form of PPPs proposed and implemented were management contracts for the rehabilitation of existing water distribution systems and/or their operations & maintenance.
Public Private Partnerships in Urban Water Supply in India

(O&M). Another important trend observed in this period was the change in financing mechanisms from private financing to financial assistance from Central/State governments or multilateral agencies, thereby reducing the cost of PPP projects. During this period, emphasis was laid on increasing private sector participation for efficient delivery of services and introducing technological innovations, rather than for financing projects.

Several attempts were made in Maharashtra and Karnataka to initiate PPP projects in the water sector, but the first management contract awarded during the Tenth Five Year Plan was the World Bank assisted Karnataka Urban Water Sector Improvement Project (KUWASIP). The success of this project, has led to the implementation of a number of such management contracts in the country. Details of the KUWASIP case study can be found in Appendix I.

**Box 1.2: 24x7 Water Supply is Possible**

The continuity of water supply is abysmally poor in most cities. To prove that 24x7 water supply is possible in the Indian context, a pilot project, KUWASIP, was funded by World Bank covering 10% of the populations in three cities in Karnataka – Hubli Dharwad, Gulbarga and Belgaum.

The results have been impressive. Key achievements are as follows:

- 24x7 water supply in every household in the coverage area
- High water pressure
- 100% metering
- High Collection efficiency
- High Cost recovery

Further details of this case study are given in Appendix I.

**PPPs under the Eleventh Five Year Plan**

The success of PPPs in the water and sewerage sector increased during the Eleventh Five Year Plan and subsequently, a number of contracts were awarded to the private sector in the following years. PPPs during this period were adopted across the value chain of water and sewerage, including bulk water supply to both, domestic and industrial consumers, improvement of the distribution systems and Operations and Management/Maintenance (O&M) of the entire water supply system. Both, BOT and management contracts were awarded.
In keeping with the trends observed during the Tenth Five Year Plan period, financing was undertaken mainly by the government or by multilateral agencies. In the Eleventh Five Year Plan, the government estimated an expenditure of Rs. 53,666 crore and Rs. 53,168 crore respectively for urban water supply and sewerage. The main sources of funding for this sector during the Plan were the Central government (54 %) and the State government (27 %), with only 3.27 % of the investment coming from the private sector.

7Here, the urban infrastructure includes only solid waste management, water supply and sewerage and storm water drainage.
2. CURRENT STATE OF THE URBAN WATER SECTOR

2.1 Service Level Benchmarks

Until recently, while there existed plenty of anecdotal evidence regarding the poor performance of ULBs in providing urban water supply, there were no clear benchmarks set by the government against which this performance could be rigorously assessed on a regular basis. This critical necessity for any service quality improvement plan – the establishment of Service Level Benchmarks (SLBs) – was undertaken by the Ministry of Urban Development (MoUD) in 2009. SLBs on a number of performance parameters for water supply, sewerage, solid waste management and storm water drainage were developed and baseline data was collected from a sample of 28 cities, spread across 14 states and different city sizes.

As can be seen from the Exhibit 2.1, the performance of ULBs on most parameters have indeed been poor. In particular, there have been deficiencies in the continuity of water supply and the extent of metering and extent of non-revenue water, with a shortfall of more than 50% from the target on both parameters. In Exhibit 2.1, the performance of the sample cities across key service level benchmarks has been presented.
### Exhibit 2.1: Service Level Benchmarks and Average Performance of ULBs

<table>
<thead>
<tr>
<th>S/N</th>
<th>Performance Indicator</th>
<th>Service Level Benchmark</th>
<th>Current Average Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Water Supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Coverage of Water Supply Connections</td>
<td>100%</td>
<td>66.6%</td>
</tr>
<tr>
<td>2</td>
<td>Per Capita Supply of Water</td>
<td>135 litres/capita-day</td>
<td>126.4 litres/capita-day</td>
</tr>
<tr>
<td>3</td>
<td>Continuity of Water Supply</td>
<td>24 hours per day</td>
<td>3.3 hours per day</td>
</tr>
<tr>
<td>4</td>
<td>Quality of Water Supplied</td>
<td>100%</td>
<td>67.2%</td>
</tr>
<tr>
<td>5</td>
<td>Efficiency in Redressal of Customer Complaints</td>
<td>80%</td>
<td>80.4%</td>
</tr>
<tr>
<td>6</td>
<td>Extent of Metering of Water Connections</td>
<td>100%</td>
<td>49.8%</td>
</tr>
<tr>
<td>7</td>
<td>Extent of Non – Revenue Water</td>
<td>20%</td>
<td>44.1%</td>
</tr>
<tr>
<td>8</td>
<td>Cost-Recovery in Water Supply Services</td>
<td>100%</td>
<td>67.2%</td>
</tr>
<tr>
<td>9</td>
<td>Efficiency in Collection of Water Supply Related Charges</td>
<td>90%</td>
<td>78.8%</td>
</tr>
<tr>
<td></td>
<td><strong>Sewerage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Coverage of Toilets</td>
<td>100%</td>
<td>87.9%</td>
</tr>
<tr>
<td>2</td>
<td>Coverage of Sewage Network Services</td>
<td>100%</td>
<td>52.6%</td>
</tr>
<tr>
<td>3</td>
<td>Collection Efficiency of Sewage Network</td>
<td>100%</td>
<td>75.7%</td>
</tr>
<tr>
<td>4</td>
<td>Adequacy of Sewage Treatment Capacity</td>
<td>100%</td>
<td>76.5%</td>
</tr>
<tr>
<td>5</td>
<td>Quality of Sewage Treatment</td>
<td>100%</td>
<td>91.3%</td>
</tr>
<tr>
<td>6</td>
<td>Extent of Reuse and Recycling of Sewage</td>
<td>20%</td>
<td>14.8%</td>
</tr>
<tr>
<td>7</td>
<td>Extent of Cost Recovery in Sewage Management</td>
<td>100%</td>
<td>65.9%</td>
</tr>
<tr>
<td></td>
<td>Efficiency in Collection of Sewage – Related Charges</td>
<td>90%</td>
<td>76.5%</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------</td>
<td>-----</td>
<td>-------</td>
</tr>
<tr>
<td>9</td>
<td>Efficiency in redressal of complaints</td>
<td>80%</td>
<td>83.1%</td>
</tr>
</tbody>
</table>


2.2 Sources of Drinking Water

The number of urban households grew at a compounded annual growth rate (CAGR) of 3.92% between 2001 and 2011. The recently released National Sample Survey Organisation (NSSO), 2011 data on household amenities shows that in order to meet the requirement of the additional households over the last decade, the provision of drinking water via different sources increased at a CAGR of 4.2% for tap water, 1.69% for well water, 3.62% from hand pumps and tube wells and 4.9% from other sources. Even though the number of access points for tap water has exhibited a higher growth rate than the rate of growth of urban households, only 60-70% of the households in the urban areas have access to tap water. This implies that while the number of urban households has been growing at 3.9% per annum, on average the provision of drinking water grew by 3.6% per annum, resulting in a growing deficit in the provision of urban drinking water supply. The figure below shows the percentage of households with access to drinking water through different sources for the years 2001 and 2011.

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8 Other sources of water include spring water, river/canal, ponds, lakes, private tanks and bottled water.
9 Source: NSSO Data (2011) MOSPI, GOI.
Figure 2.1: Sources of Drinking Water for India’s Urban Households

Disaggregating the overall national picture into individual states, we see a wide variation in the mix of different drinking water sources across states. Refer Fig. 2.2.

A quick perusal of the urban drinking water scenario reveals the following trends:

- In 2001, in states such as Odisha, Kerala, Jharkhand, Assam, Nagaland and Bihar, less than 50% of the urban households had access to drinking water through taps. This continued to be the case ten years later, in 2011.

- The percentage of households with access to drinking water through taps in states of Uttarakhand, Uttar Pradesh, Madhya Pradesh, Bihar, Assam and Jharkhand has fallen. Instead, the percentage of households with access to drinking water through tube wells and hand pumps has increased. For example, in Bihar, in 2001, 26.4% of the households used tap water, which fell to 20% in 2011. On the contrary, the number of households drawing water from hand pumps and tube wells increased from 64.9% in 2001 to 74.7% in 2011.

- States such as Mizoram, Karnataka, Goa and Tamil Nadu have shown significant progress in the provision of urban infrastructure for drinking water. The number of households with access to tap water in these states has increased from 44.2%, 78.4%, 81% and 65.4% in 2001 to 74.4%, 80.4%, 90.2% and 80.3% respectively in 2011.
The recently released NSSO data on household amenities for 2011 further shows that only 62% and 1.7% of the urban households have access to treated tap water and covered wells respectively for drinking purposes.

2.3 NON-REVENUE WATER (NRW)

On an average, the extent of Non-Revenue Water (NRW) in India is 44.1%. This is much higher than the NRW of 15% in developed countries and the 20% that is set as the SLB for Indian cities by the MoUD. Only four of the 28 cities under study reported less than 20% NRW. Cities such as Shimla and Pimpri–Chinchwad have an NRW of 23.7% and 24.3% respectively, which is close to the SLB set but higher than the NRW of developed countries.

Non Revenue Water comprises of three components:

1. Physical Losses
These include leakages in the water supply infrastructure such as the distribution and transmission pipelines, storage reservoirs, overhead tanks and taps.

2. Commercial/Apparent Losses
These are caused due to the inefficient monitoring of the flow of water. Commercial losses include inefficient metering, data errors and theft. The physical and commercial losses together are called “Unaccounted ForWater” (UFW) losses.

3. Unbilled Authorized Consumption

The service providers usually supply free water to the beneficiaries who cannot afford to pay. The sources of water for these people are tube wells and hand pumps. The water supplied through these sources is authorised consumption but is unbilled, and hence contributes to non revenue water.

Figure 2.3: Non Revenue Water Supply in a Typical Urban City in India

The main reason for high NRW in Indian cities is the inadequate number and poor quality of pipelines for transmission and distribution and the low number of metered connections. Reduction in NRW is important to ensure the recovery of capital and O&M costs incurred in providing water supply and sewerage services. The exhibit provided below compares the extent of NRW across different types of countries and also depicts the total potential revenue that is lost due to NRW.
### Exhibit 2.2: Potential Annual Revenue Lost due to Non-Revenue Water

<table>
<thead>
<tr>
<th></th>
<th>Supplied Population (Million)</th>
<th>Water Consumption (lpcd)</th>
<th>Non Revenue Water (%)</th>
<th>Total Potential Revenue lost (USD Billions per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>744.8</td>
<td>300</td>
<td>15</td>
<td>5.30</td>
</tr>
<tr>
<td>Eurasia (CIS)</td>
<td>178</td>
<td>500</td>
<td>30</td>
<td>3.50</td>
</tr>
<tr>
<td>Developing</td>
<td>837.2</td>
<td>250</td>
<td>35</td>
<td>5.80</td>
</tr>
</tbody>
</table>

3. FUTURE POTENTIAL FOR PPPS IN URBAN WATER

3.1 Future Investment Requirements

The High-Powered Expert Committee (HPEC) estimates pertaining to the total investment requirement for water supply and sewerage for the next 20 years are Rs. 8.7 lakh crore and Rs. 4.8 lakh crore, respectively. Figure 3.1 and 3.2 show the break-up of the total investment requirements into capital expenditures and operating expenditures. For urban water supply, approximately 37% of the total investment required is for capital expenditure while the remaining 63% is required for operation and maintenance. For sewerage systems, about half the total investment is used for capital expenditure and the other half for operation and maintenance.

Figure 3.1: Investment Requirements in the Urban Water Sector (In Rs. Crores)

Source: HPEC Report, GoI (2011)

Figure 3.2: Total Investments Required for Sewage Systems

Source: HPEC Report, GoI (2011)
City-wise Investment Requirements

The above mentioned investment requirements for reforming urban water supply and sewerage utilities are further broken down into per capita investment requirements for each of the city class types. The HPEC has provided these estimates based on certain assumptions.

The assumptions that were made to estimate the investment requirements in water are:
- On an average, 80% of the distribution network pipes are to be replaced for delivering continuous water supply for all city size classes.
- For cities with population of 500000, industrial water production is assumed to account for about 20% of the total water production and demand is assumed to grow at 7% per annum.
- Storage requirement is assumed to be 45 lpcd (equivalent to one-third of the daily water demand).
- Cost of connection and metering per household is assumed to be Rs. 2500.
- For estimation of replacement cost, the service life of assets is assumed to be 30 years.

The assumptions for estimates of investment requirements in sewerage network and sewage treatment:
- Underground sewerage network for all city size classes and 100% collection and treatment of waste water.
- Sewage generated is assumed at 80% of the per capita water consumption, and 5% sewage generation is assumed for infiltration from ground water (113 lpcd).
- O&M cost treatment is up to secondary treatment.
- There is no excess treatment capacity in the existing sewerage treatment plants.
- For the estimation of replacement costs, the service life of the assets is assumed to be 30 years.

Fig. 3.3 gives the per capita investment (PCI) required for capital works for different components of the Urban Water Sector value chain for different classes of cities.

**Figure 3.3: Per Capita Investment Required for Different City Classes (In Rs.)**
Water sources for class IA, IB and IC cities, especially in southern India are located far away from the city, hence the per capita investment for sourcing of water, treatment and transmission purposes for these cities tends to be higher than that of cities in other classes. The per capita investment for distribution networks and sewerage systems in metropolitan cities is lower than that in small cities and towns due to high population density.\textsuperscript{10}

Class IA and Class IB cities (35 cities) will account for 43\% of the total urban population by 2032 and require 53\% of this total investment for water supply and sewerage systems. The remaining investment is for the rest of the 4,343 cities.\textsuperscript{11}

The map below depicts the investment requirements in Class IA and Class IB cities in India. Maharashtra requires 22\% of the total investment for its class IA and IB cities, followed by West Bengal and Delhi with 13\% and 11\%, respectively.

\textsuperscript{10}Assuming that certain cities would need to rehabilitate their existing systems, whereas the rest would have to build the complete infrastructure from a scratch.

\textsuperscript{11}The re-classification of the cities has been done on the basis of the population size in the following manner:
Class IA: > 5 million; Class IB: 1 – 5 million; Class IC: 100000 – 1 million; Class II: 50000 – 100000; Class III: 20000 – 50000; Class IV+: < 20000
3.2 Sources of Financing

The total expenditure on urban infrastructure, covering all the sectors namely, water supply and sewerage system, solid waste management, roads and transportation, storm water drains and street lighting, as a percentage of GDP, is estimated to increase from 1.59% in 2011 to 2.16% in 2032. The figure below gives the different sources of financing this expenditure as a percentage of GDP.
A large amount of this expenditure needs to be financed through the urban local bodies’ own revenue sources that include exclusive taxes (property taxes, entertainment and advertisement taxes), shared taxes and revenue generated from its operations. Currently, this forms about 0.5% of the GDP, but needs to increase to 1.47% of the GDP by 2032.

According to the HPEC Report, the on-going JnNURM scheme needs to be further extended for another twenty years and funds from this scheme should rise from 0.1% of the GDP in 2011 to 0.25% of GDP by 2032.

The rest of the expenditure should be financed through non-tax revenue (in the form of user charges) and the deficit would require new financing options such as support from external agencies, institutional financing and PPPs with private sector financing.
4. STRATEGIC FRAMEWORK FOR SUCCESSFUL PPPS IN URBAN WATER SECTOR

PPPs in social infrastructure sectors such as water supply, sewerage, solid waste management, health and education have been practiced in India since the 1990s. Different methods/models were adopted and the country has witnessed few successful models and a number of unsuccessful ones. Unlike PPPs in the commercial infrastructure sectors, it has been very difficult to upscale PPPs in the social infrastructure sectors. The lack of sufficient understanding regarding people’s affordability and willingness to pay coupled by the general perception that it is the government’s responsibility to provide public amenities like water supply and waste management free of cost has made the service less amenable for private sector participation. Thus the replication of PPP models and processes that worked in the commercial infrastructure sectors like Roads and power, in the delivery of urban water supply led to their failure.

Further unlike the commercial sectors, the government did not initially provide viability gap funding to private concessionaires and instead funding was provided through schemes such as the Augmented Urban Water Supply Scheme (AUWSS), which were limited in nature. In this section, we present a framework for successful PPP implementation and highlight areas that need special focus due to the critical nature of the water supply and sewerage system. Exhibit 4.1 shows the role that needs to be performed by each stake holder involved in a PPP, the sharing of risks and the flow of funds between them. The government must make a strategic plan and identify various implementation modes (either via traditional public procurement or private sector participation) for the reforms in urban water supply and sewerage sector. As for private sector participation, a mature rationale for its suitability is necessary. The role of consultants in assisting the government for setting optimal tariff structures, avoiding undue monopoly profits to the private operator and thereby designing a sustainable financial model that allows social inclusion and environmental safeguards should be considered. Each of these factors is elaborated in this section by covering the issues and lessons from various practices in urban water supply and sewerage sector.
Exhibit 4.1: Strategic Framework for Successful PPP Implementation

Source: “Public Private Partnerships: Lessons from Experiences”, Athena Infonomics, April 2012

4.1 ROLE OF PUBLIC SECTOR

Rationale & Planning

Given the critical nature of the service – drinking water supply and sewerage systems – where the cost of delays and project failure are extremely high, it is important to evaluate the suitability of the PPP model before implementing the project. This should be done by identifying the objectives of the project and by comparing it with other ways of providing the service e.g., public procurement. In other words, the ‘value for money’ indicator for a PPP project must be measured and established.

One needs to examine the rationale for having a PPP along with an assessment of the execution capability of the private sector and the monitoring capacity of the public agency. Experiences of PPP projects in the water sector show that the reason for opting to provide water utilities under a PPP mode was initially inadequate government funds, capacity and capability to execute such projects. Examples include projects such as the Tirupur Water Supply, Krishna Bulk Raw Water Supply, Cauvery Water Supply and Water Supply in Pune, although not all of these projects were actually implemented. The government realised that to meet the requirements of the citizens, the water supply system needs to be improved. However, the municipal corporations had neither the financial capacity (due to poor management of the services accompanied by a lack of application of tariffs) nor the operational efficiency (output in terms of their staffing levels and technical expertise) to provide these services. Hence PPPs were selected to meet these financial and efficiency constraints.
Commitment

Strong political commitment towards the project is essential to avoid any delay in the approval of the project, release of central or state funds, land acquisition and providing clearances to the private sector. Furthermore, the role of the government, which varies from one type of PPP model to another, should be clearly identified and executed. The bid process should be transparent and appropriately structured so as to ensure the selection of the most competent private player.

Procedural Frameworks

The government is responsible for providing procedural frameworks related to the PPPs in this sector. These include providing toolkits, procedures for bidding and awarding contracts, modelling concession agreements (MCA), methods for monitoring and evaluating the projects. These frameworks for the urban water sector are still under formulation with support from multilateral agencies. They are an important component of PPP projects since they act as guiding tools and build more confidence among the stakeholders while executing the projects.

Regulatory Authority

Pricing of water remains a sensitive and contentious issue. However, usage of water over and above a minimum quantity essential for human sustenance should be treated as a scarce economic good and priced appropriately to ensure its conservation and proper management. Such an approach can be pursued by establishing a water tariff regulating authority at the state level.

Nodal Agencies

Although there is a national level PPP nodal agency, not all states have their respective state PPP cells. Five states have their PPP cells. These include, Andhra Pradesh, Haryana, Maharashtra, Karnataka and Rajasthan. Some of the states have their own infrastructure board, such as Andhra Pradesh, Gujarat, Haryana, Maharashtra, Karnataka and Rajasthan. Only 16 states, including Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Maharashtra, Madhya Pradesh, Goa, Punjab, Karnataka, Rajasthan, Tamil Nadu, Uttarakhand and Uttar Pradesh have their respective State PPP Policy. Of these, Gujarat is the only state which has a sector wise empanelment of consultants. The establishment of a state PPP cell is necessary specifically for sectors such as water, which is a state subject. The state PPP cell should take the responsibility of identifying the priority areas in the sector, conceptualise projects, undertake feasibility and technical studies and implement, regulate and monitor the projects.
4.2 Role of Private Sector

Private Developers and Contractors

It is important to build a highly competitive environment that facilitates the selection of the right private player with the best technical and financial expertise to execute projects without time or cost overruns. The emphasis should be on the efficiency and quality of the service provided with a strong social commitment that allows inclusivity. It must be ensured that the profit-making incentive does not lead to a monopoly over the asset by the private player. The developer should be capable of bringing new innovations and technology for effective service delivery which may not be brought in if the project is undertaken through public procurement. It is also necessary that the rehabilitation and resettlement of the local community affected due to the development of an infrastructure project be undertaken along with the government.

Consultants

Technical consultants assist the government in carrying out feasibility studies and estimating the socio-economic costs and benefits of projects and most importantly, in contract structuring. The consultants are required to align the incentives of all stakeholders involved and factor in social inclusion and environmental sustainability in the project plans. They must guide the government/private sector and therefore improve the latter’s capability to successfully implement a PPP project.

Past experiences of PPP projects in the urban water sector indicate rigid contract structuring. However, there are a few projects in which flexible components were incorporated in the contracts to restructure certain parameters. For example, the Tirupur Water Supply Project was designed in a manner that allowed for financial restructuring i.e., conversion of debt into equity. Incorporating such flexibility in the contract structures and lenders’ agreements may help to reduce the chances of project termination, thereby reducing re-bidding costs, allowing uninterrupted services to customers and enhancing the long-term sustainability of the models.

4.3 Community Participation

Engagement of the community in the provision of essential services like water has been considered a critical element to ensure the availability of these services to different sections of society, and to efficiently cater to their needs and grievances. Different forms of community involvement have been considered at various stages of the water and sewerage value chain, namely to provide financial support, manage the utilities, or monitor operations. We describe three aspects of community participation that can enhance the efficiency of a project.

Transparency

The public or private partner responsible for asset creation and provision of water supply and sewerage facility must engage the local community in the decision making process. Public communication and
consultation allows for an exchange of dialogue between the representatives of the community and the utility provider. Such an interaction also allows the public to share their views on a project or a programme that is to be implemented. As for the service providing agency, it allows them to share the details of the project so as to avoid any problems during the implementation phase. In brief, it allows transparent, mutual negotiation of the project outcomes, helps overcome information asymmetries and creates awareness among the stake holders.

Accountability

Greater community participation can improve the accountability of the public and private sector officials responsible for delivering water supply and sewerage services. For example, the Byrraju Foundation implements its ‘Sujala’ water treatment plants in various parts of Andhra Pradesh. The stake holder model of the project that showcases the active role played by the village community is presented below. The most important aspect of the project is the formation of Gram Vikas Samity — a small member team of the village community that is involved in monitoring the project. The management of the project by the community facilitates immediate redressal of grievances or any problems in service delivery.

Exhibit 4.2: Stakeholder Map of Byrraju Foundation Model of Drinking Water Supply

Source: Athena Research
Participation in Project Execution

Community participation in project execution may range from the identification of the need for service delivery to the actual operations and maintenance of the service delivery by the community. In the case of basic services, such as health, education and water supply, participation of the community may increase the efficiency of service delivery as the community’s needs and recurrent grievances are recognised. Box 4.1 gives an example where the private developer consults the village community (Village Panchayat) before setting up its water treatment centre (Water Health Centre) and also encourages them to participate in the execution of the entire water supply system.\footnote{Village Panchayats refer to a system of governance prevalent in rural India since ancient times. The 73\textsuperscript{rd} Constitutional Amendment Act, 1992 conferred constitutional status to Panchayats. It is the third tier of government below the state government.}
Box 4.1: Water Health Centers

Water Health International, founded in 1996 in USA supplies safe (meeting WHO and ISO15550 standards) and affordable drinking water to the under-served community via a decentralized innovative business model. It began its operations in India in 2005 through its subsidiary named Water Health India Pvt. Ltd. Since then it has established 175 Water Health Centers (WHCs) across different villages of Andhra Pradesh and is currently setting up its WHCs in states such as Gujarat, Karnataka, Maharashtra, Tamil Nadu and parts of North-Eastern India.

The WHCs are developed on a Public-Private-Community Partnership (PPCP) basis: usually a Memorandum of Understanding (MoU) is signed by the Village Panchayat (VP) and the company. The selection of the villages is based on parameters such as location, existing infrastructure, availability of natural resources, size of the population and village income levels. The VP is responsible for providing the company with the land, power and water sources for setting up the plant. All the support is usually provided free of cost by the VP while in some cases the concessionaire pays for the power charges. The plant, with a capacity for treating 21,000 liters per day, is built in approximately 22-40 days, once the company gets the VP’s approval. The quality of the water at each water health centre is tested every month over twenty parameters in the laboratories of the organization. The organization works with Non – Government Organisations (NGOs) that use various techniques of social marketing to capture the market and convinces the villagers about the quality of water supplied to them.

Initially, user fees were levied based on income categories. However, due to difficulties in managing price discrimination, this was changed to a system of standard fees for the entire population of a village. However, the user fees vary across different villages and districts. The variation depends on the technology and the degree of contamination of the water. This is a PPCP Project on a BOT basis, usually with a concession period of 10 to 15 years. The private developer trains and hires members of the village community to operate the WHCs and to sell the water to various houses that are situated in remote areas.

4.4 Risk Allocation

It is important to ensure that the risks associated with the PPP are properly defined and appropriately allocated among the stakeholders. Measures to mitigate risk must also be provided. Risks are critical to PPP projects as they indicate the probability of occurrence of events that may cause changes in the socio-economic, political and natural environment faced by projects. Allocation of risks is important to increase efficiency, reduce project related costs and achieve improved value for money. The risks should be allocated to those stakeholders who are best suited to handle them. In case the party, to whom the risk was allocated, fails to handle it, the other stakeholders involved in the project may make

Source: Athena Research

attempts to mitigate those risks in a manner that the community is not affected due to interrupted services.

4.5 **Financial Sustainability**

**Financing Capital Expenditure**

Most successful PPP projects in the urban water sector have had more than 50% of their capital expenditure financed by the government or by multilateral agencies. Evidence from past experiences suggests that the economic viability of the project would suffer if the private sector were to finance the capital expenditure of the project. This is because building the infrastructure for supplying water is capital-intensive and recovering this cost from user charges would make water supply services unaffordable to the poor.

Examples of successful PPP models show that public financing boosts the confidence of the private sector to enter into PPP projects in the urban water sector. Government funding through schemes under the JnNURM along with reasonable tariff structures creates a win-win situation for the project stakeholders. The Karnataka Urban Water Supply Improvement Project (KUWASIP) was funded jointly by the World Bank and the Government. Its success led to a similar financing pattern being followed by other projects, namely the water supply in Latur, Khandwa and Mysore. Details of the project are provided in the case studies in the Appendix.

**Financing Operations & Maintenance Expenditure**

Given that the capital expenditure of the PPP projects in the urban water sector will be largely funded by the government or by multilateral agencies, the viability of the project depends on its ability to recover its operations and maintenance costs. Broadly, there are two ways in which the O&M costs can be recovered.

**A. Revenue through User Charges**

The private operator/implementing government agency levies water tariffs on the users. The revenue generated from the collection of tariffs will be used to recover the O&M costs. The revenue can be shared with the private operator in either of the two forms discussed below:

First, in a BOT (Toll) project, the revenue risk can be borne by the private sector partner and the private partner collects user charges during the concession period after which the ULB takes over the user charges collection function. Such a mechanism is under operation in the Tirupur Water Supply Project.

Secondly, in a BOT (Annuity) project, the private operator can be made responsible for collection of user charges but only receives a certain predetermined percentage of the revenue collected based on its collection efficiency. Khandwa Municipal Water Supply project is an example of such a revenue model.
B. Revenue through Performance Based Payments

The performance based method of compensating the private partner may or may not involve levy of user charges. Here, the revenue to the private operator for executing water supply and/or the sewerage system is based on its performance in meeting the set service standards. The payment is made by utilizing grants available under government schemes or from multilateral agencies. Hence, the revenue risk of the private player is linked to its performance. Such a mechanism ensures enhanced performance by the private sector partner and discourages monopoly profits and provides quality services to the customers. The Karnataka Urban Water and Sanitation Improvement Project is an example of this type of a revenue model.

Box 4.2: Pricing of Water

Pricing of water is an extremely contentious issue in the Indian context. The opposition is primarily ideological in nature and fails to appreciate the reality of water scarcity across the world and the impending need to conserve and manage this scarce resource. Pricing of water and/or private sector participation in its delivery are seen as tantamount to privatisation of water per se.

Yet, a pricing structure that allows everyone 24*7 access to an acceptable minimum quantity of water for basic sustenance, and that charges users consuming above the set minimum level so as to recover at least the O&M costs of providing the water supply services can be an important step towards conserving water as well as providing quality service.

Water tariff systems such as flat tariffs or tariffs as a percentage of property taxes do not incentivise users to regulate their water consumption. Tariff structures such as volumetric tariffs or differentiated tariffs based on income levels of the consumers are more socially acceptable and environmentally conscious. Volumetric or differentiated tariff structures take account of both, social inclusion and affordability issues, and ensure that a minimum quantity of water is within the reach of all classes of people, irrespective of the ability and willingness to pay.

The cost of administering different types of water tariff varies from category to category. For example, a flat water tariff is easier to collect and govern than a volumetric tariff which requires an efficient meter system.
5. CONCLUSION

Much work needs to be done to revamp the crumbling urban infrastructure in the country and provide universal access to basic services such as water and sanitation. PPPs in the urban water sector, if undertaken in a well-planned manner, and for the right reasons, is one viable approach for solving some of the chronic problems faced by the sector. This report highlights some of the necessary steps that must be undertaken for a successful PPP.

PPPs, as has been emphasized in this report, are not appropriate for every situation and should not be implemented indiscriminately. In many cases, it may be more appropriate to undertake public works through EPC contracts. Selection of the appropriate model of private sector participation – either through EPC and management contracts or through BOT Toll/Annuity models – is an important step in the project identification phase, but one that often does not receive the necessary attention. A detailed process of arriving at the appropriate model of private sector participation that includes exhaustive assessment of existing physical infrastructure, current performance on service delivery benchmarks, and the technical, operational and financial capability of the ULBs, needs to be developed.

The selection of the appropriate private sector participation model maximizes the potential performance of the developed system. Realizing this potential, however, requires a strong focus on execution from all the stakeholders. It is particularly important to undertake intensive capacity building of urban local bodies and implement reforms that make them accountable and responsible for achieving service level benchmarks in water supply and sewerage.

A programmatic approach that integrates planning for urban water supply and sewerage at the state level, which is further broken into targets and objectives for cities that are stratified according to their size, is the overarching approach of implementing change. Full achievement of the service level benchmarks should occur in a phased manner, where intermediate targets are set, based on a number of parameters, such as the state of existing physical infrastructure, the technical and operational capacity of the ULBs and the private sector, availability of finance, etc.

The next phases of our research will develop an approach to identify the appropriate private sector participation model and develop guidelines for phase-wise implementation for PPPs at the urban local body level.
APPENDIX I | CASE STUDIES

1. THE TIRUPUR WATER SUPPLY PROJECT

Background

Tirupur, a town in Tamil Nadu is at the centre of India’s cotton knitwear industries with the textile units contributing to nearly 90% of the country’s exports. Water is an intensively used raw material in this industry. It was in the early 1990s that the industrial units in Tirupur started facing water shortages. The industrial units in Tirupur had no access to piped water due to the lack of infrastructural facilities. Moreover, the other sources of water, such as ground water and surface water, were heavily polluted due to discharge of toxic effluents without treatment into the River Noyyal by the dying and bleaching units which operate in the area. This rendered the ground water unfit for use. Lack of access to water was slowing down the growth of the industries and increasing the cost of production as the industries had to rely largely on private water tankers who charged a high price for water supply.

In order to protect the industries from making losses, the Tirupur Exports Association (TEA), a body which constituted primarily of knitwear exporters, approached the Government of Tamil Nadu (GoTN) to make provision for the supply of industrial water to the textile industrial clusters. Heeding to the request of TEA, the GoTN in 1993–94, mandated the Tamil Nadu Corporation of Infrastructure Development (TACID) to design and develop the Tirupur Area Development Project (TADP) with the objective of developing the water supply and sewerage system for extracting water to meet the industrial demands. TACID approached IL&FS to assist in the implementation of the project. The project cost estimated by IL&FS was Rs. 500 crore. However, the government did not have adequate financial resources to implement such a large project. Hence, it was decided to implement the project on a PPP basis, making this the first PPP project in India in the water sector.

In August 1994, the GoTN signed a MoU with the TEA and IL&FS to form a public limited company called the New Tirupur Area Development Company Limited (NTADCL). However there was an initial

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15 The total project cost of $100 million has been converted into Indian rupee terms with the following exchange rate – one USD = `50.
lag of five years in the implementation of the project due to a change in the government. Political instability and frequent change in the government is a potential threat to such large-scale projects. The project was further delayed as NTADCL only achieved financial closure in 2000 with a debt-equity ratio of 1.5:1. Meanwhile, the textile industrialists had to meet their industrial water requirements by buying water from farmers of the villages in the district.

A concession agreement was signed between the GoTN, Tirupur Municipality (Contracting Authority) and NTADCL (Concessionaire) with a project cost of Rs. 1,023 crore, to be developed on a BOOT basis with a concession period of 30 years. The construction for the project finally started in 2002 and the operations began in 2005. A brief timeline of the project is given on the next page:

**Exhibit 1a: Timeline of the Tirupur Water Supply Project**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TACID approached IL&amp;FS for assistance</td>
<td>MoU was signed between GoI, GoTN, TEA and IL&amp;FS</td>
<td>Concession Agreement signed between GoTN, TMC and NTADCL</td>
<td>NTADCL was incorporated as a public limited company</td>
<td>Construction started</td>
<td>Operations began</td>
</tr>
</tbody>
</table>

**Structure of the Project:**

A. **Stakeholder Model**

The key stakeholders in the project were IL&FS (the private entity), NTADCL, Tamil Nadu Water Infrastructure Company (TWIC) and TEA. The exhibit below depicts the stakeholder model which identifies the role of each stakeholder and the transfer of resources from one entity to another.
The role of IL&FS was primarily to provide transactions and financial advisory and undertake the documentation for the same. It was also responsible for the management and execution of the project.

NTADCL, a Special Purpose Vehicle (SPV) established by TWIC, was made responsible for the development and implementation of the project. Unlike the traditional SPVs which consisted only of private organizations, this SPV was a joint shareholding between the public and the private sector. The first task of the SPV was to make the project commercially viable and to achieve this objective, a tariff structure was established which allowed for the collection of user charge by the concessionaire from the beneficiaries.

Contractors for the project were selected through a pre-qualification process and submission of technical and financial bids. Around 40 Indian and International contractors had participated. The Construction and Operations and Management contracts were signed in 2002.

B. Financial Structure

NTADCL was responsible for raising finances for the project. However, it had encountered various barriers in the process. The primary issue facing the project was the reluctance on the part of the financial institutions to provide credit for the project. Concerns were expressed as there was no

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16Please refer to the revenue model discussed later.
precedent for PPP in the water sector and this was the first project of its kind in India. Also, there was less clarity regarding the relevant risks shared by the different stakeholder.

The project achieved financial closure in 2000. The various sources of financing have been given in the table below.

**Exhibit 1c: Sources of Financing**

<table>
<thead>
<tr>
<th>Sources of Financing</th>
<th>Amount (INR Crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>322.7</td>
</tr>
<tr>
<td>Tamil Nadu Water Investment Company (TWIC)</td>
<td></td>
</tr>
<tr>
<td>a. IL&amp;FS</td>
<td>57</td>
</tr>
<tr>
<td>b. GoTN</td>
<td>48</td>
</tr>
<tr>
<td>c. TEA</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td>217.7</td>
</tr>
<tr>
<td>Debt</td>
<td>613.8</td>
</tr>
<tr>
<td>IDBI</td>
<td></td>
</tr>
<tr>
<td>Subordinate Debt</td>
<td>86.5</td>
</tr>
<tr>
<td>Total</td>
<td>1023</td>
</tr>
</tbody>
</table>


**C. Revenue Structure**

The water supply plant had a total capacity of 185 Million Litres per Day (MLD), of which 125 MLD was to be supplied to the textile industries, 25 MLD to Tirupur residents and 35 MLD to the nearby villages. The prices for the same were fixed at Rs. 45, Rs. 5 and Rs. 3 per kiloliter respectively, which allowed for a cross-subsidization mechanism. The industries were charged a price which was decided by the Price Review Committee constituted under the project. The prices for domestic users and other users were based on recommendations made by the Tamil Nadu Water & Drainage Board. The concession agreement also had provisions for price escalations that covered annual inflation.

**D. Alternative Revenue Loss Mitigation Measures**

Certain innovative measures were mentioned in the concession agreement to mitigate risks. These were as follows:

**Water Shortage Period Fund (WSPF)**

This fund covered an amount of Rs. 75 crore that was meant to mitigate the risk of the concessionaire during water shortages arising from the reduced flow of water or degradation of water quality. This would allow the concessionaire to continue generating revenues irrespective of the quantity and quality of water drawn from the river.
Debt Service Reserve Fund (DSRF)

A fund of Rs. 50 crore was created to ensure timely debt servicing during its operations.

Status of the Project since Inception

It was only in 2005 that NTADCL was able to provide continuous supply of water to all consumers, both domestic and industrial. However, the project faced a series of unexpected events which negatively affected the profitability and commercial viability of the project. One of the main setbacks to the project was the decline in the industrial demand for water. There were several reasons for this. Firstly, the global recession led to a fall in the demand for Indian textile exports. Secondly, new technologies in the textile industry reduced the water intensity of production. Thirdly, Tirupur had adequate rainfall, which allowed the industrialists to extract ground water at a cheaper cost. Moreover, the mitigation efforts were insufficient to make up for the revenue loss with the DSRF getting completely exhausted in the period.

The low industrial demand was accelerated due the court order in January 2011 which resulted in the closing of several industrial units for causing pollution by discharging used water into the nearby rivers without any treatment. The Pollution Control Board has since then taken strict measures and only allows units that will comply with the policy of ‘zero liquid discharge’ into the rivers to commence operations. Majority of the units, as a consequence, have outsourced their dying operations.

Lessons

Delays in project due to change in government

This project was proposed by the existing government in 1993. However, an election and change in the government in 1996 resulted in poor political will for implementing the project. This delayed the project by a period of four years until financial closure was achieved in 2000. Thus sustenance of political will for implementation of such long term projects is central to the successful implementation of PPPs.

Projections of demand for water were not changed

The initial water demand projections were made in 1994 by the textile industries without engaging any consultant. By the time the NTADCL developed the project and started operations, the economic environment of the industry had changed. There should have been an inbuilt mechanism which would allow for re-forecasting of demand to capture such changes.

Lack of support from the industrial units

The project was developed specifically to cater to the demands of industrial units. However, during its operational phase, the town received adequate rainfall, which allowed the industrial units to extract more ground water instead of buying water from the project. Also, increased pollution of the rivers by the industry hindered the operation of the project and increased the revenue losses.
Provision of special rights to the foreign investor

One of the foreign equity investors had a share of 27.05%, which was the largest amongst the investments made, following TWIC. The investor was given special rights that made it necessary to seek prior approval in order to restructure the financial model. The investor disagreed with a number of amendments suggested.

Immediate measures taken

To reduce the revenue risk associated with the private developer and to ensure smooth flow of funds, TWIC (financier) approached the Supreme Court with an immediate request to allow 10% of the textile units to operate. TWIC had taken on the responsibility of ensuring that these units complied with the Tamil Nadu Pollution Control Board directive of zero effluent discharge. This allowed NTADCL to breakeven.

Measures currently under Consideration

Restructuring of the Revenue Model

The capacity of the water supply plant at present is 250 MLD, which can be upgraded to cover additional users through a minor investment of Rs. Rs. 50 crore. NTADCL is considering exploiting this additional capacity to supply a minimum of 100 MLD to the TMC. However, this will take another 3-4 years as the TMC needs to build the necessary infrastructure for storage facilities and distribution systems, including a number of overhead tanks. Water will be supplied to the residents of the village at the weighted average tariff (approximately Rs. Rs. 25-27 per kiloliter) as against Rs. Rs. 3 per kiloliter proposed in the initial revenue model. An additional 85 MLD will be supplied to industrial units and other commercial centers beyond Tirupur.

Corporate Debt Restructure Package:

Under this measure, the conversion of some portions of the debt into equity is being considered. The banks would convert 15% of the debt to equity. The government is planning to give interim debt and extra equity, which will be used by the NTADCL to repay a portion of the debt and for operations and maintenance. IL&FS may also convert its subordinate debt into equity.

2. The Karnataka Urban Water Supply Improvement Project

Background

The Urban Drinking Water and Sanitation Policy, 2002 of the Government of Karnataka (GoK) articulated the need for augmenting the bulk water supply, initiating reforms in distribution networks, volumetric pricing and gradual private sector participation in the delivery of water supply in the state. Until 2003, the Karnataka Urban Water Supply and Drainage Board (KUWSDB) was responsible for
sourcing bulk water and supplying it to the distribution points in the cities. The distribution of water to the urban households was operated and managed by the respective ULBs. Over the years, the ULBs have performed poorly due to the lack of funding to maintain the distribution network and to ensure continuous water supply.

In order to implement the policy and to test the possibility of 24*7 continuous water supply, the GoK launched the Karnataka Urban Water Supply Improvement Project (KUWASIP) in 2005 with assistance from the International Bank for Reconstruction and Development (IBRD), a component of the World Bank. The two bodies collaborated to jointly finance the project and leverage the expertise of the World Bank in project delivery and social intermediation to meet the project objectives.

**Structure**

The project consists of two components:

i) Rehabilitation of the distribution network in the demonstration zones of the selected cities and operations of the same: This was to be done on a PPP basis (performance based management contract)

ii) Priority Investments (PI) for enhancing bulk system capacities and increasing their efficiency by reducing transmission losses: This was to be done on an EPC basis with the nodal agency being KWSDB.

The total project cost was Rs. 237 crore, funded by the World Bank and the Government of Karnataka. A detailed structure of the allocation of investments is given in Exhibit 2a below.

**Exhibit 2a: Financial Structure of KUWASIP**

<table>
<thead>
<tr>
<th>Sources of Funds</th>
<th>Amount (Rs. Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Bank for Reconstruction and Development</td>
<td>182</td>
</tr>
<tr>
<td>Government of Karnataka</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>237</td>
</tr>
</tbody>
</table>

**Use of Funds**

<table>
<thead>
<tr>
<th>Physical Investments</th>
<th>Amount (Rs. Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Rehabilitation for Distribution Network in Demonstration Zones</td>
<td></td>
</tr>
<tr>
<td>1.1 Phase II</td>
<td>42</td>
</tr>
<tr>
<td>1.2 Phase III</td>
<td>22.6</td>
</tr>
<tr>
<td>2) Priority Investments</td>
<td>154.5</td>
</tr>
<tr>
<td>Project Implementation Support</td>
<td>8.15</td>
</tr>
<tr>
<td>Total</td>
<td>237</td>
</tr>
</tbody>
</table>
This case study will focus on the first component of the project, which was implemented on a PPP mode.

**Operations and Maintenance of the Distribution Network**

A technical consultant was appointed to undertake a feasibility study to identify the cities, their respective demonstration zones and estimate the project cost. The three cities that were identified were Belgaum, Gulbarga and Hubli-Dharwad. A certain number of wards from each of these cities were selected as demonstration zones, such that 2.2 lakh people (approximately 10% of the population from each city) were covered.

The concession agreement was signed in 2005 between a private developer and five government bodies: three ULBs, Karnataka Urban Water Supply and Drainage Board (KUWSDB) and Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC). The project was to be developed in three phases for a period of three years and six months. The role of the private developer in each of these phases is shown in Exhibit 2b below.
In the first phase, an assessment of the existing network of pipelines was undertaken. Several technical challenges were faced by the private developer in identifying the leakages as a detailed underground network map was unavailable. Further, it was discovered that the pipes could not withstand high pressure and were also placed at shallow depths which could result in damage to the pipes due to vehicular traffic. Thus, a complete replacement of the distribution network was proposed. The amount of investment proposed by the concessionaire was Rs. 26 crore, which was much lower than what was estimated by the technical consultants (Rs. 42 crore) which was subsequently approved by the government.
In the second phase, the private developer appointed three sub-contractors who would be responsible for each component of the O&M operations: pipeline renewal, installation of meters and consumer connections, and issuance of bills and collection of tariffs. Even though this phase was to be completed in 58 weeks, it got deferred by another 16 weeks due to a delay in the approval of the sub-contractors by the nodal agencies.

A technical auditor was appointed by the government to assess the key performance indicators to be met by the private developer. This task was undertaken during the last six weeks of phase 2. The indicators proposed by the auditor included:

- 24*7 continuous water supply to 90% of the demonstration zone.
- 90% metering coverage and issuance of bills
- Reduction in water losses to 30 liters/connection/day/meter pressure
- 90% of the customer services stations to be operational

The private developer completed this phase successfully and started with phase three (operations of the distribution network) in April 2008.

**Stakeholder Model**

Throughout the project period, the ownership of the assets was with the ULBs. The responsibility of operations and management was to be transferred to the ULB at the end of the concession period. The private developer was not entrusted with the responsibility for tariff setting. KUIDFC was responsible for monitoring the developer and coordinating between various stakeholders. A detailed stakeholder model for the project is given below.
A certain amount of remuneration was provided to the private developer to carry out the functions in each of the phases. In order to incentivize the private developer to avoid cost overruns and time delays, be efficient in use of capital and resources and meet the key performance indicators, the scope of the project provided bonuses based on the specific requirements that were met. The details of the remuneration and the bonuses are given in Exhibit 2d below.

### Exhibit 2d: Remunerations and Bonuses Allocated to the Private Developer

#### Remuneration

<table>
<thead>
<tr>
<th>Remuneration Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed remuneration</strong></td>
<td>60% of the total remuneration which is paid in quarterly installments throughout the project period</td>
</tr>
<tr>
<td><strong>Performance remuneration</strong></td>
<td>40% of the total remuneration which is paid in quarterly installments during the operations and management phase, only if the key performance indicators are met</td>
</tr>
<tr>
<td><strong>Retention money</strong></td>
<td>10% of the total remuneration which is paid on successful completion of the project</td>
</tr>
</tbody>
</table>
Bonuses

<table>
<thead>
<tr>
<th>Capital efficiency during rehabilitation phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>For savings ≤ 25% of the total capital expenditure, bonus equals 3.75% of the total remuneration</td>
</tr>
<tr>
<td>For savings &gt; 25% of the total capital expenditure, bonus equals 10% of the total remuneration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capital efficiency during O&amp;M phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>For savings ≤ 25% of the total O&amp;M expenditure, bonus equals 15% of the total remuneration</td>
</tr>
<tr>
<td>For savings &gt; 25% of the total O&amp;M expenditure, bonus equals 40% of the total remuneration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance efficiency during O&amp;M phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>For reduction in real losses between 15 &amp; 20%, bonus equals 20% of the total remuneration</td>
</tr>
<tr>
<td>For reduction in real losses &gt; 20%, bonus equals 30% of the total remuneration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent increase in billed volume to the base volume of bulk water supplies is</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%, bonus equals 12% of the total remuneration</td>
</tr>
<tr>
<td>&gt; 25%, bonus equals 30% of the total remuneration</td>
</tr>
</tbody>
</table>


The private developer utilized less than 25% of the funds allocated for the capital and operations expenditure thereby earning a capital efficiency bonus of 3.75% and 15% of the total remuneration. In addition, it also met all the performance targets that were set by the implementing agencies and the technical consultant, thereby earning a performance efficiency bonus as well.

Key Lessons

Pre-project assessment should be carried out by the implementing agencies

The private developer faced difficulties while designing the detailed project report, as the quality of information available about the distribution network was poor. All the three ULBs and KWSDB did not have any records of the underground pipeline system and the number of connections. These studies should be carried out by the implementing agencies before the project is awarded as it brings more clarity in the scope of the project.

Co-operation by the Government

There should be sustained co-operation amongst the various levels of government and also with the private developer. This can shorten several delays in the project. Some of the delays faced by the developers in the project include getting approval from the implementing agencies for the selected sub-contractors, non-availability of bulk water from the KWSDB to the distribution points during the
demonstration phase and delay in release of payments to the private developer by the implementing agencies.

**Formation of Social Intermediation and Communications Strategy Cell (SICS)**

The SICS was formed under the KUIDFC comprising the representatives from each of the government bodies and NGOs. A budget of Rs. 2 crore was allocated for the activities to be undertaken by them. These included customer surveys to assess the need for continuous water supply and the willingness to pay volumetric tariffs, and raising awareness about water usage and hygiene factors.

**Approach of a phased project**

A major factor contributing to the success of the project was the approach adopted for its implementation. It allowed for the flow of funds in installments, specifically focusing on the performance of the developer. The approach called for phased implementation of the project in a selected demonstration zone which helped to reduce the risk burden on the private developer. Phased implementation also allowed for formulation of realistic expectations regarding the performance, cost and delivery. Additionally, it helped to prove to all the stakeholders that continuous water supply with the collection of volumetric tariffs was possible.

**Implementation of pro-poor policy**

The project took the needs and constraints of the urban poor into account. The urban poor were identified as those residing in houses with less than 600 square feet of built-up area. These people were given a waiver of initial deposit for getting a connection and were charged concessional rates for a lifelong supply of 8,000 liters per household per month. Also, some water was supplied free of charge through public kiosks, cisterns and bore wells fitted into hand pumps for the most vulnerable sections of the society.

**Current Status**

After completing the project in 2010, the operations and maintenance of the water distribution system in the demonstration zones of the selected cities of Karnataka was re-tendered. The financial bid parameter was decided based on the cost charged by the private developer for operating the water distribution system. This cost was, once again, divided into a fixed component and a variable component based on the performance of the developer. The project was awarded to the same private developer who had earlier implemented the project. Currently, the government is structuring the project for expanding the rehabilitation of the water network system in other cities.
The Khandwa Municipal Corporation (KMC) had estimated the city’s population to be 2,25,373 in 2004. The water required to meet the demand of the population was estimated to be 29 million liters per day (MLD) based on the standard assumption of providing each individual with 135 liters per day, as formulated by CPHEEO. However, the KMC had the capacity to supply only 17.20 MLD from its three main sources of water namely, Bhagwant Sagar Reservoir (Sukta Dam), Nagchun Dam and groundwater, with each of them contributing 10.5 MLD, 1.2 MLD and 5.4 MLD, respectively. Around 60% of the water supplied to the towns was drawn from the Sukta Dam. Despite the KMC’s claim that 80% of the town had access to water supply, it was discovered that large residential colonies comprising of 15 wards did not have piped water supply and were dependent largely on private water tankers to meet their needs. Since 2004, various efforts have been undertaken by the KMC to meet the deficit of 11.8 MLD of water.

First, the KMC tried to increase the quantity of water drawn from the Sukta Dam. This required replacing the open drain with a pipeline from the reservoir to the treatment plant and an additional installation of a 28-inch pipeline from the treatment plant to the augmentation centre. Housing and Urban Development Corporation (HUDCO) was approached for credit and were willing to provide a
loan of Rs. 13 crore. However, the Government of Madhya Pradesh (GoMP) refused to provide a counter-guarantee and hence the project was abandoned.

A second effort was made in 2006 to draw more water from the main canal of the Indira Sagar Dam and use Nagchun tank as the reservoir for distribution. The cost estimated for this project was Rs. 34.35 crore and it was to be funded through the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). However, the Narmada Development Authority informed the KMC that the canal cannot be operated in the summer as it becomes dry.

The KMC subsequently hired private consultants – M/s. Mehta and Associates to identify a new source of water and design a water supply project for the town of Khandwa. In April 2007, ChhotiTawa River was identified as a new water source. The estimated project cost for designing the water supply was Rs. 103 crore, of which Rs. 3 crore was allocated as consultancy costs and Rs. 93 crore was to be funded through UIDSSMT. The project was proposed to be undertaken on a PPP mode.

**Structure of the Model**

The project was to be implemented on a BOT basis with a concession period of 25 years. M/s. Mehta and Associates was responsible for designing the project, estimating the cost, providing transaction advisory and other advisory services. The project was to be implemented in two phases. Firstly, the construction of the pumping facilities, treatment plant, overhead tanks and the distribution system was to be completed over a period of two years. The remaining 23 years were allocated to the operation and maintenance of the project.

Exhibit 3a provides a detailed scope of the project. It is evident, from exhibit 3a, that the operational risk lay with the concessionaire, who was responsible for the construction and operation of the entire value chain.

**Exhibit 3a: Value Chain of the Project**
Due to delays in preparing the Detailed Project Report, the project cost inflated to Rs. 115.32 crore. In 2009, a Concession Agreement was signed between KMC and Vishwa Infrastructures to implement the project. The bid criterion for the selection of the concessionaire was the lowest capital cost estimated and the lowest tariff charged from the water users.

Revenue Structure

The total project cost was Rs. 115.32 crore. The capital expenditure of Rs. 93.25 crore was to be financed by a government subsidy through the UIDSSMT. This is a grant that ULBs receive from the State and the Central Government for their willingness to implement Municipal Reforms under the UIDSSMT. The subsidy was to be deposited in installments by the state nodal agency into the account of the private concessionaire for executing the project. The rest of the project cost was to be financed by the concessionaire itself. An upfront equity of Rs. 5.51 crore was made by the private developer. The remaining amount (Rs. 16.55) was financed through debt. So the share of GoI and GoMP together in the project was 81% and the share of the private concessionaire was 19%. The KMC did not have any funds of its own to invest. The various sources of financing and its utilization have been given in the exhibit below.

Exhibit 3b: Financial Structure of the PPP Model

<table>
<thead>
<tr>
<th>Sources of Funds</th>
<th>Amount (Rs. Crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Infrastructure Development Scheme for Small &amp; Medium Towns (UIDSSMT)</td>
<td>93.25</td>
</tr>
<tr>
<td>Debt</td>
<td>16.55</td>
</tr>
<tr>
<td>Private Equity</td>
<td>5.51</td>
</tr>
<tr>
<td>Total</td>
<td>115.32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of Funds</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Preparation and Consultancy Services</td>
<td>3.45</td>
</tr>
<tr>
<td>Capital Costs</td>
<td>111.87</td>
</tr>
<tr>
<td>Total</td>
<td>115.32</td>
</tr>
</tbody>
</table>

The cost of operations and management/maintenance was to be financed through the revenue generated from the collection of tariffs. The concessionaire was responsible for establishing a volumetric metering system and collecting water tariffs, which then had to be transferred to the KMC’s escrow account. The private developer was paid by the KMC based on collection efficiency. The stakeholder model of the project has been provided below.

**Exhibit 3c: Stakeholder Model**

Source: Athena Research

The estimated Internal Rate of Return (IRR) for the project was 12%. This was based on the bid price of the treated water per kilolitre that would be charged by the company to cover its O&M costs over the concession period, the construction costs incurred by it and the interest payments on debt. This excludes the share of GoI and the GoMP made under the provision of the UIDSSMT.

The supply of water was to be undertaken in two phases. The first phase allowed supply of only 17 MLD of water for the first four years of the O&M component of the project. This would be increased to 30 MLD from the fifth year, once all connections to the domestic households, commercial institutes and industries are released. The concessionaire had estimated distribution losses of 15% (approximately 5 MLD of water). Therefore, in the second phase, the target for water supply was 34.74 MLD.

The O&M costs proposed by the private developer for the first phase was Rs. 7.62 crore per annum, i.e. Rs. 63.75 lakh per month. The concession agreement included a provision for cost escalation at 10% per annum. To meet these costs, the water tariff proposed by the concessionaire was Rs. 11.95 per kilolitre of water supplied and there was a provision that allowed this to be increased by 10% every third year;
i.e. after every two years. A similar revenue structure covering operations and maintenance costs and generating profits is expected to be implemented in the second phase.

Lessons

Government grants attract private participation

The financial structure of the project plays an important role in attracting the developer. A grant given by the State and Central Government via the UIDSSMT scheme covered around 80% of the total project cost which reduced the financial risk borne by the private concessionaire.

Governance and regulatory issues

According to the private developer, the project will be successful as there is a strong commitment by all the stakeholders and the government has been showing keen interest, ensuring a mobilization of political will. Minor delays however were faced in acquiring land and releasing funds.

Willingness to pay water tariffs by the community

The revenue structure was designed while the project was still in its implementation phase. However, this structure is yet to be finalized by the project implementers. The question that needs to be addressed is the ability of the concessionaire to recover the costs. This is because nearly 40% of the population in Khandwa lives in the slum areas and the average cost recovery of expenses by the KMC during 2005 to 2008 was only 32.48%.

Raising Awareness

Awareness projects were conducted by the concessionaire in association with local NGOs. The focus of the campaign was to create awareness in schools and hospitals about the quality of water and the availability of 24x7 water. The primary objective of such campaigns was to get public acceptance and avoid conflict or any other related hurdles at a later stage.

Current Status

The project was commissioned to be completed in March 2012. This deadline was not met due to a delay in setting up electro mechanical systems for the project and commissioning the distribution network. After construction, the supply of water will be undertaken in a phased manner in select wards

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17 Based on this, the concessionaire, during the first phase of the water supply, could barely break even with an estimated revenue of ₹ 7.70 crore.
as demonstration. This will be gradually expanded to the rest of the town and complete operation of
the water supply system will commence. The revenue structure of the project has not been finalized
yet, despite the submission of the water tariff by the concessionaire during the bidding process. There
are ongoing discussions between the developer and the government on making annual payments to
the concessionaire in proportion to the revenue collection by the KMC.
REFERENCES


