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Urban Water Reforms for the
next decade

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H2O conference*

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India is still at an early stage of the urbanisation process and we will witness exponential growth in many of our cities over the next few decades. By 2030 the urban population is expected to reach more than 590 million. This will put enormous pressure on all existing resources, especially water. Despite sufficient availability of raw water, many of our cities struggle to provide more than a few hours of water supply.

Improving water availability in our cities requires addressing complex policy, institutional and funding challenges. Our collective vision should be to provide good quality, reliable, affordable and continuous (24x7) water supply to residents. The core of the new approach will include instituting a new era of greater accountability and a Performance-driven approach. Service delivery to urban poor has to be an integral part of this approach to bring about greater inclusiveness.

Recent experience with PPP in urban water supply shows that with a customer focussed approach and demonstration of clear benefits, there will be greater political and public acceptability of private participation. At the same time, fiscal framework at the local level has to be considerably strengthened before attempting wide scale replication of PPP.

The National Water Policy is expected to be revised in 2012 and the India H2O Conference 2011 will provide a platform for discussion among stakeholders on important policy issues. To this end, PwC and ASAPP Media Information Group have co-authored this report to assess the issues confronting the urban water supply sector in India. A review of international experience shows interesting models that could be adapted to the Indian context. Finally, a comprehensive agenda has been discussed across various dimensions covering financing, institutions, PPP, resource sustainability and capacity building.



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Foreword

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Executive Summary

With complex institutional arrangements, poor cost recovery and high level of Non-Revenue Water, bringing safe and affordable water with good reliability is a challenge for most cities in India. The situation is exacerbated by poorly targeted subsidies and large investment requirement. While Public-Private-Partnerships (PPPs) represent some promise for improvement, an integrated approach is required for meeting the urban water challenge.

Addressing the financing issues requires greater devolution of grants to the third tier of government (that is charged with delivering water supply services) under a predictable framework and expanding funding options for the sector. Getting our institutions right is critical and this requires creating an accountable and performance-driven approach and clear contractual arrangements for service delivery.

Creating an enabling environment for PPPs requires focussing on appropriate project design and improving viability of PPPs by concentrating on a suitable fiscal framework as well as policy changes that recognise the unique characteristics of urban water supply PPPs. Better resource sustainability can be achieved by instituting a long-term programme for NRW reduction, appropriate regulation of ground water and suitable incentives for industries to use alternative water sources such as sea water and recycled water.

The ultimate goal of providing 24x7 (continuous) water supply in our cities cannot be achieved without our Urban Local Bodies (ULBs) being managed by efficient and well motivated urban managers. Sustained effort is required to build their capacity and urban infrastructure programmes should reach out more pro-actively to cities for supporting their capacities.

Introduction

With burgeoning population and rising consumption levels, the world is soon going to be confronted with a serious resource challenge. While agriculture is expected to account for the majority of growth in water withdrawal in India, the challenges posed by growing urbanisation on water requirement also calls for a monumental shift in response from all stakeholders.

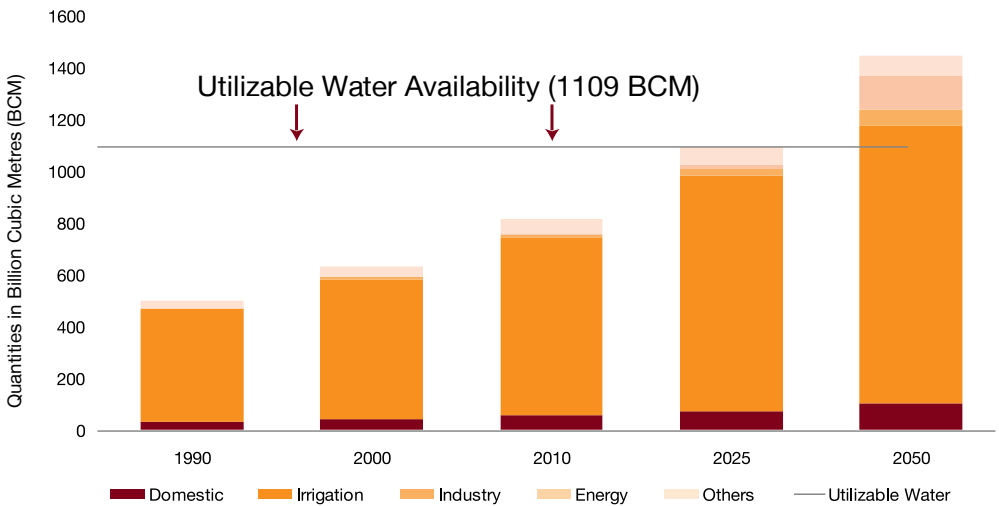
The Central Water Commission (CWC) has assessed the total utilisable water resources of the country as 1108.849 Billion Cubic Metres (BCM) which includes 690.309 BCM of surface water and 418.54 BCM of groundwater. While the rising population continues to put pressure on per capita water availability, another area of concern is the depleting water table. The annual extraction of groundwater in India is over 150 BCM (Tushaar Shah et al, 2000), which is one of the highest in the world. Moreover, issues like saline water intrusion in coastal

areas and deteriorating water quality further curtail the potable water availability in the country.

Besides, global climate change is adding to the resource availability crisis by distorting the hydrological cycle. The impact would be visible both in terms of quantity viz. melting of glaciers & polar ice caps as well as in terms of quality through increased salinity and pronounced water pollution. India’s per capita water availability is expected to witness a 26% decline by 2025 & 36% decline by 2050 relative to 2001 levels (www.indiastat.com).

- *Urban Population coverage by individual connections :64% in India compared to 91% in China, 86% in South Africa and 80% in Brazil*
- *Duration of water supply: 1-6 hours in India compared to 24 hours in Brazil and China and 22 hours in Vietnam*

Demand Supply Gap



Source : www.indiastat.com; CWC

Chapter 1

Setting the Context

- *Per capita supply of water: 37 lpcd - 298 lpcd for a limited duration in India compared to 150 lpcd continuously in Paris and 171 lpcd for 21 hours in Mexico*
- *Non-revenue water (NRW): 50% of water production in India compared to 5% in Singapore*

Source: Report on India Urban Infrastructure and Services – High Powered Expert Committee (HPEC 2011)

According to estimates by United Nations, the urban population is expected to increase to 590 million by 2030. Indeed, scarcity of safe, affordable and reliable water could perhaps be the most serious challenge that could derail the urban growth machine. The classic case of fall of Angkor Wat, the famous temple city in Cambodia, shows that inadequate management of water resources was a contributing factor to the demise of the once flourishing city.

India has adopted inclusive growth as a guiding principle for broad-based economic growth. The disproportionately higher impact of unreliable water supply on the urban poor has been well documented through several research studies. If our cities have to work for urban poor, ensuring wide spread access to water will remain a critical indicator for measuring inclusive growth.

Context

This paper captures the multiple challenges that confront urban water supply. These range from complex institutional arrangement to poor cost recovery and inadequate incentives for changing the present method of management. Public Private Partnerships (PPPs) may have good potential in addressing some of the issues, but global experience shows that unless the incentives for all stakeholders are well-aligned, relying on PPPs to solve the urban water situation may not yield the desired results.

Successive National Water Policies have emphasised on private participation as a tool for improving service delivery and management in the sector. However, the intent has not been sufficiently supported through action. A new National Water Policy is expected to be released in 2012. If this Policy has to facilitate an exponential shift in how the sector is managed, it has to address several areas. It is hoped that this paper will contribute to the debate on the proposed National Water Policy, 2012 and the challenges faced by our cities in providing water to our residents.

Institutional framework does not engender accountability

Water Supply and Sanitation (WSS) in India is governed by a fairly complex institutional structure categorized by fragmented responsibilities for different set of institutions including municipal bodies, parastatal entities (such as Public

Health and Engineering Department) and other statutory institutions. While WSS is a state subject, centre is responsible for developing overall policy, standards and directing investments in the sector. The responsibilities of state include development, financing and cost recovery for water supply and sanitation within their territory.

Institutional Framework in Urban Water Supply

State	Capital Works	O&M	Revenue Functions
Andhra Pradesh	PHED	Municipal Body	Municipal Body
Bihar	PHED, Municipal Body	PHED, Municipal Body	Municipal Body
Gujarat	GWSSB, Municipal Body	Municipal Body	Municipal Body
Haryana	PHED	PHED	PHED
Karnataka	KUWSDB	Municipal Body	Municipal Body
Kerala	KWA	KWA	KWA
Madhya Pradesh	PHED, Municipal Body	PHED, Municipal Body	Municipal Body
Maharashtra	MJP, Municipal Body	Municipal Body	Municipal Body
Orissa	PHED, Rural Water Supply and Sanitation Department, Housing and Urban Development Department	PHED, Rural Water Supply and Sanitation Department	PHED, Rural Water Supply and Sanitation Department
Punjab	PWSSB	PWSSB, Municipal Body	Municipal Body
Rajasthan	PHED	PHED	PHED
Tamil Nadu	TWAD Board	TWAD Board, Municipal Body	Municipal Body
Uttar Pradesh	Jal Nigam, Municipal Body	Jal Sansthan, Municipal Body	Jal Sansthan, Municipal Body
West Bengal	PHED, Municipal Body	PHED, Municipal Body	Municipal Body

Source: Report on India Urban Infrastructure and Services – HPEC

Chapter 2

Why water fails to reach consumers

Different categories of institutions are supposed to have different levels of autonomy. The inter-se accountability between institutions responsible for planning, financing, development, O&M is non-existent. In principle, there is a strong rationale for decentralised management of urban water supply. Given variations in local conditions, water availability, capacity and willingness to pay, adopting a common state-wide model is likely to have problems. Further, the state level institutions have little accountability to elected representatives of ULBs.

However, merely adjusting the institutional structure will serve little purpose. Since the mid 1990s, there have been wide-spread calls for reform of urban water supply through transfer of urban water supply functions from state level agencies to duly elected ULBs. However, little thought or action has been given to the transfer of functionaries or funds.

In majority of our cities, water supply operations do not recover even O&M costs. Also, the ULBs do not have the technical personnel to manage these operations. In this scenario, merely transferring the functions will only increase the burden on capacities and finances of ULBs and set them up for even greater failure.

Complexities of water being a public good

Water has been consecrated as a public good by United Nations wherein the access to water is regarded a human right. Providing access to a certain minimum quantity of water for meeting basic human needs is one of the fundamental responsibilities of the State. In the era of rising consumption and resource depletion, water is moving towards becoming an economic commodity. However, despite the prevailing circumstances one cannot deny the social relevance of water.

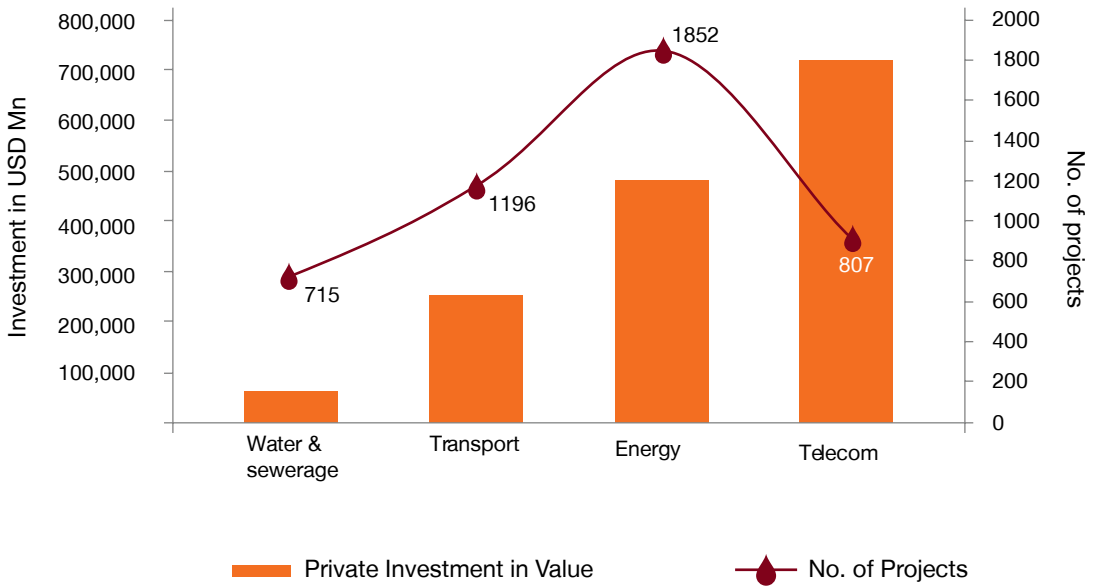
Urban water service delivery in India can be identified with limited coverage of house to house connections, inadequate supplies and poor quality. In addition to creating inefficiencies, poor service delivery increases economic losses, both for state agencies as well as for the consumers. Excessive talk of water being a public good has taken the attention away from the need to conserve and rationalise the usage of water. Unfettered withdrawal of ground water has meant that many parts of the country have witnessed a sharp fall in the water table. Availability of subsidised power has also accelerated uncontrolled withdrawal of water and wasteful agricultural practices. Low pressure in the distribution system encourages consumers to install booster pumps thereby increasing energy consumption. Intermittent water supply calls for incremental investment in storage tanks thereby pushing the costs up. Another significant externality of poor service delivery is the attendant social and health costs.

Public good and private investment

Higher the element of public good, lesser is the likelihood of attracting private investment. In India sectors like transport, highways, energy and telecom have attracted much larger private investment. Since, 1990, only 4% of the projects by value and 16% of the projects by number have been in water and sewerage sector (PPIAF Database). This is after the initial euphoria of the 1990s which saw a number of PPP projects in water supply in Latin America and Africa. However, many of them ran into trouble due to the difficulties faced by both sides in adhering the contract conditions.

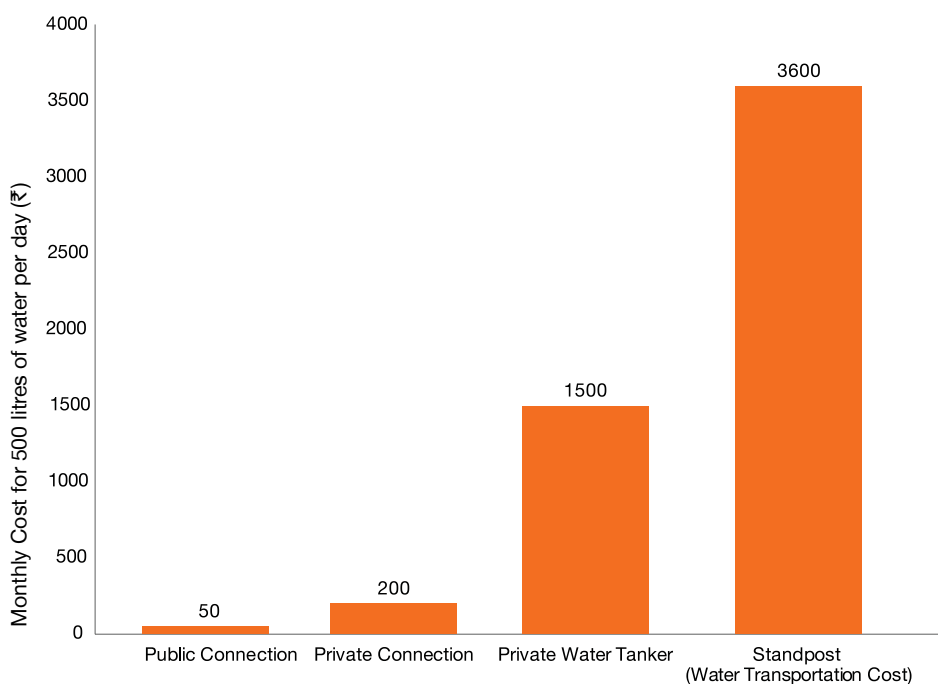
Nevertheless there is a clear case of private sector participation in water. Experience of the last two decades points out that well designed performance-based management contracts are more likely to be successful in water sector, especially in developing economies. The need of the hour is to evolve a model that is suited to the local context. There may eventually be more than one model. There needs to be an adequate balance between ownership, pricing and governance, and the challenge lies in striking the right balance between social & commercial aspects.

Private Investment in Infrastructure



Source: PPIAF Database

Coping Costs



Source: Report on India Urban Infrastructure and Services – HPEC

Inefficient public delivery imposes high cost on poor

Too much attention has been placed on increasing the resource base as opposed to ensuring efficient management of supply and distribution. User charges are kept low on the argument of keeping water affordable for the poor. Yet it is well known that most urban poor are not connected to the formal network and hence do not benefit from low tariffs.

While the burden of unreliable water supply is felt by all sections of the society, it is more pronounced on the lower-income households. The cost of coping with unreliable water supply is highest on the urban poor. An intermittent water supply forces the poor to forgo work on days when water arrives. Alternatively, they may have to pay much higher cost for supply from illegal or informal networks. The impact

on women and children is also higher as they are most likely to be involved in such household activities.

Slums may not be taken into consideration for planning purposes and such habitations are typically bypassed at time of service expansion. The responsibility of ULBs is often restricted to supply through public standposts or delivering water through ad-hoc arrangements such as water tankers. Since provision of a municipal water connection may be seen as regularising an illegal slum and lead to demand for tenure rights, ULBs and state governments have not extended themselves to provide house service connections in slums. Even where the ULB has a policy of providing water connections to the urban poor, the steep initial charges often create a road block for the urban poor to get a water connection. However, guidelines under the recently announced Rajiv Awas Yojna (RAY) have taken cognisance of these and have made the provision

Components of Water Tariff



Water tariffs do not reflect the economic cost

One of the fundamental issues that plagues urban water supply is the prevailing approach towards the setting and revision of water tariffs. **National Water Policy 2002 clearly states that water charges ought to be fixed in a way to cover the operations and maintenance costs for providing the service initially and a part of the capital cost subsequently** (Om Prakash Mathur, Sandeep Thakur 2006).

However, many states have a common water tariff across their urban areas and this often belies the true economic cost of water in a local area. Even so, the tariff is not fixed after a detailed assessment of costs. At present, water charges are not indexed to inflation. This makes every rate revision subject to government ratification, which is politically difficult.

Some cities levy water tariff as a proportion of property value. Others may have a fixed charge which is not linked to consumption. However, there is a concerted move across the country to move towards volumetric pricing of water. Ensuring 100% metering of all connections would be critical.

Most cities have much higher tariffs for industrial and commercial consumers. While the intended purpose is to provide some level of cross subsidy from these

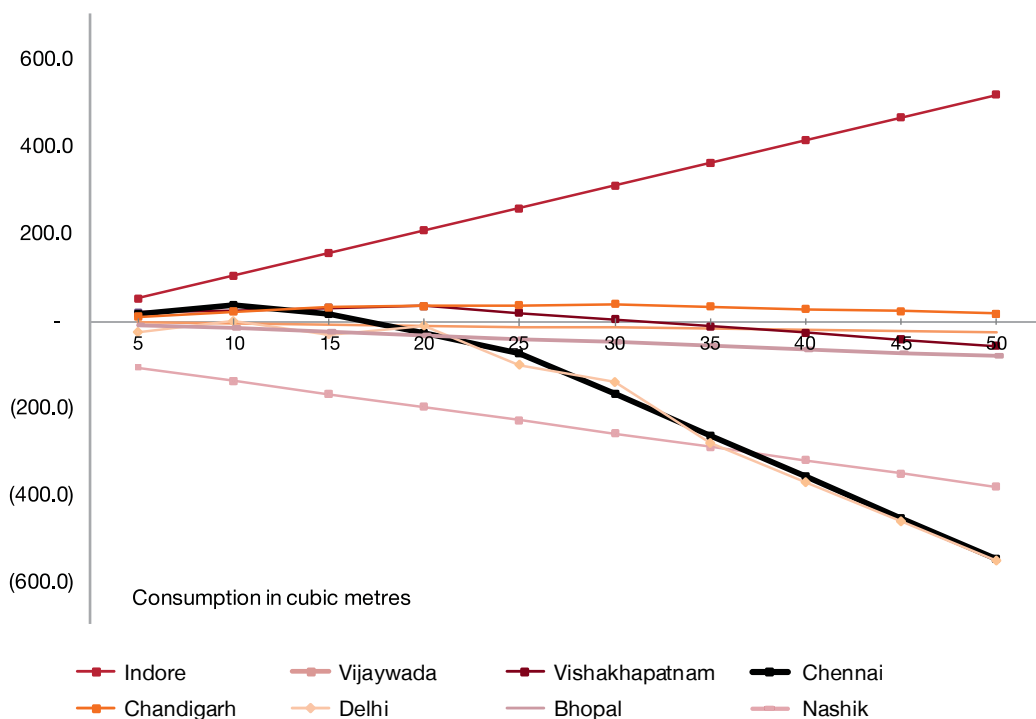
categories to residential consumers, it also has unintended consequences. Faced with paying increasing cost for relatively unreliable municipal water, commercial and industrial consumers in many cities have opted out of the system or have resorted to groundwater or other private sources. This increases the cost pressure on ULBs as the more attractive consumers exit the municipal system.

Subsidy does not reach the poor

The problems of inappropriate tariff mechanism is further accentuated by the fact that subsidy, provided through lower user tariffs, does not reach the urban poor for whom it is intended. Cities that have flat rate structure based on ferrul size do not distinguish between the minimal level of consumption of urban poor and that of rich households who use much larger volume of water due to their consumption pattern.

Many cities have implemented Incremental Block Tariff (IBT) structure wherein the rate per unit of water increases at higher levels of consumption. This provides appropriate incentives as those who consume more water are required to pay beyond the average production and O&M cost. However, if the tariff structure is not scientifically designed taking into account the consumption pattern and costs, it may perpetuate a regressive subsidy environment.

Implicit Subsidy through Tariffs



Source: 2007 Benchmarking Databook of Water Utilities in India, ADB, Delhi Jal Board, TERI, PwC Analysis

Analysis of the tariff structure of a few cities in India shows that a city like Chennai has a tariff structure wherein those consuming upto 20 KL per month (which translates to 135 litres per capita per day for a five member household) pay at a rate which is almost equal to the cost of water. Consumers in higher category face much higher rates. Chennai has long been known for facing water shortages and such a tariff structure promotes conservation of water and efficient practices. Delhi seems to have a similar structure

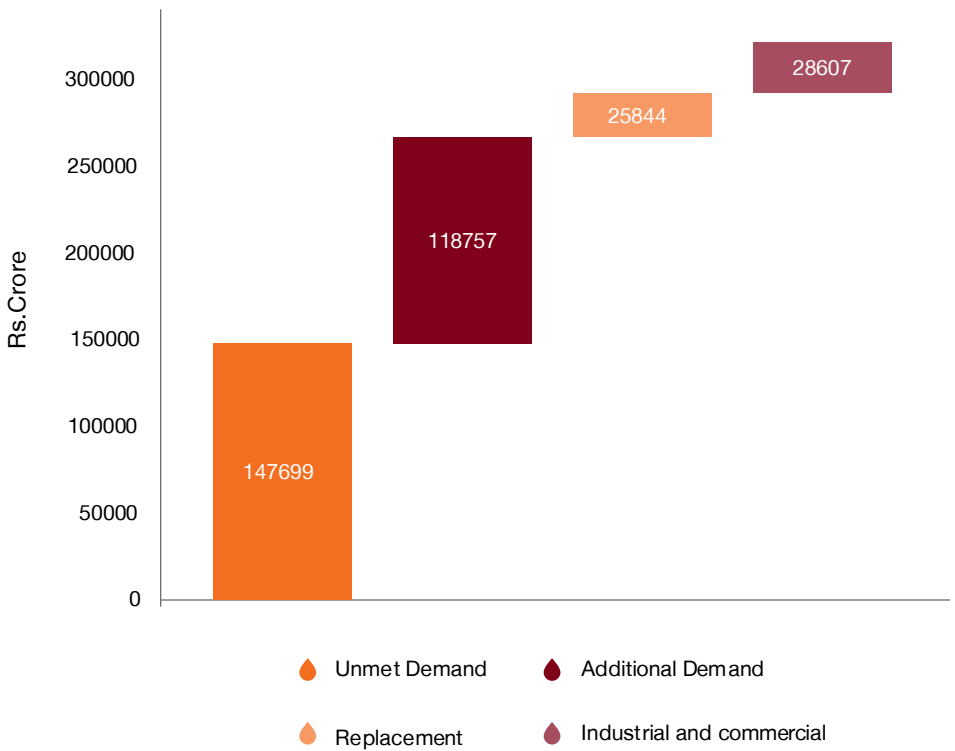
While Chandigarh does not seem to provide any cross subsidy across different consumption levels, Vishakhapatnam follows a similar approach to Chennai although it is less stark. Vijayawada seems to be generating some additional resources from water as it is not providing any subsidy across consumption categories. On the other hand, a city like Indore has much lower average tariff relative to its cost structure. In such a city those consuming greater quantity of water also seem to receive higher implicit subsidy. While Bhopal and Nashik have higher tariffs for higher volume of consumption, the degree of difference in tariffs may not be sufficient to incentivise efficient usage.

Funding Gap in urban infrastructure

For several decades, investment in urban infrastructure in general and urban water supply in particular was hitherto a neglected area. While our cities have continued to feel the pressure of rising population and ever expanding need for services, the financial resource base of ULBs has not kept pace with this expansion. Except for property tax, ULBs do not have any other revenue source that has the potential for revenue buoyancy.

Even in case of property tax - frozen assessment values, low rates, absence of property records, and inefficient administration result in actual realisation being much below the potential. Urban water supply projects are mostly implemented through grants received from central and state government along with debt from financial institutions taken with state government support. Very few utilities have sufficient internal accruals to finance capital investments.

Investment Requirement (2012-32)



Source: Report on India Urban Infrastructure and Services – HPEC

As per the High Powered Expert Committee report, the total requirement over the next 20 years (2012–32) for water supply is expected to be approximately ₹ 3.20 lakh crore. The magnitude of this requirement can be gauged from the fact that total cost of projects approved under the seven year JNNURM programme, for urban water supply stood at only ₹. 19,681 crore (www.jnnurm.nic.in).

The bane of non-revenue water

Non Revenue Water (NRW) refers to the difference between the amount of water put into the distribution system and the amount of water billed to the consumer. Owing to the state of water infrastructure in the country, the level of water loss in the distribution networks is extremely high. While there are no comprehensive studies undertaken in India,

NRW is estimated to be in the range between 40% - 60% or even higher. A study by ASCI put the NRW at 74%. High NRW is a result of technical deficiencies in the system as well as due to commercial and policy gaps. Technically, the system is characterised by poor quality of infrastructure, poor O&M practices and absence of use of technology for monitoring and repair of leakages. Most of the cities do not have updated maps of water pipelines and are unable to monitor waterflow on a real-time basis. Leakage may be detected after a long delay resulting in significant water loss.

On the commercial and policy front, most ULBs face high level of theft and illegal connections in their water system. In some cases this may be due to consumers tapping illegally into the system when they are unable to get official access. ULBs may

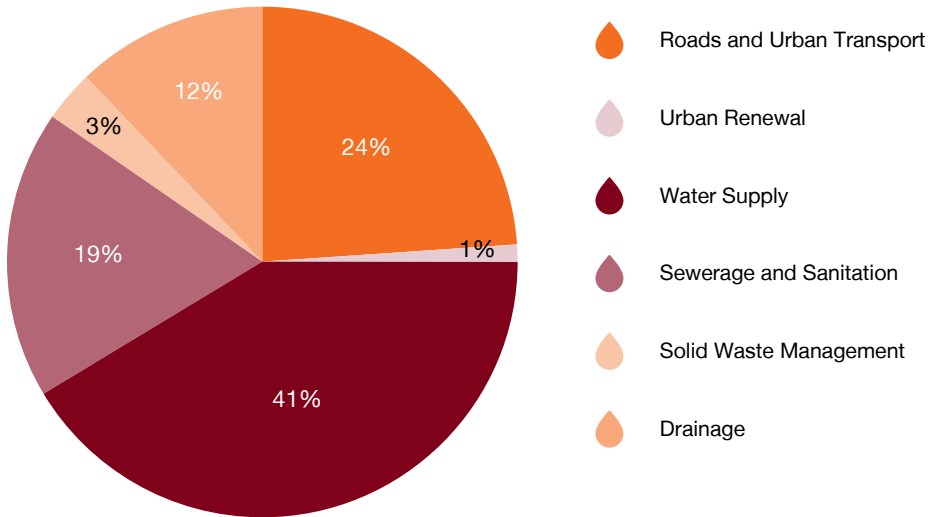
also not have complete customer records resulting in legitimate customers not being billed for water being supplied.

Very few cities have bulk meters and have very little information on availability of water in different parts of the city. Further, domestic level metering is not yet widespread in India. One of the key reforms being instituted across many cities is the introduction of consumer level metering. However, it has been observed that 50% of the installed domestic and bulk meters in India remain defunct (Ministry of Urban Development, Government of India). The reason behind meter malfunction is intermittent water supply leading to deposition of sediments. Non functional meters force the cities to resort to flat billing which delinks tariffs from consumption.

Water Balance in a typical Indian City

Water Produced (100%) 164 mld	Authorised Consumption (30%) 50 mld	Billed & Authorized Consumption (26%) 42 lld	Billed & Metered (4%) 6 mld	Revenue Water 26%) 42 mld	Collected (20%) 33 mld	
		Unbilled Authorized	Billed & Unmetered (22%) 36 mld			Public Standpost (5%) 8 mld
	Unaccounted for Water Losses (70%) 114 mld		Apparent Losses	Theft	Non revenue Water 74%) 122 mld	
		Real Losses	Customer Meter Errors, Data Errors	Storage Leakage		
			Trasmission Main Leakage			
			Service Connection Leakage			

Investments under JNNURM (as of Dec' 10)



Source: Report on India Urban Infrastructure and Services – HPEC

In December 2005, Government of India announced the Jawahar Lal Nehru National Urban Renewal Mission (JNNURM) to address the multi-dimensional challenges facing the urban sector in general and urban water supply in particular. JNNURM is a reform-driven integrated and coherent program to develop and implement high-impact projects in select cities of India.

Water sector constitutes the single largest sector both in terms of number of projects executed as well as in terms of the total funding support. The mission recognises

the need for wide-spread reform and has a number of mandatory and optional covering inter alia, improving local governance, revenue mobilisation, cost recovery, pro-poor focus and removing bottlenecks relating to urban land.

Public Private Partnerships (PPPs) have been a major focus area under JNNURM wherein all the ULB's are encouraged to seek investment from the private sector to supplement government resources for the development of urban infrastructure.

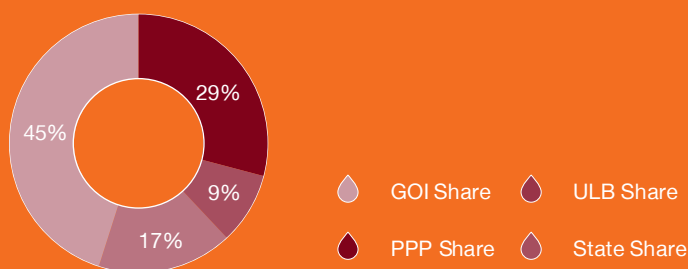
Chapter 3

Driving investment through PPPs

PPP in water under JNNURM

A recent survey of PPP projects under JNNURM revealed that 8 projects in water supply were being undertaken under PPP route. While six of them involved capital contribution, two projects only covered O&M component. 29% of the total investment in the six projects was through private investment with the balance being government contribution (JNNURM, 2010-11). It also revealed that PPP in O&M can be done with little baseline information, cost reflective tariffs or robust mechanisms for monitoring operator performance. However, longer-term PPP involving capital contribution requires a robust regulatory environment, reliable information and strong political will.

Projects under Water Supply with Capital Commitment by PPP operator



Source: JNNURM

Has JNNURM crowded out private investment?

This is a difficult question to answer. On the one hand, statistics over the last 5–7 years show that private investment in urban infrastructure sectors including water supply has substantially lagged behind the investment levels in other infrastructure sectors like roads and highways, energy, airports etc. On the other hand, there are several valid reasons for slow pace of PPPs in urban services.

Firstly, services such as water supply, sewerage and sanitation, etc. have strong characteristics of public good and there is often resistance (real or perceived) to raise user charges. Secondly, government institutions providing urban services are weak in most cases and do not have the capacity to manage private sector service providers. The multiplicity of institutions involved in the urban sector further complicates the issue. Finally, urban sector consists of multiple sub-

sectors such as water supply, sewerage, sanitation, etc. are different sectors in their own right and there is no “single model” of PPP that can be applied to the urban sector (Financial Express, 2008).

Yet, one of the stated objectives of JNNURM was to help ULBs leverage funds from other sources. Despite 36 ULBs being rated as investment grade, none of them have accessed debt from the capital markets. Further, these cities have accounted for over three-fourth of the Central Assistance under JNNURM. These figures underscore the point that there has been little leveraging of funds.

Finally, it is also possible to argue that the limited number of PPP projects that have been structured under JNNURM could have leveraged more private investment if not for the liberal grant funding available from central and state sources. It is possible that projects that could have been structured under the PPP mode have instead been implemented

under full public funding. In such a scenario, discretionary spending by ULBs in other infrastructure projects which have no scope for PPP is likely to have been delayed. Without creating a counter-factual scenario, it is not possible to come to a clear conclusion.

PPPs in urban water – an evolving process

The initial PPPs during 1990s in India were modelled on Latin American and East Asian experience and sought huge investment across the entire value chain of water supply ranging from source development to supply and distribution. These models did not take sufficient cognisance of the poor finance health of ULBs and the lack of capacities of ULBs to enter into complex agreements.

Despite numerous setbacks, PPPs in urban water are on the way up. There are several cities which have PPPs under implementation and many more are likely to join this list. Nagpur, towns in Karnataka and Madhya Pradesh, and Delhi are implementing PPPs on a pilot basis before wider replication across the entire city.

Furthermore, there is considerable heterogeneity in the project components and structure of PPPs. This underlines the fact that there is no single model for water PPPs. There is a greater focus on moving towards performance-based management contracts. Even in projects that involve capital investments, the project structures have innovative provisions for dealing with uncertainty arising due to poor quality of existing information.

Key PPP Projects in Water

Project	Key feature
Aurangabad, Maharashtra	<ul style="list-style-type: none"> Covers water treatment, transmission, rehabilitation and distribution. Payment through annual grants and user fee collection Risk of delay/non-availability in funding from central and/or state government to be borne by operator
Nagpur, Maharashtra	<ul style="list-style-type: none"> 24x7 water supply project in selected zones Rehabilitation and distribution improvement Capital investment is publicly funded Performance-based management contract
Mysore, Karnataka	<ul style="list-style-type: none"> System study, capital investment planning, rehabilitation, O&M, billing and collection Capital investment plan to be decided after system study. 80% funding from JNNURM Performance-based management contract
Latur, Maharashtra	<ul style="list-style-type: none"> Water treatment plant, transmission and distribution system, O&M of water supply including existing facilities, billing and collection Billing and collection rights with operator in lieu of fixed payment to ULB

Salt lake (Kolkata), West Bengal	<ul style="list-style-type: none"> • Design construction and O&M of reservoirs, transmission and distribution system, Sewerage Treatment Plant and distribution system • Bulk water supply to industrial area and integrated water and sewerage charge • Grant of upto 35% from JNNURM
Chennai, Tamil Nadu	<ul style="list-style-type: none"> • 100 MLD Design, Build, Own, Operate, Transfer project in JV with Befesa • Levelised water tariff over a 25 year period to be paid by Chennai Metropolitan Water Supply Sewerage Board
Khandwa, Madhya Pradesh	<ul style="list-style-type: none"> • Construction of intake well, water treatment plant, overhead tanks including O&M responsibility • 25 year BOT contract with annuity payment
Madurai, Tamil Nadu	<ul style="list-style-type: none"> • System study, preparation of investment plan, rehabilitation of system and O&M • Investment upto 30% of project cost and balance through JNNURM
Chandrapur, Maharashtra	<ul style="list-style-type: none"> • Management contract covering O&M of distribution system • Operator is responsible for adding new connections • Payment of fixed amount to ULBs in lieu of right to collect water charges • 10% increase in water charges every three years
Belgaum, Gulbarga and Hubli-Dharwad, Karnataka	<ul style="list-style-type: none"> • Management contract for 24x7 in select zone • Clear demonstration of benefit led to expansion in other zones • Tariff increase only after demonstration of benefit

Source: PwC Research

Analysis of PPIAF database shows that close to 40% water projects involving private investment tend to hit roadblocks and have to be cancelled, distressed or compromised (Patricia Clare Annez, 2006). Review of international experience in urban water supply reveals interesting examples. While too much attention is drawn to international experience on PPPs, there are several other aspects such as regulatory framework and management of public utilities that hold important lessons for India.

- **France:** It is a leader in affermage or lease contracts, water supply to over 80% of the urban population is through private companies. Majority of the projects are in the form of management contracts where the investment responsibility rests with public sector. Three large companies viz. Veolia, Suez and Saur control most of the market. There is no independent regulator and tariffs are determined through negotiation and contracts. National Audit Agency monitors tariffs and expenditure through review of annual reports. Partnership Contract framework allows a local body to enter into a competitive dialogue process with a few shortlisted bidders while ensuring full transparency.
- **United States of America:** Both publicly owned and privately owned utilities exist. Standards relating to water supply are governed through federally mandated regulations. Regulation of water utilities, including tariff setting is within the purview of Public Utility Commissions (PUC) in each state. Each PUC can determine rules for exemption of utilities from legislative purview. In most states, private investor owned utilities are regulated subject to certain minimum threshold such as number of customers. Many states exempt municipal owned utilities from regulatory purview of PUC, while others regulate them if the utility expressly presents itself for regulation. Further, most local governments raise bonds for financing investment in water supply and sanitation infrastructure and hence there is indirect regulation by the bond market.
- **United Kingdom:** Water supply in England and Wales is provided through either integrated water and sewerage companies or through water only companies. The Water Services Regulation Authority (Ofwat) established by statute has powers to set and monitor tariffs and service standards. There is a consumer commission in each of the jurisdictions which reports to Ofwat on issues concerning consumers. Ofwat extensively uses benchmarking and price-cap regulation as tools towards achieving greater efficiency.
- **Australia:** Like India, Australia also has a federal structure where water is a state level responsibility. The market structure across states varies according to local conditions. State wide agency model is prevalent in some states like South Australia and Western Australia. There is also presence of regional utilities which serve multiple local government areas. Finally, there are also local government owned utilities and select private sector utilities. Regulatory framework has also been customised to suit local conditions. While some independent regulators set service standards and tariffs, others have only responsibility for service standards with actual tariff setting retained by state government. Separation of conflicting roles of policy making, service delivery

Chapter 4

Learning from International Experience

and regulation in order to ensure accountability and application of user pay principles are the underlying philosophies across the sector.

- Senegal:** In 1995 Senegal passed a law for institutional reform of urban water supply. A three way affermage contract involving the government, state owned asset holding company (SONES) and a private operator governs the relationship. There is also a separate management contract between SONES and operator. Investment and execution of capital works is the responsibility of SONES. The operator is responsible for overall management of the infrastructure, maintenance and repairs as well as adding new connections. Payment is linked to adherence to performance standards including leakage reduction and collection of user charges.
- Korea:** K-Water in South Korea is a public utility that is responsible for water resource management including bulk water. It also provides retail distribution services and focuses on getting into partnerships with local bodies that face financial stress and uses its technical expertise to improve efficiency of operations. In one such case, K-Water was able to reduce non-revenue water from 47% to 30% within 4 years without any tariff increase and also achieved a huge jump in customer satisfaction (ADB, 2009)
- Phnom Penh:** Since 1993, the Phnom Penh Water Supply Authority (PPWSA) has instituted a series of transformational reforms which have led to stellar results. A policy framework established clear accountability while giving the utility full operational autonomy for service improvement. The distribution network was widened and measures for full cost recovery were instituted. Through systematic measures NRW was reduced from 72% in 1993 to below 6% in 2009 (IUCN 2010). The reform measures received full support from higher echelons of political establishment. Appropriate incentives and suasion were used to bring about a behavioural change among consumers and staff. There was a clear framework and commitment to supply subsidised water for the poor. For these achievements PPWSA was awarded the ADB prize in 2004.



- **South Africa:** Johannesburg Water is a utility owned by City Council and has responsibility for provision of water supply and sewerage services. It has a separate contract for bulk supply with Rand Water (a private sector company). There is also a separate management contract for a five year period and at the end of this period, the operator should have transferred reasonable expertise to Johannesburg Water. Capital investments are approved and financed by the City Council. While Johannesburg Water is responsible for collection of water charges from top 20% of the consumers, the City Council collects revenues from other users (Aldo Baietti, William Kingdom, et al 2006)
- **Singapore:** The Public Utility Board in Singapore is a statutory body responsible for managing the water supply in an integrated manner. It operates under the purview of ministry of environment. There is clear operational autonomy with respect to regular activities such as procurement, recruitment of staff, performance appraisal and out-sourcing of activities. Tariff adjustments are proposed by PUB and finally approved by the Cabinet. The Act under which PUB was formed provides for setting tariffs to recover full costs of O&M, interest, depreciation and a part of infrastructure development cost. Customer centric metrics such as time taken to install meters, response time for complaints and water supply interruptions are closely monitored. PUB also periodically surveys its customers to obtain feedback on performance (Aldo Baietti, William Kingdom, et al 2006).
- **Small Scale Water Agencies:** Small Scale Water Agencies (SSWAs) play an important role in serving people in most of the developing countries across Asia, Africa and Latin America. SSWAs have been fairly successful in addressing water needs of consumers who are not served by the formal network and at costs that are lower or comparable to supply by public utilities. These institutions exist in a variety of ambiguous legal and institutional environment. Providing legitimacy and recognising the SSWAs could help the public utilities reach out more effectively to the urban poor and those living in un-planned colonies.

The above experience points out that different countries and cities have taken separate routes to reform their urban water supply sector. Whether involving public utilities or private operators, the following key principles have to be followed:

- Set out a transparent, accountable and credible institutional and policy framework
- As far as possible conflict between policy-making, operations and tariff setting should be removed through institutional arrangement.
- Cost recovery through user charges has to be followed to ensure sustainability of operations
- Focus on service delivery and improving operational efficiency
- Approaches for private sector participation should also include SSWAs who could be quite effective in providing service in areas where formal network may not be present.



Reform of urban water supply requires a long term perspective. There are five areas which require immediate and concurrent action. The measures cover financing, institutions and policy, PPPs, resource sustainability and capacity building. These measures have close synergy with one another and so lack of movement on any one of them will soon become a bottleneck for other areas.

- **Addressing the financing conundrum** requires greater devolution of grants to the third tier of government under a predictable framework and expanding funding options for the sector.
- **Getting our institutions right** is critical and this requires creating an accountable and performance-driven approach and clear contractual arrangements for service delivery.
- **Creating an enabling environment for PPPs** requires focussing on appropriate project design and improving viability of PPPs by concentrating on a suitable fiscal

framework as well as policy changes that recognise the unique characteristics of urban water supply PPPs.

- **Better resource sustainability** can be achieved by instituting a long-term programme for NRW reduction, appropriate regulation of ground water and suitable incentives for industries to use alternative water sources such as sea water and recycled water.
- **Capacity building** in the sector is necessary for achieving the goal of providing 24x7 (continuous) water supply in our cities. For this, our ULBs need to be managed by efficient and well motivated urban managers. Sustained effort is required to build their capacity and urban infrastructure programmes should reach out more pro-actively to cities for supporting their capacities.

Chapter 5

Driving Change

Total revenue of ULBs in India is only 0.9 % of GDP as compared to 7.4% for Brazil and 6% for South Africa (HPEC 2011). Clearly for a large and heterogeneous country like India, significant amount of expenditure will continue to be at local level. Therefore, mechanisms have to be evolved to provide more resources onto the ULBs' table. They will require access to multiple sources of funding including debt from financial institutions and capital markets. This will require the creation of a suitable enabling framework. Finally, the approach to setting of tariffs has to be streamlined and better targeting of subsidies has to be achieved.

Devolution of Funds

The Thirteenth Finance Commission has recommended that there should be a provision for automatic transfer of funds based a percentage of divisible pool of taxes to ULBs. This will link the resource base of ULBs to buoyant sources like the proposed GST and at the same time minimise distortions that may arise due to local taxation. To ensure predictability in the transfer, it would be imperative to have necessary legal changes both at the central and state level.

This will not only increase the resources available to the ULBs but also ensure that they can take on long-term commitments such as raising debt from financial institutions and capital market. Being able to predict the availability of resources over a three to five year time frame is essential for long-term planning. The Constitution of South Africa has a provision for a Municipal Infrastructure Grant, which is a conditional multi-year grant to finance infrastructure investment requirements (Sahasranamam 2010).

Creating a pool of resources for ULBs

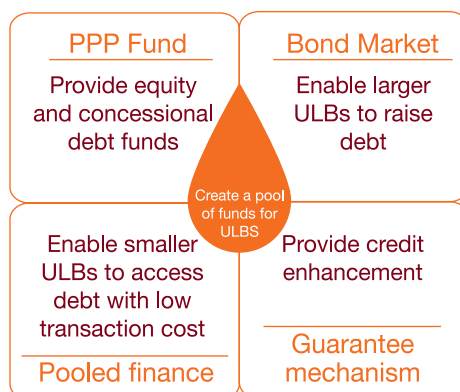
Devolving all resources through budgetary route may not help ULBs in adequately leveraging their resources. Allocation to urban infrastructure in general and water sector in particular needs to be channelised through several sources.

- **PPP fund:** PPP can be given a fillip by having a dedicated fund for supporting PPP projects taken-up by ULBs. This fund should initially focus on providing support for better structuring of PPP projects and then go on to provide long-term debt for such projects. In select cases, it may contribute equity as well for promoting unique and experimental PPP projects. The proposed KfW supported PPP fund should be operationalised with a minimum corpus of ₹ 500 crore. Based on the response, the size of the corpus may be enhanced.
- **Bond Market:** Large sized ULBs should be encouraged to access the bond market through suitable incentives. One of the reasons for poor participation by ULBs is the lack of depth of the market and need for state government guarantees. Increasing devolution of funds may obviate the need for state government guarantee for the bonds. Complementary measures need to be instituted to encourage pension funds, insurance companies and other long-term investors to invest in municipal bonds.

Chapter 6

Address the financing conundrum

Funding Mechanisms



- **Pooled finance:** The pooled finance model has been present for a number of years and yet has not taken off widely in the country. The model adopted in Tamil Nadu under TNUDF which blends loan and grants and adopts stringent project appraisal practices needs to be widely replicated. International development agencies like World Bank and ADB should provide support for such mechanisms.
- **Guarantee mechanism:** A guarantee mechanism could be put in place under the overall fiscal framework regime to provide support for ULBs. Such a mechanism will reduce overall cost of borrowing for ULBS and provide creditors and contractors better comfort. However, the moral hazard involved in providing such guarantees has to be addressed. Creating an intercept to grants from higher level of government and closing the guarantee window for a certain period after default could be some of the measures that could address this problem.

User pays principle and better targeting of subsidies

ULBs need to strictly enforce user pay principle and levy tariffs based on consumption. Achieving 100% recovery of O&M costs is one of the key reform milestones under JNNURM. Ensuring that the customer database is updated at regular intervals is an obvious task but one which is not diligently done by most ULBs.

Tariffs should be linked to actual cost of service and so there should be a framework for adopting different water tariffs across

cities. While the IBT mechanism may be the best option for consumption-based tariffs, it is predicated on widespread coverage of consumer level metering. Therefore, 100% coverage of metering is a prerequisite for consumption-based tariff.

The level of cross subsidy between residential and other categories should be designed keeping in mind the opportunity cost of alternative supply for industrial and commercial consumers. A very high level of cross subsidy may result in under-reporting and give incentive for wrong classification for such connections. To ensure that water tariffs keep pace with increase in costs, indexation of non-controllable elements of costs may be built into the tariffs. At the same time, the ULB should be responsible for bringing about efficiency improvement, the benefits of which are passed onto consumers.

Achieving cost recovery through user charges does not mean that there should be no subsidy for the urban poor. Providing subsidy through low user tariffs is not only bad targeting but also economically inefficient as the user tariffs do not reflect the economic cost of additional water usage. An effective way of channelizing the subsidy to the poor would be through direct transfer of subsidy and letting all consumers face tariffs which reflect actual costs. This will not distort the consumption decision and lead to more economical usage. The central government is already working on a model for such transfers in other services. It should also be tried on a pilot basis for water supply.



Fixing the institutional framework involves much more than formation of city utilities or transfer of water supply functions to ULBs. The underlying rules based on which the urban water supply sector operates needs to radically change. Instituting a performance and accountability based approach is at the core of this change. Transparency in operations can be brought about through ring-fencing of water supply function in water utilities and ULBs. The regulatory framework is an important part of the institutional landscape and needs to be designed keeping the local conditions in mind.

Separation of conflicting roles

Policy making, service delivery and regulation are clear and distinct functions that should be performed by separate units within an overall governance framework. Many water utilities and parastatal entities undertake two or more of these functions,

especially service delivery and regulation which may come in direct conflict with each other. Therefore, it may be necessary to consider a mechanism by which service delivery and regulatory functions can be separated or at least the interface between the two functions can be minimized.

Performance and accountability driven approach

ULBs being the elected government at the local level should have overall responsibility for provision of water supply services. It can choose between any of the three options for service delivery:

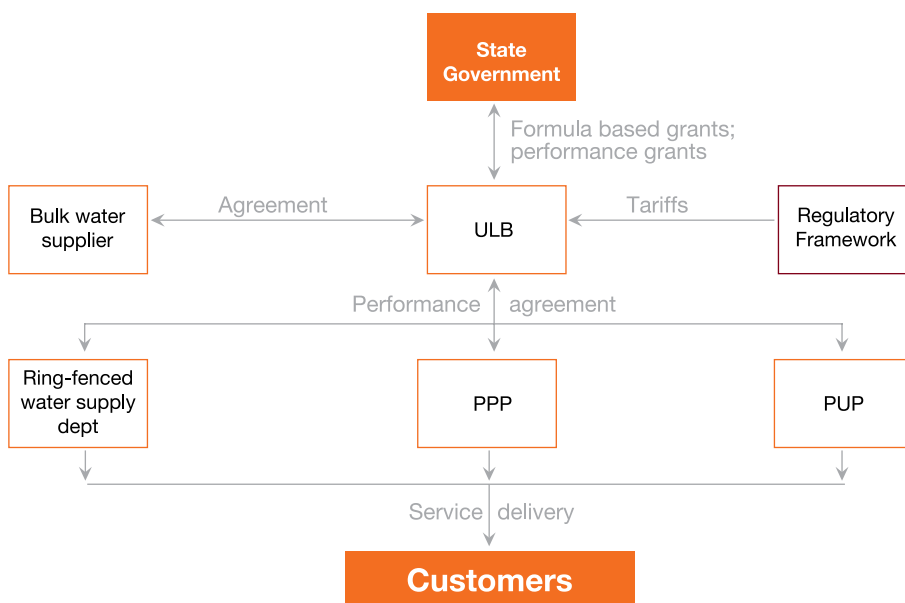
- Ring-fenced water supply department,
- PPP arrangement with a private operator, or
- Partnership with a public entity or Public-Public-Partnerships (PUPs)

Irrespective of the arrangement, clear performance agreement would be laid down

Chapter 7

Getting institutions right

Institutional Framework for future



to ensure adherence to service delivery standards. These performance agreements will cover:

- Service delivery standards
- Coverage requirements
- Capital investment plan and execution, if that responsibility is retained by ULB
- Payment mechanism, and
- Monitoring mechanism
- Recourse in case of non-adherence to service standards

In case the ULB depends on a separate bulk water supplier, a separate bulk water supply agreement should be entered into on similar aspects as mentioned above. Finally, there will also be an agreement between state government and ULB under which periodic devolution of formula-based grants would take place. Additional performance grants could be given subject to the ULB meeting policy objectives and service standards as originally agreed.

In many cities, parastatal water utilities agencies such as Public Health and Engineering Departments (PHED) are responsible for service. ULBs should enter into transparent performance based agreement with PHED in such cities. The partnership between two public entities or PUPs should still be based on sound commercial principles (Financial Express, 2010). While an implicit agreement has always existed between the government and its agencies for delivering services, the model needs to be credibly enforced. The contractual framework should have a set of inbuilt incentives and penalties that would ensure that organisational behaviour is channelled in the right direction. One of the mechanism would be to transfer the budget for O&M for water supply to ULBs and provide official sanction to the performance agreement between ULB and PHED such that payment to PHED is made by the ULB.

India experiments with PUPS: without strict contractual framework

- In Kerala the local body has an MoU with Kerala Water Authority for implementation of water supply projects as well as the O&M
- In Orissa, Public Health and Engineering Organisation and ULB have entered into an MoU which clearly lays out that PHEO will be accountable to ULB for delivery of water supply and sewerage services as per pre-determined standards. However, the issue of tariff setting and responsibility for meeting O&M gap is not clearly captured.

Source: PPPs to PUPS, Financial Express, December 2010

Ring-fencing

Currently, most ULBs do not face a hard budget constraint on water supply. With clear ring-fencing the ULB would be responsible for meeting the O&M expenses on water supply and sanitation through user charges. In certain cases, the current recovery from water charges may be too low or the cost of operation including the cost of bulk water may be very high necessitating some level of subsidy – either from state government or from general revenues of the ULBs. It is possible to implement ring-fencing even under such scenario. There should be pre-agreed support for water supply to meet the O&M gap that cannot be met from user tariffs. The gap funding will be on a reducing scale and reach a “no-gap” situation within a defined time period. The gap will also be clearly linked to service levels. The reduction in O&M gap will have to be achieved through a combination of billing and collection efficiency improvements, leakage and wastage reduction, cost efficiency in operations and tariff improvement.

Incentive based regulation¹

The regulatory framework for urban water sector in India needs to evolve taking into account the local context. The most common objective of regulation is to ensure the establishment and monitoring of service standards and user charges in a manner which promotes sustainability of the sector. In the Indian context, regulation also needs

to play a key role in bringing about a change in behaviour of public utilities, government agencies, and consumers. (B.Rajesh 2009)

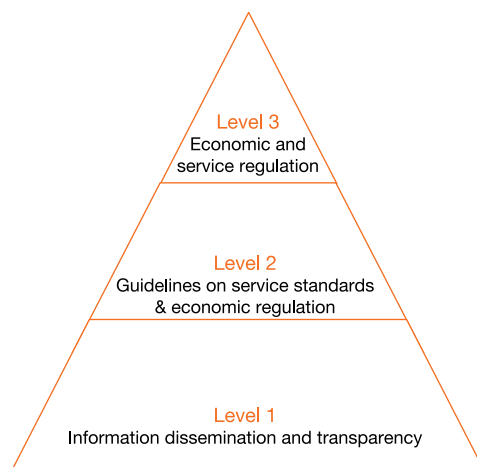
ULBs in India are at different levels of capacity and the regulatory framework should take this into account. Further, regulation is more likely to be successful when adherence to the regulatory framework translates into clear benefits to the ULBs. Therefore, the state government should design an incentive package consisting of investment support, capacity building assistance and operational autonomy to motivate ULBs to change their behaviour in response to regulation.

The Opt-in regulation is suggested as a possible approach for consideration. It is possible to adapt this approach to the local context in different states. It may also be designed to meet different regulatory objectives ranging from transparency to independent setting of tariffs. Therefore, it may be categorized as an umbrella approach to regulation of municipal services in which objectives, form (compulsory or optional) and institutional design as well as incentives could be structured to fit the requirement of each state as well as ULBs within the state.

The basic principle behind opt-in regulation is that ULBs have the option of being part of a regulatory framework. Furthermore, having decided to be bound by regulation, they have some limited choice of the extent to which they want to assign their discretionary powers to an independent regulator.

1 This section draws extensively on the article written by the author in July 2009

Framework for opt-in regulations



Level 1 is the most basic level of regulation under which the ULBs agree to capture and share information relating to service standards and cost of services. Ideally, Level 1 should be compulsory for all ULBs. The service level benchmarks defined by Government of India allow for different levels of reliability of indicators based on the system used for capturing the data. States that are keen to implement only level 1 of this framework can do so without setting-up an independent regulator. This information may ultimately be useful for benchmarking of ULBs across the state.

Level 2 is the next level of sophistication under which the regulatory authority provides guidelines on service standards to be met and the principles to be followed while determining tariffs. While these guidelines may not be completely binding,

the ULBs will have to report to the regulatory authority on how they meet or plan to meet the service standards and the present system of determining user charges. Incentives should be provided by the state government to ULBs which follow these guidelines more closely. An institutional arrangement involving a regulatory committee with sufficient executive powers would be required for level 2.

Level 3 is the highest level of regulation wherein the ULBs will agree to be bound by the tariff determined by the independent regulatory authority. One of the mechanisms for incentivizing the ULBs to “opt-into” this level of regulation would be substantial state government support for investments. Further, many ULBs would like to proceed from level 2 to level 3 only after being convinced of the benefits of being part of a regulatory framework.

Supporting PPPs in urban water supply will require a focussed approach and transplanting models from other sectors is unlikely to work. PPPs in urban water should be driven primarily by the need to improve service delivery and for bringing about greater operational efficiency. ULBs need to be clear about the rationale and need for PPPs before embarking on this journey. Given the public good characteristics of urban water supply, there may be a need for rethinking viability gap funding guidelines for urban water PPPs. Annuity models could be tried out but only after appropriate changes in the fiscal arrangement.

Start from first principles

Before initiating a PPP projects, the ULB functionaries need to assess the project structure by trying to answer the following questions (JNNURM 2008). This is a critical step as a badly configured design will condemn the project to failure.

- **Clarity in objectives** – ULB should have clarity on whether PPP is being sought for development or construction of water treatment plant, rehabilitation of distribution system, identification and extension of service to new connection, management of existing distribution system, introduction of new technology or for a combination of these.
- **Improvement in service delivery** – If the performance benchmarks are clearly identified it is possible to link payments to actual services and make the system transparent for the ULB and the private party. Ability to define performance standards is a crucial element of successful PPP design.
- **Financial impact** – It is a misconception that PPP projects have to generate revenues and be financially viable on

their own. Per se it is not necessary for a PPP project to be a revenue generating activity. Involving a private party may be justified even on the grounds of efficiency improvement. However, projects with user tariffs could be revenue neutral for the ULB. Therefore, it is more important to analyse the impact of the project on the finances of the ULB.

- **Availability of competitive suppliers** – There should be sufficient number of competing firms available in the market place. This will ensure best rates to the ULB and lower user charges for the public. In some cases, reputed contractors are not keen to take-up projects with ULBs as they may be less lucrative due to the smaller size. Therefore, it is necessary to build capacities of smaller contractors who typically work at a city level to increase the availability of contractors for PPP projects.
- **Organisational capacity** – The complexity of the project should be such that the ULB has capacity to manage the project. However, the capacity can be strengthened in the short-term through use of external advisors.
- **Regulatory impact** – It is important to assess whether the current legal framework allows the ULB to undertake PPP projects without substantial legal or procedural delays. In some cases, the governing legislation for ULBs has specific provisions that enable the ULB to provide services through PPP. In other cases, there is a state-wide enabling legislation for PPP.

Improving viability of PPP projects

There is no silver bullet for improving the viability of urban water supply projects. While innovative structuring of a project can help in better risk allocation and improve private sector response, the

Chapter 8

Enabling environment for PPPs

long-term success of PPPs will depend upon funding mechanism, adherence to user pay principles and good quality of project preparation

- **Political support:** PPP projects have to receive support from the political representatives, especially the mayor and elected councillors. It is necessary to seek their support and participation in design of the project right at the outset.
- **Project preparation and data quality:** Key risk issues should be identified and discussed with stakeholders. Data on customers, billing and collection, production information, water losses, etc. should be transparently shared. Bidders should also be given sufficient time to undertake a due diligence. DPR consultants should be required to capture information about existing water assets in greater detail.
- **Marketing of projects:** Views and opinion of potential bidders should be taken into account at early stages of project structuring.
- **Ring fencing of projects:** Private sector would be more interested in projects that have clearly established boundaries with less potential for scope creep. Projects like development and O&M of water treatment plant, sewerage treatment plant would be more amenable to PPP as these could be ring-fenced from operation of the distribution system. Operators also have greater opportunity to showcase their technical expertise. However, this benefit needs to be traded off against the need for dealing with multiple contractors – for water treatment and for distribution.
- **Focus on management contracts:** Management contracts for O&M of distribution system are most common in water sector as these allow the ULB to benefit from private sector expertise in O&M of water distribution. It also minimises the risk of failure from attempting a big bang project.
- **Addressing uncertainty through project design:** Projects may have to deal with uncertainty of information, especially relating to quality of existing distribution assets. Government is best placed to handle this risk and therefore, a cap may be put on capital investment expected from private operator. The contract should have a clear framework for approval and financing of additional capital investment by the government.
- **User pay principle:** It is advisable that a ULB should have credible tariff framework well before the PPP project comes on-stream so that there is a history of user charge payments. Introducing water tariffs along with the PPP project increases uncertainty for the operator. In such a scenario it may be better to provide operational grants for an initial period to demonstrate the benefits for the system to users before wide spread imposition of user charges. This will help gain support of users for the PPP projects.
- **Credibility of state government support:** Till such time the overall fiscal framework changes to provide greater financial resources directly to ULBs, dependence on state government support for capital contribution for PPP projects will continue to remain high. Uncertainty could be brought down if the state government is able to credibly commit funding for a project.
- **Flexibility in viability gap funding:** At present viability gap funding is restricted to a maximum of 40% of the project cost. The principle of viability gap is that a project generates positive externalities, the benefits of which cannot be appropriated by a private operator. In case of a water supply project, these externalities include less time spent by the urban poor in access to water, better health outcomes, etc. Since these cannot be easily appropriated through higher user charges, the government may consider increasing the proportion

of viability gap funding on a case by case basis. At the same time, the value for money in executing a project through PPP route needs to be demonstrated.

- **Model principles vs. Model contracts:** There are multiple project configurations possible in an urban water supply project and each project is unique. Adopting a model contract is fraught with the danger of being blindly adopted across other projects where such a contract is least applicable. Instead, there should be a concerted effort to identify the most common project configuration and develop an indicative risk sharing matrix for each of those. Such risk matrices will form the basis for preparation of contract documents and also leave sufficient room for adapting it to suit the project requirements.

Supporting PPP projects through annuity

It could be argued that annuity model minimises the risk for operator to generate revenues through imposition of user charges. Annuity model was initially adopted in the road sector before the operator gained confidence and graduated to toll-based projects.

There are three distinct differences that should be highlighted between the sectors. Firstly, road traffic is intrinsically linked to GDP growth and therefore, the upside potential from increase in traffic will accrue to the private operator. In urban water projects, while consumption profile

will change with increase in income, it is not obvious if there is tremendous upside potential. Secondly, imposition and collection of user charges is more challenging than collection of tolls. Finally, the annuity model in road sector took off on the back of dedicated funding available from fuel cess. There is no such dedicated revenue source for funding annuity projects in water.

ULBs have an important social obligation in terms of basic services. Entering into annuity projects will require the ULB to allocate certain part of its resources into an escrow account for meeting the annuity payment commitments. This may severely impinge upon the ULB's ability to perform its obligatory functions. The Planning Commission has recommended a limit of 25% of the total outlay for a scheme of a department over a five year period as the cap for annuity. In case of ULBs where the share of committed expenditure may be higher, the annuity cap may be lower than this percentage.

Even if ULB has comfortable buffer for committing annuity payments, the certainty of such payments for the private opportunity may still be subject to devolution of funds from the state government. Thus, the private operator may still be exposed to payment risk. In the long term, ensuring a predictable and formula based transfer of resources will increase the revenue base for ULBs and enable them to enter into annuity contracts without recourse to state government support.

PPP Framework in South Africa

PPPs in South Africa are governed by The Public Finance Management Act (PFMA) 1999 and Treasury Regulations and Treasury Practice Notes issued from time to time. The Act provides for preparation of multi-year budget projections for income and expenditure.

The Treasury Regulation 16, issued in pursuance to the Act authorises institutions (including departments, constitutional entities, public companies) to take-up PPP while ensuring affordability. The institutions can undertake PPP projects based on budgetary allocations provided to them for the current year and also based on future projections for the institution made by the relevant treasury unit. This provides a clear mandate to take-up PPP projects involving government budgetary commitment across multiple years.

A wholistic approach is needed for ensuring sustainability of resources. Reduction of NRW offers huge potential for resource savings but is a challenging task requiring good administration coupled with sound policy. 100% consumer level metering will be a necessary cog in the wheel of achieving resource sustainability. Further, experience in Nagpur shows that providing continuous water supply along with consumption-based tariff actually reduces the total water demand. As long as abstraction of ground water continues unabated, there will be little incentive for consumers to change their behaviour. Industrial water requirements represent a lower level priority on the nation's water resources and this should be reflected in policy through a push to desalination and compulsory reuse of water for certain purposes.

Reducing Non-Revenue Water

Reduction of NRW represents a very good opportunity for improving overall sustainability of urban water supply. Some of the benefits of NRW reduction are:

- Increase in the supply to legitimate consumers without an increase in resource availability or treatment capacity
- The per unit cost of reducing leakage is likely to be lower than the significant cost involved in creating additional capacity
- With more revenue water, the need for increasing water tariffs to meet costs would be reduced as greater volume of water supplied will be paid for
- It has the potential to bring hitherto unconnected consumers into the formal distribution system

This also offers the greatest opportunity for utilising private sector expertise as ULBs may not have the required skills in this area. Many cities have initiated water audits to get a better understanding of the different components of NRW in their water system. However, only a few have gone ahead and taken credible steps towards instituting a credible programme for NRW reduction.

Instituting and implementing an NRW reduction programme requires a multi-pronged strategy. Important elements of this strategy are:

- Full grant support for preparing an NRW reduction plan at a city level
- Creating of a financial support plan for ULBs to implement specific reduction measures. This programme should provide incrementally higher level of support for more and more challenging measures
- Identification of all un-connected consumers and having a policy of providing access to the formal network.
- Introduction of bulk level metering across a city to capture water availability across different zones and introducing measure for water balancing and equitable distribution of water
- Moving towards 100% consumer level metering and consumption based tariffs. If majority of the connections are metered, a volumetric tariff structure that reflects the true economic cost of water can be introduced

Chapter 9

Achieving resource sustainability

- Energy costs may constitute a significant proportion of water generation and distribution costs. Implementing the Energy Savings Company (ESCO) model with suitable modifications for water could help reduce technical losses. Replacement of old pumps, removal of unwanted bends and usage of pipes and material with lower friction would not only increase pumping efficiency, but also ensure suitable suction lift and help maintain adequate pressure in the system besides minimising energy costs.

24x7 is a focus area for future

Introducing continuous water supply (24x7) is one of the focus areas for urban water supply. Many cities in India have sufficient water resource availability and yet supply water for only a few hours a day. Currently, there are 9 projects under implementation under JNNURM for provision of 24x7 water supply (source: www.jnnurm.nic.in). The steps in moving towards 24x7 water supply lie in NRW reduction coupled with wide spread introduction of metering. Experience from Nagpur shows that, contrary to perception, water demand has gone down after introduction of continuous water supply.

Recommendations of High Powered Expert Committee

- *100 per cent individual piped water supply for all households including informal settlements for all cities*
- *Continuity of supply: 24x7 water supply for all cities*
- *Per capita consumption norm: 135 lpcd for all cities*

Regulating groundwater abstraction

Many cities rely on ground water for meeting their requirements. In some cases, surface water has to be transported over long distances making immediately available groundwater more economical to use. Further, unreliable nature of municipal supply may push more consumers to abstract groundwater. Under the Indian Easement Act 1982, every land owner has a right to collect and dispose all water under his land and on surface which does not pass through a defined channel. This gives the land owner the right to abstract the groundwater. However, judicial pronouncements also point towards a greater role for the state in conserving the use of groundwater. Nationwide implementation of regulation of groundwater is not practicable. However, in critical zones, such abstraction should be

monitored. Regulations such as registration of water pumps and monitoring its usage should be implemented. In general ensuring greater community participation, creating awareness about long term impact of over-abstraction and improving reliability of municipal supply may help in stabilising the ground water situation.

Desalination

Desalination could be considered an option in water starved regions of the country, especially in the coastal states of Gujarat and Tamil Nadu. Currently the project economics for desalination does not make it a suitable option for meeting drinking water requirements. However with technical improvements and economies of scale, the cost may come down in future. Cost of water from desalination could be comparable or lower relative to the opportunity cost

incurred by industry in coastal areas. Once desalination costs start to come down, such projects may also reserve a portion for meeting drinking water requirements of nearby towns and villages. Based on the successful experience with the first desalination project in Chennai, the second one has also been awarded and a third one is in pipeline. A key factor to consider in desalination is the salinity of the water discharged back into the sea and any impact on the local ecology should be suitably mitigated.

Water reuse for industrial requirement

As per the National Water Policy 2002, water for industry has lower priority relative to drinking water and irrigation

requirements. This priority has not been effectively translated into clear guidelines for implementation. Some cities now mandate that, subject to technical parameters, industries should use recycled water for meeting their requirements. Demand for tertiary needs should be met from recycled water. There have been several legislations for recycling of water in industries including Water Act of 1974 and Environment Protection Act of 1986. The government had set up Central Pollution Control Board (CPCB) to enforce EPA. Using a command and control regime may not be possible due to sheer diverse number of users and high monitoring costs. Self-regulation by industry along with an effective enforcement mechanism that levies a high penalty for default could be considered.



Transformation of the water sector hinges on capacity of urban managers to plan and implement the reform measures. If cities are the future of India's economic opportunity, then they should be managed by the best and brightest in the country. All IAS officers should go through a compulsory stint as municipal commissioner. A separate cadre of professional urban managers should be created as a state level service. To increase the profile of this service there should be best in class training provided. For this purpose, a network of national institutes focussed on urban management should be created. Twinning arrangements should be created with well managed utilities for transfer of skills. Finally, a performance-linked incentive programme has to be put in place so that the urban managers see a long-term benefit in bringing about sustainable improvements rather than focussing on immediate sub-optimal measures.

Capacity building is an ongoing process. Despite the presence of capacity building

fund under JNNURM, very few proposals were received. This shows that ULBs were either not aware of this facility or did not perceive any benefit in approaching the fund. Furthermore, cities with greater capacities are more likely to benefit from national level programmes and initiatives due to their ability to prepare good quality proposals. Not only should urban infrastructure programmes like JNNURM have dedicated funds for capacity building, but more importantly, there should be concerted effort to reach out to those cities which have the greatest need for such capacity building. One of the hitherto neglected aspects of capacity building has been the absence of database which captures various performance metrics for ULBs. While the service level benchmarking initiative is a good starting point, the suitable end state should be creation of a data system that facilitates informed decision making at the ULB level. Capacity for PPP and for introducing regulation will have to be gradually built up within the sector.

Chapter 10

Building capacity of urban functionaries

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Bibliography

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