every drop counts

Water Reforms - Mumbai, Maharashtra -

MCGM- A Glimpse of Size & Scope of Operations

• MCGM is the Local Authority for Mumbai which is -
  – India’s financial capital
  – Maharashtra’s state capital
  – A city with very high population and structural density
    (Population density of 27,209 persons per Sq. Km.)
  – A coastal city with massive reclamation.

• MCGM caters to, –
  – An area of 437.71 Sq. Km.
  – A population 12.5 Million people (2011)
  – Slum Population 6.5 Millions (2011)

MCGM has –
  – An employee strength of 1,40,000
  – An annual Budget of Rs.26,581 Crores.
Sources of Water Supply For Mumbai

Basin wise water Sources

- Vaitarna
- Upper Vaitarna
- Lower Vaitarna
- Middle Vaitarna
- Pinjal
- Gargai
- Bhatsa
- Ulhas
- Kalu
- Shai
## Existing Water Supply Sources

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Source</th>
<th>Year of Completion</th>
<th>Qty of Water Supply (MLD)</th>
<th>Total Qty of Water Supply (MLD)(Cumulative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vihar Lake</td>
<td>1860</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>Tulsi Lake</td>
<td>1879</td>
<td>18</td>
<td>128</td>
</tr>
<tr>
<td>3</td>
<td>Tansa Lake</td>
<td>1892 to 1925</td>
<td>455</td>
<td>613</td>
</tr>
<tr>
<td>4</td>
<td>Lower &amp; Upper Vaitarna</td>
<td>1957</td>
<td>1095</td>
<td>1703</td>
</tr>
<tr>
<td>5</td>
<td>Bhatta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I Mumbai</td>
<td>1981</td>
<td>455</td>
<td>2158</td>
</tr>
<tr>
<td></td>
<td>II Mumbai</td>
<td>1989</td>
<td>455</td>
<td>2613</td>
</tr>
<tr>
<td></td>
<td>III Mumbai</td>
<td>1996</td>
<td>455</td>
<td>3068</td>
</tr>
<tr>
<td></td>
<td>III A MUMBAI (Partial)</td>
<td>2004</td>
<td>452</td>
<td>3520*</td>
</tr>
</tbody>
</table>

* Including 120 MLD enroute supply
Mumbai Water Supply Scenario

Water Supply: 3520 Mld (including 120 mld en route supply)

Trunk Conveyance:
Tunnel and Trunk Mains (Range 1800 mm to 3500 mm): 1000 KMS

Major Water Treatment Plants:
- Bhandup: Rated capacity 1910 Mld, working at 2100 Mld
- Panjarapur: Rated capacity 910 Mld, working at 1010 Mld
- Vehar: Rated capacity 110 Mld
- Tulsi: Rated capacity 18 Mld

Major Pumping stations:
Pise, Panjarapur, Bhandup, Raoli

Master Balancing Reservoirs: 2 (Yewai 118 MLD & Bhandup 246 MLD)
Service Reservoirs: 27
Length of water mains: 4000 Kms
No. of Distribution Zones: 112
No. of Leak-detection Zones: 615
Mumbai Water Supply Scenario

No. of daily operated valves : 850

Supply hours : 1 to 16 Hrs

Average Pressures
- Trunk Mains : 50 MWC to 80 MWC - 1000 KM
- Feeder Mains : 20 MWC to 50 MWC
- Distribution Mains : 3 MWC to 15 MWC - 4000 KM

Material
- Trunk & Feeder Mains : M.S. & C.I
- Distribution Mains : C.I., D.I., P.E

Total Connections
- Metered : 3,83,306
- Un Metered : 1,00,000

Non functional meters : 40%
(City is partially and Suburbs are fully metered)

Water billed (Year 2012) : 2,242 MLD
# Mumbai Water Supply Scenario

## Contd..

<table>
<thead>
<tr>
<th>Mumbai Population in Million</th>
<th>Per Capita Consumption (LPCD)</th>
<th>Total Consumption (MLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slum</td>
<td>6.5</td>
<td>100</td>
</tr>
<tr>
<td>Non Slum</td>
<td>5.93</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>12.43</td>
<td></td>
</tr>
</tbody>
</table>
Policy of granting Water Supply to Slums

Eligibility – Structure prior to 1.1.1995, Metered water connection with tap in GWP

Not Eligible - Structure post to 1.1.1995
Tariff structure consists of:

- Water Charges
- Sewerage Charges

- Water Tax (R) 0.253 % / (NR) 0.459 % to 1.837 % of CV
- Sewerage Tax (R) 0.163 % / (NR) 0.296 % to 1.185 % of CV
- Water Benefit Tax (R) 0.069 % / (NR) 0.126 % to 0.504 % of CV
- Sewerage Benefit Tax (R) 0.043 % / (NR) 0.078 % to 0.311 % of CV

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Category</th>
<th>Water Charges Rs. Per 1000 Ltr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slums</td>
<td>3.00</td>
</tr>
<tr>
<td>2</td>
<td>Resi. C.H.S. Bungalows / Row Houses</td>
<td>4.00</td>
</tr>
<tr>
<td>3</td>
<td>Dispensaries, Hospitals, Maternity Homes</td>
<td>16.00</td>
</tr>
<tr>
<td>4</td>
<td>Commercial Establishments, BEST</td>
<td>30.00</td>
</tr>
<tr>
<td>5</td>
<td>Industries, Railways, BARC</td>
<td>40.00</td>
</tr>
<tr>
<td>6</td>
<td>Bulk Consumers, Star Hotels, Race Course</td>
<td>60.00</td>
</tr>
</tbody>
</table>
Mumbai Water Supply Scenario.. Continue

**Billed Estimate**

Residential : 1982 MLD  
Industrial : 80 MLD  
Commercial : 180 MLD

**Meter Category**

Domestic (non slum) Residential : 87,414  
Domestic (slum) Residential : 2,30,525  
Commercial : 59,933  
Industrial : 5,434
REVENUE GENERATION

- Annual Revenue Demand - 917.39 Cr.
- Annual Revenue Recovery - 885.16 Cr.
- Cost of Production of Water - Rs. 11.15/KL
M.M.C. Act

- Municipal Corporation has its independent Act: MMC Act 1888
- Tariff structure is proposed by the Municipal Commissioner and approved by the standing committee. Present Tariff structure is revised & effective from 16.06.2012.
- In last revision Standing Committee has also authorized the Municipal Commissioner to revise the Tariff to a maximum of 8% every year based on the actual increase in
  - Admin expenses
  - Energy
  - Bulk Water Charges
  - O & M Expenses
Slum Colonies in elevated areas

Water supply by gravity is not possible to Slum Colonies in elevated areas

Policy adopted:

- Ground storage tank, Pumping system and pumped delivery main to be constructed by the corporation at its cost.

- Installation to be handed over to the association of slum dwellers for O & M

- Association is also responsible for payment of water charges bill.
Achievement of Household piped water supply

Individual household water supply is made available in planned developments.

In Slums water supply through metered connection is given to a group of slum dwellers with Tap in general washing place.

Municipal corporation does not provide Public taps in slums.
Ground Water Supply

Support of Ground Water Supply for treated water supply is meager in Mumbai.

Nearness of Sea as caused salinity in ground water due to ingress of sea water.

There are about 12000 Tube wells.

Rain Water Harvesting is compulsory for new development of area more than 300 sq.mtr.

Ground Water is mainly used for non domestic purposes.

Survey of Ground Water Potential is being done through Ground Water Survey development agency of GoM.
Demand Management

✓ Development in Mumbai continues
✓ Slums are being rehabilitated in planned houses
✓ Old Buildings are being redeveloped
✓ This development is financially viable only with increased Floor space index. (FSI)
✓ Problem of inequitable distribution exists.
✓ To achieve equitable distribution formation of District Metering Zone, District Metering area, Installation of bulk flow meters has been under taken
✓ Active leak control measures are being revived.
## Information of Targets and Service Level Benchmarking to be achieved by 2013 under JnNURM BSUP Reforms

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Service Level Benchmarking</th>
<th>Expected Efficiency</th>
<th>Present Status</th>
<th>Target for March 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coverage of Water Supply Connections</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Per Capita Supply of Water</td>
<td>135 Ltrs Per day per Person</td>
<td>135 Ltrs Per day per Person</td>
<td>150 Ltrs Per day per Person.</td>
</tr>
<tr>
<td>3</td>
<td>Extent of Metering of Water Connections</td>
<td>100%</td>
<td>81%</td>
<td>85%</td>
</tr>
<tr>
<td>4</td>
<td>Extent of Non Revenue Water (NRW)</td>
<td>20%</td>
<td>20%</td>
<td>18%</td>
</tr>
<tr>
<td>5</td>
<td>Continuity of Water Supply</td>
<td>24 x 7</td>
<td>2 to 6 Hours</td>
<td>4 Hours on an average</td>
</tr>
<tr>
<td>6</td>
<td>Quality of Water Supply</td>
<td>100%</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>7</td>
<td>Efficiency in redressal of Customer Complaints</td>
<td>Within 24 Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cost of Recovery in Water supply services</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>9</td>
<td>Efficiency in Collection of Water Supply related Charges</td>
<td>90%</td>
<td>80%</td>
<td>82%</td>
</tr>
</tbody>
</table>
Water Supply- Key Issues

➤ Issues pertaining to Quantity of water
   Overall availability and equitable distribution

➤ Issues pertaining to Quality of Water
   Contamination due to aging network

➤ Issues pertaining to Cost of Operations and tariff structure

➤ Issues pertaining to hours of supply
   Intermittent supply vs. 24X7 supply

➤ Issues pertaining to “unaccounted for water”
   Physical as well as revenue losses

➤ And last but not the least... Customer Relationship Management
   Challenges of Rising Expectations.
Quantity issue: Does Mumbai have enough water?

- Mumbai’s Current Population: 12.5 million
- Mumbai’s water supply: 3350 MLD
- Non-revenue water: 25% - 30%
- Domestic per capita water availability: >180 lpcd (excluding 25% leakage & Ind./Com. Demand)
- Avg. Hours of Supply: 1.5 to 4 hours

The per capita water availability in some cities having 24 X 7 water supply:
- London: 150 lpcd
- Singapore: 160 lpcd
- Kuala Lumpur: 120 lpcd
- Paris: 150 lpcd

Thus Mumbai has enough water to switch over from the present intermittent to Continuous pattern of water supply provided:

1. Non revenue water is to be reduced significantly
2. Customer Demand to be managed (including wastage)
3. Supply to be augmented to meet the rising demand (new sources to be created for future demand)
Transition from Intermittent to 24 X 7 Water Supply

Major Water Sector Initiatives

- **Demand-side Management**
- **Supply-side Management**
- **Source Augmentation**
**Demand Side Management**

- Universal metering with AMR Meters are being introduced to enable the citizens pay as per their consumption.
- Agencies for supply, installation, operation/maintenance & reading of water meters are appointed.
- The issues of Metering Slums / un-metered connections in old city are being redressed separately.
- Telescopic Rates to encourage conservation of water are introduced *considering 5 persons per premises*.

  **The Telescopic Tariff Structure approved and adopted as below:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upto 150 lpcd</strong></td>
<td><strong>One time</strong></td>
</tr>
<tr>
<td><strong>150 to 200 lpcd</strong></td>
<td><strong>Two times</strong></td>
</tr>
<tr>
<td><strong>200 to 250 lpcd</strong></td>
<td><strong>Three times</strong></td>
</tr>
<tr>
<td><strong>250 lpcd &amp; above</strong></td>
<td><strong>Four times</strong></td>
</tr>
</tbody>
</table>
Source Augmentation - Long Term Plan

Following sources are proposed to be developed in phases:

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Source</th>
<th>Basin</th>
<th>Yield (MLD)</th>
<th>Major Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Middle Vaitarna</td>
<td>Vaitarna</td>
<td>455</td>
<td>Dam, Intake Conveyance, WTP, MBR &amp; Pumping Station</td>
</tr>
<tr>
<td>2</td>
<td>Gargai</td>
<td>Vaitarna</td>
<td>440</td>
<td>Dam</td>
</tr>
<tr>
<td>3</td>
<td>Pinjal</td>
<td>Vaitarna</td>
<td>865</td>
<td>Dam, Conveyance, WTP</td>
</tr>
<tr>
<td>4</td>
<td>Damanganga</td>
<td>Damanganga</td>
<td>1586</td>
<td>Dam, Conveyance, WTP</td>
</tr>
</tbody>
</table>
Supply Side initiatives

Comprehensive Water Supply Distribution Improvement Programme is proposed to be taken up under the guidance of a reputed Consultant with broad scope of work as under –

**Water Distribution Management & NRW Reduction:**

1. Digital mapping of the utility on GIS compatible base maps.
2. Hydraulic modeling of the entire network.
3. Hydraulic model of DMA, each comprising about 1000 connections.
4. 100% Consumer metering, Bulk metering and District Metering set-up.
5. Water balance and estimation of NRW/UFW
6. Leakage detection, Repairs / Rehabilitation / Replacement plan
7. Water balance. If NRW within limits, implement 24X7 supply
8. Introduce pressure regulating devices for equitable distribution
9. Introduce / upgrade Distribution management tool ‘SCADA’
Other Major Projects

Replacement of Twin 1800 mm dia. Tansa main

- Tansa & Tarali - 43 Km) by 2750 mm single main
- In city limits (Bhandup-Maroshi and Mahim-Race course) 25km

Under Ground Water Supply Tunnels (in progress)

- Modak Sagar – Y-Branch 3500 mm (7 Km)
- Maroshi - Ruparel College 3000 mm (12 KM)
- Powai – Ghatkopar 2500 mm (5 Km)
- Powai – Veravali 2500 mm (1.8 Km)
- Gundavali – Bhandup 5500 mm (14 Km)

Under Ground Water Supply Tunnels (Proposed)

- Tilak Nagar – Trombay 2750mm (5 Km)
- Tilak Nangar – Naigaon 3000mm (9 Km)
- Pinjal – Gundavali 5500mm (64 Km)
MUNICIPAL CORPORATION OF GREATER MUMBAI

T H A N K Y O U
for your interest


every drop counts

Water Supply of Brihanmumbai