ICRIER’S
PROGRAM ON CAPACITY BUILDING & KNOWLEDGE
DISSEMINATION ON URBANIZATION IN INDIA

PREPARING FOR THE URBAN CHALLENGES OF THE
21ST CENTURY

SERVICE DELIVERY OF WATER AND SANITATION
- CHALLENGES FACED BY METROPOLITAN CITIES
(SURAT CITY)

FEBRUARY 06, 2013

Mr. Jatin Shah, City Engineer,
Surat Municipal Corporation
Surat : Water Supply System
Growth of Surat City

- Historical Development Of Surat Dates Back To 300 BC.
- Municipality Established In 1852 AD.
- Municipal Corporation Formed In 1966.

<table>
<thead>
<tr>
<th>Year</th>
<th>Area in Sq. Km</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>8.18</td>
<td>223182</td>
</tr>
<tr>
<td>1961</td>
<td>8.18</td>
<td>288026</td>
</tr>
<tr>
<td>1971</td>
<td>33.85</td>
<td>471656</td>
</tr>
<tr>
<td>1981</td>
<td>55.56</td>
<td>776583</td>
</tr>
<tr>
<td>1991</td>
<td>111.16</td>
<td>1498817</td>
</tr>
<tr>
<td>2001</td>
<td>112.27</td>
<td>2433785</td>
</tr>
<tr>
<td>2001*</td>
<td>326.51</td>
<td>2877241</td>
</tr>
<tr>
<td>2011</td>
<td>326.51</td>
<td>44.7 Lakhs</td>
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</tbody>
</table>
Surat : City Expansion

- Unprecedented growth in last four decades.
- 10-fold population rise in last 4 decades.
- 3-fold increase in area in 2006.
- Now ranks the 8th most populated city in the country.
Water Supply – Present Status

- Source of Water: River Tapi
- Population covered under piped network*: 94% (out of 47 Lacs present pop. of city)
- Present installed capacity of Intake Wells: 1463 MLD
- Present installed capacity of Water Works: 1178 MLD
- Present gross daily average water supply: 840 MLD
- Average Per capita Water Supply per day: 140 lpcd
- Total storage capacity of all WDS & WW: 653 ML
- Total app. length of water supply pipelines: 2750 Km.
## Water Supply
### Increase in water supply since year 1995

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Year</th>
<th>Area (Sq.Km.)</th>
<th>Est. Population (Lacs)</th>
<th>Gross Av. Daily Water Supply (MLD)</th>
<th>% Population Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1995</td>
<td>112.28</td>
<td>19.00</td>
<td>180</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>2000</td>
<td>112.28</td>
<td>24.00</td>
<td>440</td>
<td>88</td>
</tr>
<tr>
<td>3</td>
<td>2005</td>
<td>112.28</td>
<td>30.00</td>
<td>580</td>
<td>95</td>
</tr>
</tbody>
</table>

Area of city increased in year 2006 from 112.28 Sq.Km. to 326.51 Sq.km

| 4 | 2013 Present | 326.51 | 47.00 | 780 domestic + 60 Industrial = 840 MLD | *94% |

* Remaining area to be covered by Dec., 2013
## Water Supply Master Plan

As per Water Supply Master Plan for Surat city

<table>
<thead>
<tr>
<th>Year</th>
<th>2026</th>
<th>2041</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>87.48 Lac</td>
<td>123.04 Lac</td>
</tr>
<tr>
<td>Projected Water demand</td>
<td>1682.63 MLD</td>
<td>2331.67 MLD</td>
</tr>
</tbody>
</table>
## Water Supply: Increase in water supply Infrastructure

<table>
<thead>
<tr>
<th>Water Supply Components</th>
<th>Present Year 2013</th>
<th>Ongoing/tender works Year 2013</th>
<th>Ultimate capacity Master Plan Year 2041</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake wells (in MLD)</td>
<td>1463</td>
<td>2033</td>
<td>2425</td>
</tr>
<tr>
<td>Water Treatment Plants (in MLD)</td>
<td>1178</td>
<td>1468</td>
<td>1678</td>
</tr>
<tr>
<td>UGSR Capacity (in ML)</td>
<td>624.7</td>
<td>680.9</td>
<td>726.7</td>
</tr>
<tr>
<td>ESR Capacity (in ML)</td>
<td>28.6</td>
<td>70.9</td>
<td>124.3</td>
</tr>
<tr>
<td>Distribution Network (in Km)</td>
<td>2750</td>
<td>3100</td>
<td>3400</td>
</tr>
</tbody>
</table>
Preparing for Urban Challenges in 21st Century – Water Supply

- Efficient Water Supply Management
- Water Quality Monitoring
- Operation and Maintenance practices
- Energy Efficiency and savings measures
- NRW Reduction initiatives
- Water Conservation
Efficient Water Supply Management

- Strict Water Quality compliance in adherence to drinking water standard IS 10500
- Adequate water supply (meeting LPCD norms) through effective O&M Practices
- Water conservation and IEC activities
- Optimum O&M Cost with
  - Lowest production cost (Rs./KL)
  - Reduced energy consumption level (KWH/ML)
  - Loss reduction / control
- Effective Service Delivery in sustainable manner
- 100% cost recovery
### 100% Cost Recovery

#### WATER SUPPLY

**REVENUE INCOME V/S EXPENDITURE**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Revenue Income</th>
<th>Revenue Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>0</td>
<td>4330.39</td>
</tr>
<tr>
<td>2006-07</td>
<td>3651.14</td>
<td>5048.84</td>
</tr>
<tr>
<td>2007-08</td>
<td>4388.58</td>
<td>6302.59</td>
</tr>
<tr>
<td>2008-09</td>
<td>4857.34</td>
<td>6690.65</td>
</tr>
<tr>
<td>2009-10</td>
<td>6109.16</td>
<td>7105.16</td>
</tr>
<tr>
<td>2010-11</td>
<td>6370.15</td>
<td>7304.81</td>
</tr>
<tr>
<td>2011-12</td>
<td>6906.67</td>
<td>9016</td>
</tr>
</tbody>
</table>

- Revenue Income
- Revenue Expenditure

**Rs. in Lacs**

- 0
- 1000
- 2000
- 3000
- 4000
- 5000
- 6000
- 7000
- 8000
- 9000
- 10000

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**Note:** This document provides a financial overview of water supply revenue income versus expenditure from 2005-06 to 2011-12, showing a steady increase in revenue income and expenditure over the years.
<table>
<thead>
<tr>
<th>Sr.</th>
<th>Location</th>
<th>Frequency</th>
<th>Parameter</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generation (more than 445 samples)</td>
<td>Round the Clock</td>
<td>pH, Turbidity, TDS, Free Residual Chlorine (FRC), Dissolved Oxygen (DO)</td>
<td>Raw Water, Treated / Supply Water from Water Works</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Hourly</td>
<td>pH, Turbidity, Free Residual Chlorine (FRC)</td>
<td>Raw Water, Treated Water</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Shift wise</td>
<td>pH, Turbidity, Colour Index, Taste, FRC, TDS, Alkalinity, DO</td>
<td>Raw Water, Treated Water, Supply Water</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Weekly</td>
<td>pH, Turbidity, Colour Index, Taste, FRC, TDS, Alkalinity, DO, Total Hardness, Nitrate, Iron, Fluoride, Ammonical Nitrogen, Chloride, Chlorine Demand, BOD, COD, MPN Index (17 parameters)</td>
<td>Raw Water, Treated Water, Supply Water</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Quarterly</td>
<td>All heavy metals as per IS 10500 including above 17 parameters</td>
<td>Raw Water, Treated / Supply Water</td>
</tr>
<tr>
<td>1</td>
<td>WDS (12 samples)</td>
<td>Twice in Supply hour</td>
<td>Turbidity, FRC</td>
<td>Supply water to consumer from WDS</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Weekly</td>
<td>pH, Turbidity, Colour Index, Taste, FRC, TDS, Alkalinity, DO, Total Hardness, Nitrate, Iron, Fluoride, Ammonical Nitrogen, Chloride, Chlorine Demand, BOD, COD, MPN Index (17 parameters)</td>
<td>Supply water to consumer from WDS</td>
</tr>
<tr>
<td>1</td>
<td>Consumer (more than 660 samples)</td>
<td>Daily</td>
<td>Odour, pH, TDS, Ammonical Nitrogen, FRC</td>
<td>Consumer samples</td>
</tr>
</tbody>
</table>
Operation & Maintenance Practices
Installation of SCADA System at WTP

- Installed SCADA (Supervisory Control and Data Acquisition) System at,
  - Intake well machinery operations
  - Booster / Pump House in water works
  - Water Treatment Plant – Plant unit operations
    - 250 MLD capacity WTP at Rander Water Works
    - 200 MLD capacity WTP at Sarthana Water Works
    - 150 MLD capacity WTP at Katargam Water Works
    - 150 MLD capacity WTP at Sarthana Water Works

- Benefits of SCADA
  - Optimization in deployment of manpower
  - Remote monitoring and control
  - Reduction in overall maintenance and in down time, helps better inventory management for spares, consumables etc.
  - Rationalization in Utilization of equipments / machineries (Transformers, pump sets etc.)
Operation & Maintenance Practices

Water Treatment Plants & Grid Network

- **GRID System**
  - All Water Works and Water Distribution Stations are interlinked
  - Any water works can feed water to any water distribution station
  - Helped to restore entire water supply system within 36 hours during the floods of August 2006
Energy Efficiency and savings measures

- Installation of thyristor based APFC panels
- Coating for Energy Saving to various pumps
- Rationalisation of contract demand at WW/ WDS etc.
- Replacement of pumps and trimming of impellers of pumpsets at various Water Works and Water Distribution Stations after energy audit.
- Replacement of Zero Velocity Valve
- Re-engineering in Water Supply routes
- Various Energy Saving measures reduced specific energy consumption in water supply (Specific Energy Consumption has reduced from 355 KWH/ML to 279 KWH/ML)
Wind Power Generation:

- Installed 2nos. of 1.5 MW Wind Power Plant at Village: Gosa, Dist.: Porbander
- Total Expected energy generation: - 6.40 GWH/ annum
- Total Expected energy saving: - Rs.2.83 Cr. per annum
- Total Capital Investment: - Rs.18.43 Cr.
- Total O & M cost up to 10 years: - Rs.3.76 Cr.
- Actual energy generated till Jan 2013: - 1.76 Crore Unit
- Effective energy saving till Jan 2013: - Rs. 8.48 Crore

Renewable Energy for Water Supply
Wind Power Generation:

(Expected to be commissioned by Feb 2013 End)

- 8.4 MW capacity Wind Power Plant
- Total Expected energy generation: -
  
  1.72 Crore units/ annum

- Total Expected energy saving : -
  
  Rs.7.4 Crore per annum

- Total Capital Investment: -
  
  Rs.52.18 Crore
Conventional energy efficiency measures, re-engineering of water supply routes and wind energy generation, the total savings have reached a level of

- 1.26 CroreKWH/ annum
- Rs. 5.96 Crores/ annum
Energy Efficiency and savings measures - Results

Water Supply (in MLD) Vs. Specific Energy Consumption (kWH/ML)

Water Supply (in Million Liters per Day)

- 2001-02: 355.99
- 2002-03: 449.08
- 2003-04: 343.98
- 2004-05: 413.33
- 2005-06: 516.03
- 2006-07: 316.95
- 2007-08: 305.04
- 2008-09: 291.78
- 2009-10: 280.43
- 2010-11: 279.88
- 2011-12: 279.17
- 2012-13: 285.07

Specific Energy Consumption (kWH/ML)

- 2001-02: 406.13
- 2002-03: 454.60
- 2003-04: 478.58
- 2004-05: 514.33
- 2005-06: 567.09
- 2006-07: 596.94
- 2007-08: 655.31
- 2008-09: 710.46
- 2009-10: 744.53
- 2010-11: 789.10
- 2011-12: 836.42
- 2012-13: 785.07

- Total Energy Cost is Rs. 43.1 Crore
- Recurring Energy Saving by all means is Rs.5.96 Crore.
- Hence, through energy savings measures, 13.83% savings towards Electricity cost is realized

Total Annual O&M Cost : Rs.90.16 Crore
NRW reduction initiatives

- Establishment of NRW Cell- Tasks on hand
  - Planning for comprehensive Water Audit
  - Flow measurement & Metering
    - Generations (100% implemented) – Non contact type – ultrasonic flow meters
    - Distribution Stations (100% implemented) – Electromagnetic flow meters
  - Consumer metering
    - Consumers having connection sizes more than 0.5” are metered
    - All Industrial connections are metered (Electromagnetic meters)
Promoting Rain water harvesting system for ground water recharging

- As per DCR – Gujarat, it is mandatory to install RWH in all new development permission for High rise building and plot area more than 4000 m².
- Rebate scheme for Rain Water Harvesting
  - Residential societies, apartments
  - Industrial units
  - Open plots
  - Subsidy offered by SMC for People participation – 50% of actual amount or Rs. 2000/- (whichever is less).
- SMC’s own premises/ buildings - 198 Nos 6” to 8” dia. RWH completed till date.
Water Conservation – IEC Activity

- IEC Activities related to Water Conservation
  - Designing & Execution of campaign
  - Awareness program for water conservation
  - Seminar, Workshop
  - Survey
Water Conservation – IEC Activity

- Imparting Education: Visit of
  - School going Children to all water works on continuous basis
  - Colleges
  - NGOs
<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Target 2012-13</th>
<th>Achievement 2012-13 till Dec-2012</th>
<th>Service Level Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage</td>
<td>93%</td>
<td>94.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Per Capita Supply of Water</td>
<td>140 lpcd</td>
<td>140 lpcd</td>
<td>135 lpcd</td>
</tr>
<tr>
<td>Extent of Metering</td>
<td>5.8%</td>
<td>2.4%</td>
<td>100%</td>
</tr>
<tr>
<td>Extent of Non-revenue Water</td>
<td>Can be known after Water audit results.</td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td>Continuity of water supply</td>
<td>3.5 Hours</td>
<td>3.5 Hours</td>
<td>24x7</td>
</tr>
<tr>
<td>Eff. in redressal of customer complaints</td>
<td>95%</td>
<td>98.5%</td>
<td>80%</td>
</tr>
<tr>
<td>Quality of Water Supplied</td>
<td>99.5%</td>
<td>99.9%</td>
<td>100%</td>
</tr>
<tr>
<td>Cost Recovery</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Eff. In Collection of Water Charges</td>
<td>88%</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>
To reduce sole dependency on surface source water, SMC has planned in the direction of alternate source of water in following ways:

- Construction of 2 Radial collecting wells in river bed
- Construction of Balloon Barrage on the downstream of existing weir on river Tapi to create a water reservoir.
- Laying of pipeline from Kakrapar to Surat
To maintain the financial self sustainability by 100% recovery of O&M Cost by;

- 100% metering
- Creating public awareness for willingness to pay for the service of water.
- Regular revision of water charges
- Reducing NRW & UFW below 20%
- Encouraging PPP model for comprehensive O&M of 24x7 water supply system
Water Supply : Challenges of 21st Century

- To cope up with haphazard rapid urbanization on the outskirts of the city;
  - Comprehensive Water Supply Master Plan is prepared for long term – up to year 2041
  - Synchronized Water Supply Planning in Coordination with Urban Development Authority for the area surrounding the city.

- Better Water Supply Management by
  - Utility Mapping in GIS (in progress)
  - Phase-wise Implementation of 24x7 water supply system
  - Technological up-gradation like SCADA for whole water supply system (presently it is already installed at Water Works)
Surat : Sewerage System
# Sewerage Scenario in Surat

## Year 2012-13
- **Coverage**: 149 sq. km. (i.e. 76 % of present habitable area & 92 % of total Population)
- **Length of sewer network**: 1428 km.
- **Sewage Pumping Stations**: 35 Nos (1483.78 MLD)
- **Sewage Treatment Plants**: 9 Nos. (726.5 MLD)

## Year 2014
- **Coverage**: 204 sq.km. (i.e. 100 % of present habitable area)
- **Length of sewer network**: ~ 1600 km.
- **Sewage Pumping Stations**: 58 Nos (1949.98 MLD)
- **Sewage Treatment Plants**: 12 Nos (992.50 MLD)
Sewerage Zones and STPs

Total Existing Sewage Treatment Plants 9 nos.
Total Existing Capacity: 726.5 MLD

- **STP Under Augmentation**: 3 Nos. – 150 MLD
- **STP Under Construction**: 1 Nos. – 66 MLD
- **STP Under Planning**: 2 Nos. – 53 MLD
Preparing for Urban Challenges in 21\textsuperscript{st} Century – Sewerage

- Sewage Treatment Plants: Utilization of Latest Technologies
  - Compliance with the Discharge Norms of GPCB for Sewage Treatment
- Cost Effective Implementation: Sewage Pumping Station and Rising (Pumping) Main
- Energy Efficiency Reforms
  - Sewage Gas Based Power Plant
  - Carbon Credit: Clean Development Mechanism
- SCADA and Automation
- PPP Initiatives
  - Common Effluent Treatment Plant
  - Wastewater Recycling Project
- Efficient O&M Practices for Sewerage System
## Sewage Treatment Plants: Utilization of Latest Technologies

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>STP Location</th>
<th>Year of Commission</th>
<th>Capacity (MLD)</th>
<th>Process</th>
<th>Process Design</th>
<th>Utilizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anjana</td>
<td>1995</td>
<td>82.5</td>
<td></td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>2</td>
<td>Bhesan</td>
<td>1995</td>
<td>100</td>
<td></td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Bhatar</td>
<td>1999</td>
<td>120+42</td>
<td></td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>4</td>
<td>Karanj</td>
<td>1999</td>
<td>100</td>
<td></td>
<td></td>
<td>98</td>
</tr>
<tr>
<td>5</td>
<td>Singanpore</td>
<td>2003</td>
<td>100+55</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Bamroli</td>
<td>2002</td>
<td>100</td>
<td></td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Asharma</td>
<td>2009</td>
<td>15</td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Khajod</td>
<td>2009</td>
<td>25</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>Variav-Kosad</td>
<td>2012</td>
<td>84</td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>10</td>
<td>Dindoli</td>
<td>Under execution</td>
<td>66</td>
<td></td>
<td></td>
<td>--</td>
</tr>
</tbody>
</table>

**TOTAL**

|                | 726.5       | 163    | 584   |
Sewage Pumping Stations

- Submersible Type Sewage Pumping Station
  - Use of High Efficiency Sewage Submersible pumps
  - Only Wet-Well is required – No Dry Well – Cost of Civil Construction and construction time is reduced substantially
Green Energy Generation
Sewage Gas Based Power Plants

- GAS SUCTION BLOWERS
- H₂S SCRUBBER SYSTEM
- SEWAGE GAS HOLDER
- ENGINE FEEDING BLOWER
- ENGINE-GENERATOR SET
- FLARE STACK
Initiatives

Sewage Gas Based Power Plant:

- First Sewage Gas to Electricity Generation at Anjana Sewage Treatment Plant of 0.5 MWe capacity was set up in 2003.
- 3 another Sewage Gas based power plants each of 1 MWe capacity were commissioned in 2008.
- Additional two sewage gas based power plants each of 0.55 MWe and 0.75 MWe are installed and on verge of commissioning.
- The total electricity generated till Dec 2012 from sewage gas is
  - 3.87 Crore units
  - worth Rs. 17.96 Crore

Carbon Credit:
- The proposal to get the carbon credit from 3 Sewage Gas Based Power Plant is approved by Ministry of Environment & Forest and is under process for validation and project registration at UNFCCC. It is estimated that the project would generate 58586 CER (Certified Emission Reduction).
Through Energy efficiency measures and Green Energy Generation through Sewage Gas has resulted the total savings of

- 68.7 Lac unit per annum
- Rs. 3.18 Crores/ annum
Initiatives

SCADA (Supervisory Control And Data Acquisition)

- On existing 23 SPS and 6 STPs at project cost of Rs. 33 cr.
- On line Data Monitoring and Controlling.
- Advance Planning for preventive maintenance and reduced break down period
- On line electrical data to be used to improve energy efficiency and energy audit
PPP Initiatives
PPP Initiatives

Common Effluent Treatment Plant (CETP)

• Estimated Cost : Rs. 119.00 Crores
• Project Components
  • Wastewater Collection Network – 21 km
  • Pumping Station - 140 MLD
  • Conveyance Line - 3.5 km
  • CETP - 100 MLD
• Public Private Partnership :
  • Expenditure for Wastewater Collection Network, Pumping Station and Conveyance line will be borne by SMC
  • Expenditure for CETP will be borne by Pandesara Industries.
• Commissioned in January 2011
PPP Initiatives

Common Effluent Treatment Plant (CETP)

Effluent Pumping Station

Common Effluent Treatment Plant (CETP)
**Initiatives – Waste Water Recycling Project**

**Tertiary Treatment Plant**

- 40 MLD Industrial Grade Tertiary Treated Water supply to Industries at Pandesara GIDC from Bamroli STP is under execution.

- Commissioning of this project will help to reduce the load on drinking water resources.
Total Energy Cost is Rs. 23.50 Crore

Recurring Energy Saving by all means is Rs.3.18 Crore.

Hence, through energy savings measures, 13.53% savings towards Electricity cost is realized

Total O&M Cost: Rs.46.02 Crore
# SLB – Sewerage
## Target Vs. Achievement FY 2012-13

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Target 2012-13</th>
<th>Achievement 2012-13 (till Dec-12)</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage of Toilets</td>
<td>98%</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>Coverage of Sewerage Network</td>
<td>98%</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>Collection efficiency of Network</td>
<td>96%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Adequacy of Sewage Treatment</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Quality of Sewage Treatment</td>
<td>96%</td>
<td>92.28%</td>
<td>100%</td>
</tr>
<tr>
<td>Extent of reuse and recycling of Sewage</td>
<td>2.5%</td>
<td>2.29%</td>
<td>20%</td>
</tr>
<tr>
<td>Efficiency in redressal of customer complaints</td>
<td>95%</td>
<td>98%</td>
<td>80%</td>
</tr>
<tr>
<td>Cost Recovery</td>
<td>100%</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>Eff. In Collection of Sewage Charges</td>
<td>88%</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>
To cope up against the challenge of rapid urbanization; following points are planned:

- No disposal of sewage to be allowed in open gutter/ Nallah /ground by covering 100% city area under sewage network.
- Reuse & Recycle of sewage (zero disposal concept)
- Protection of water bodies/ ground water against pollution
- Conservation of ground water quality & quantity
- Controlled generation of sewage by imposing sewage tax
- To enhance public awareness about ill-effects of open defecation
To cope up with haphazard rapid urbanization on the outskirts of the city;

- Comprehensive Sewerage Master Plan is being prepared for long term – up to year 2044.

- Synchronized Planning in Coordination with Urban Development Authority.
Thank You