

# Gujarat State Waste Water Recycling Policy

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# Gujarat State Waste Water Recycling Policy

**1. Preamble:** Gujarat is one of the most urbanized states of the country. It has an urban population of 2.4 crores accounting for 42.6 % of the total population of the State, that is, 6.03 crores. Due to rapid pace of urbanization Gujarat state has to struggle to increase and up-grade the existing coverage of urban basic services like water supply and sewerage. Out of total estimated 5,452,769 HH of all cities of Gujarat 1,205,483 HH are covered with underground drainage connection which amounts about 22% of coverage. 12 cities are covered with 100% UGD connectivity while 51 cities have UGD coverage ranges from 50% to 90%. 107 cities have UGD coverage below 50%. 170 cities of Gujarat generate 4385 MLD waste water out of which 2115 MLD waste water is being treated by STPs. All ULBs (Urban Local Bodies) produces everyday about 4385 ML. waste water. The State Government has shown its firm commitment towards inclusive development of the urban areas by implementing various Urban Infrastructure Development projects in the State. The State Government has launched “Swarnim Jayanti Mukhya Mantri Shehri Vikas Yojana” (SJMMSVY) scheme in the year 2009, for various infrastructural projects and basic services, Rs 22,000 crores were allocated in two phase. Out of which allocation for sewerage projects are Rs.5700 crore. In SJMMSVY programme 98 works in 82 Nagarpalika completed and 77 works in 76 Nagarpalika in progress which has been planned to complete by end of March 2017. During the execution of these projects followings are major challenges/issues and bottlenecks for execution of Sewerage system in Urban Gujarat area.

- Hard rock strata in hilly areas of Saurashtra region
- Water seepage due to high water table in coastal region as well as in south Gujarat
- Out Growth (OG) beyond administrative boundaries of municipal areas has increased over last decade. It is estimated that more than 45 areas are developed in OG area having more than 3.5 million populations. These areas continue to be administered under rural set up resulting into haphazard developments and faced with the problem of inadequate infrastructure.
- Sewerage service is highly subsidized which is more concern for sustainable
- Out of total 167 ULBs only 18 have functional STPs.
- Only two ULBs have waste water recycling plants.

Looking to the development of sewerage projects, demand of water and waste water treatment scenario in the state, it has been decided to frame Waste Water Recycling Policy 2017, which will guide to develop recycling waste water plant by ULBs, line agencies, state Govt and decision makers across the Gujarat state

**2. Need for State Waste Water Recycling policy:** The rainfall pattern in Gujarat is erratic and uneven which leads to imbalances in distribution of water in different regions. About 95 % of total annual rainfall occurs during few days of monsoon period (June to September) due to Seasonal winds from the South-West direction. There is wide variation in availability and distribution of rainfall across the State and numbers of rainy days are also very limited. There are total 185 river basins in the State. The total water availability in the state is 50 BCM, of which surface water accounts for 38 BCM and ground water accounts for the balance 12 BCM. Of the 38 BCM of surface water, more than 80% is being used for irrigation purposes, leaving limited supply for drinking and industrial uses. Kutch is an arid zone, with scanty rainfall and no perennial rivers. North Gujarat area has rechargeable aquifer but rainfall in this region is very less while ground withdrawal is very high due to excessive irrigation and industrial water demand, leading to the depletion of ground water table. South and Central Gujarat are heavily agricultural and industrial areas, Saurashtra region comprises of rocky formation, it has very low recharging capacity, so ground water replenishment is very low. While North Gujarat, Saurashtra and Kutch constitute 71% of total geographical area of the State, they account for less than 30% of the water resources. With increasing population and economic growth, water demand is likely to pick up considerably in the future. The agricultural consumption in the total demand, resulting in relatively reduced availability for domestic and industrial uses. Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. Thus, availability of water has become a limiting factor, particularly for agricultural and industrial development.

Govt of Gujarat is continuously looking for additional sources of water to supplement the limited resources available to the region. As argued in the 12th Plan document, perhaps the most important lesson for urban water work in Gujarat is the need to tackle water and waste water, particularly use of recycle of waste water together. Sewage invariably goes into streams, ponds, lakes and rivers of the city, polluting the waterworks so that health is compromised. Or it goes into ground, contaminating the same water, which will be used by people for drinking. As surface water or groundwater gets contaminated, the city has to search for newer sources of its supply. Its search becomes more extensive and as the distance increases, the cost of pumping and supply increases. Currently, we measure sewage in the most rudimentary of ways: we assume that 80 per cent of the water officially supplied by municipalities is returned as sewage. The challenge of waste water disposal & recycling is enormous and needs urgent intervention.

### 3. VISION:

In India, responsibility of providing waste water service lies with State government. States are responsible for laying down policies for water & waste water service and establish institutional systems for their development and management. Institutional arrangements vary from State to State: State-level Public Health Engineering Departments (PHEDs), specialized State-level Water Supply & Sewerage (WSS) boards, specialized city-level boards, and Municipal Corporations (MCs) and Urban Local Bodies (ULBs) deal with urban Water Supply & Sewerage (WSS) related issues. The 74th Constitutional Amendment Act of 1992 envisages WSS for domestic, industrial, and commercial purposes to be one of the 18 functional responsibilities of ULBs. Gujarat has developed vision for management of waste water as under:

**“Universal Coverage of UGD with at-least 40% of waste water to be recycled by using advance, proven and sustainable technology in all towns and cities of Gujarat state”**

**4. Objective:** With main objective of more conscious use of water with goal **“Water of higher quality should not be used for application that can tolerate inferior quality”**. It has following sub objectives

- To achieve universal and equitable access to safe and affordable drinking water for all. For which reduce the gap of Potable Water Supply and Demand in Urban Gujarat
- To improve water quality by reducing water pollution in surface and subsurface sources
- To increase water use efficiency across all sector and to ensure sustainable withdrawals and supply of freshwater to address water scarcity and reduce number of people suffering from water
- To bring down billing charges of fresh water resulted due to long distance transportation, gradient and high energy costs.
- To mitigate conflicts of water resource allocation between the Domestic and Agricultural / Industry
- To reduce groundwater extraction and increase conservation of water resources
- To implement integrated water resources management at all levels
- To take appropriate action to protect and restore water related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

- To expand international cooperation and capacity building support to developing countries in water and sanitation related activities and programmes including water harvesting, desalination, water efficiency, waste water treatment and reuse technologies
- To support and strengthen the participation of local communities in improving water and waste water management

**5. Legislation and guidance documents:** While policy and guiding frameworks it has been found that, there has been little in terms of detailed guidance on the treatment standards, types of reuse applications, design and O&M considerations for management of wastewater recycling projects and tariff structures for sale of recycled wastewater for various applications across the country. There are few undertaken by various states and cities in India, are largely structured individually and developed in isolation at the local level. Ministry of Urban Development (MoUD) has been addressing this issue and recently developed specific guidelines for the recycling and reuse of wastewater. MoUD has issued various advisories in recent years covering various aspects of urban sanitation including wastewater recycling, detailed guidance has formally been included for the first time in the recently revised and updated Manual on Sewerage and Sewage Treatment Systems (2013) (CPHEEO 2013). The concept of wastewater recycling and reuse and the need to include the same in all water supply and wastewater management programs is recognized by most policy frameworks and institutions in India, as summarized below, are taken in to consideration while framing this Policy:

1. The Planning Commission (as part of the water and waste management strategy in the 12th five year plan) National Urban Sanitation Policy (NUSP), 2008
2. National Mission on Sustainable Habitat and the Service Level Benchmarking
3. Quality standards suggested by Central Pollution Control Board and Gujarat State Pollution Control Board.
4. Standards set by Bureau of Indian Standards (BIS)
5. National Water Policy, 2012
6. National Environment Policy 2006 , Ministry of Environment and Forests
7. Manual on Sewerage and Sewage Treatment Systems, by Central Public Health and Environmental Engineering Organisation (CPHEEO), MoUD, 2013
8. Environmental (Protection) Act, 1986 & Environment (Protection) rules, 1986
9. The water (Prevention and control of pollution) Act, 1974 & The water (Prevention and control of pollution) Amended rules, 2011
10. The water (Prevention and control of pollution) cess, Act, 1974 & The water (Prevention and control of pollution) Cess rules, 1978
11. Gujarat Municipal Act 1963

12. Bombay Provincial Municipal Corporation Act 1949
13. Quality standards for waste water & waste water disposal suggested by Central Pollution Control Board and Gujarat State Pollution Control Board.
14. Standards set for waste water by Bureau of Indian Standards (BIS)

**6. Approach :** United Nations Economic and Social Council provided water management policy to support this approach by stating that "no higher quality water, unless there is a surplus of it, should be used for a purpose that can tolerate a lower grade" (United Nations, 1958). Low quality waters such as wastewater, drainage waters and brackish waters should, whenever possible, be considered as alternative sources for less restrictive uses. Agricultural use of water resources is of great importance due to the high volumes that are necessary. Irrigated agriculture will play a dominant role in the sustainability of crop production in years to come. Reduction in the extent of exploitable water resources, together with competing claims for water for municipal and industrial use, will significantly reduce the availability of water for agriculture. The use of appropriate technologies for the development of alternative sources of water is, in case of water scarce area probably, the single most adequate approach for solving the problem of water shortage, together with improvements in the efficiency of water use and with adequate control to reduce water consumption.

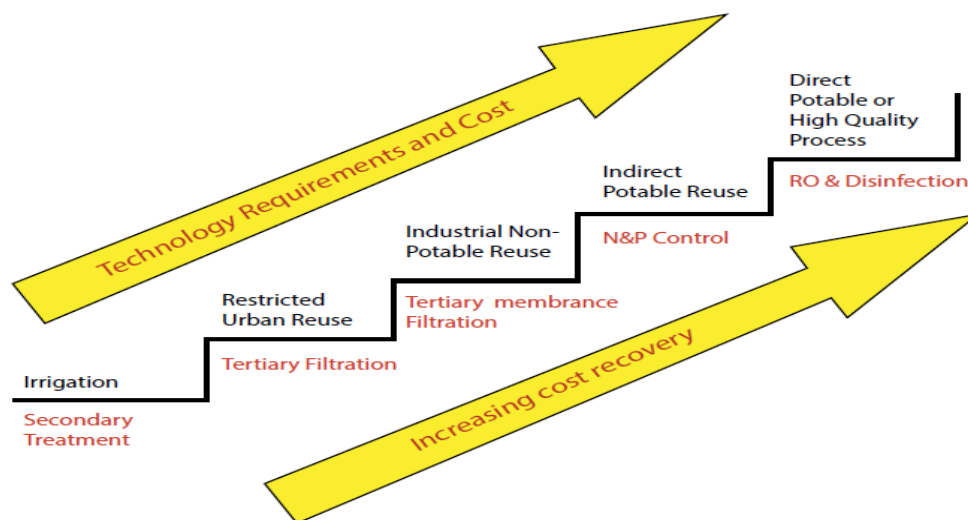
While developing recycling waste water plant, it is advisory to have transparency in selection of plant technology, tendering process and selection of private operator & company. This would also require strengthening of the capacity building of the Government Authorities.

## **7. State Waste Water Recycling Policy**

**7.1 Technological Options:** A key component in any strategy aimed at increasing the coverage of wastewater treatment should be the application of appropriate wastewater treatment technologies that are effective, simple to operate, and low cost (in investment and especially in operation and maintenance). Appropriate technology processes are also more environment-friendly since they consume less energy and thereby have a positive impact on efforts to mitigate the effects of climate change

Technological Options for wastewater recycling plants can be categorized based on utilisation of recycled waste water, blends of waste water plant location, demand of recycled waste water etc., Chapter 7 of part A of Manual on Sewerage and Sewage Treatment Systems (2013), CPHEEO discusses in detail the different types of treatment technologies suitable under different conditions. The manual also provides details on the design considerations and operating requirements for a variety of technologies which will be suitable for different usage. The other significant

classification criterion is the type of treatment provided primary treatment, secondary treatment or tertiary treatment. Primary treatment essentially consists of removing the suspended solids present in the wastewater through physical sedimentation or coarse screening methods. Secondary treatment involves some form of biological treatment which removes the organic matter lowering the bio-chemical oxygen demand (BOD) of the wastewater. Tertiary treatment provides the most advanced level of treatment, reducing BOD and the total dissolved solids (TDS) levels to very low levels and can also be effective in removing dissolved impurities and nutrients such as nitrogen and phosphorus that may be present in the water. The type of advanced treatment (nutrient removal/ reverse osmosis/advanced disinfection) will depend on the type of reuse application, and is usually significantly capital-intensive along with high O&M costs compared to conventional secondary treatment alone. Figure below illustrates this concept, demonstrating the link between the levels of treatment, intended use of treated water, cost of treatment and extent of cost recovery.



**7.2 Reuse of Treated Effluent:** Treated & Recycle wastewater effluent is considered a water resource. It is said that, water resource saved or recycled is equally considered as produced. India is an agriculture country and its economy largely dependent on agriculture therefore; priority should be given to agricultural reuse of treated effluent. Expenditure & Pricing per KL of recycle waste water depends on the quality of waste water. Depending upon which different blending is suggested Crops to be irrigated by the treated effluent or blend thereof with freshwater resources shall be selected depends upon type of soil, crops, season and need of irrigation Demand and use of Industrial reuse of reclaimed wastewater is increasing in recent year This also depends on blend which may have different characteristics for BOD, COD, PH, Color etc., In recent year at ULB level, demand of recycle waste water for fire-brigade & landscaping and garden purpose is also seen. To summarize, in India treated sewage is being used for a variety of applications such as (a) Farm Forestry, (b) Horticulture, (c)



Toilet flushing, (d) Industrial use as in non-human contact cooling towers, (e) Fish culture and (f) Indirect and incidental uses. CPHEEO 2013 provides guiding principles for use of treated sewage water, norms, standards quality check as well as case studies

**7.3 Reuse of Sludge:** Civic authorities face challenges that call for improved infrastructure and better institutional arrangements with respect to sludge treatment. It is very important to choose the most appropriate wastewater sludge treatment and recycling channel, taking into account social and environmental impacts. There are lots of options for recycling waste water sludge. However, following four possible solutions are proven on recycling wastewater sludge:

- **Agricultural recycling:** This yields plant nutrients and NPK values and used as soil en-richer very effectively in farms and gardens
- **Land-filling:** The sludge is mixed with municipal waste in landfills, where its anaerobic decomposition produces landfill gas recoverable as energy.
- **Incineration or co-incineration:** Incineration, or gas-phase thermal oxidation, destroys organic matter, leaving a tiny amount of mineral byproducts.
- **Road and paving tile construction:** Sun dried sludge can be used as substitute building material for paving tiles and road construction activities or backfilling or pre-cast concrete work after taking appropriate pH value and other tests of sludge.

Therefore, the policy makes advocacy to use appropriate options for sludge

**7.4 Priority:** Goal of State Waste Water Recycling Policy is to re-use of water which ultimately help to preserve and the availability of water resources of the State Priorities shall be allocated for utilization of water for various uses so that the same may become a guideline for all. Looking to the importance of economy of the state and importance of sector development, it is desired to give priority for distribution of recycle waste water with following sequence

1. Irrigation/ Agriculture purpose
2. Landscaping, Gardening & Fire brigade in ULBs
3. Hydro-power
4. Industries (Both agro-industries and non-agricultural industries)
5. Promotion to help sports activities like development Cricket ground, golf grounds etc.,
6. Rejuvenate lakes/river for navigation and other uses
7. Any Other

Prioritization to impacts total water-resource management and therefore demands careful balancing with a perspective for the future. Therefore, these priorities could be



modified or added, if necessary keeping in view the characteristics and necessities for the concerned areas and regions. Water Supply priorities can be different for formulating water development projects for present. These priorities for the State are consistent with the National level & state level other relevant policies , acts & rules.

**7.5 Pricing:** In view of the service to be self sustained, total costing for construction of STP, cost of wastewater collection & treatment, rate of interest on capital investment, etc., against which, ULBs are generally recovering wastewater charges, connection fees, sewerage taxes and treatment fees. Normally, this is limited to recover operation and maintenance costs. For the cost recovery, universally accepted principle of “polluter pays” should be applied. As per MoUD guideline it is mandatory to have 100% cost of O&M of sewerage system shall be recovered from consumer. The costs will depend on the system/technology adopted for collection of sewerage and treatment and the administration costs. It is important that the full cost of the service is assessed for each urban area instead of adopting a typical cost assessment. Additionally, ULB are in a position to sell the treated effluent to industrial customers depending on the need for and availability of other water sources. Utilities may charge industrial customers for supplying recycled wastewater based on the treatment provided and quality of wastewater. Private sector participation can also be played importance role. The private sector role in reuse of treated effluent shall be encouraged and expanded. The role of the private sector will expand with management contracts, concessions and other forms of private sector participation in wastewater management. The concepts of BOO/BOT shall be entertained.

**7.6 Private Sector Participation:** Wastewater reuse projects are technically complex, and require huge capital investments. Considering this, engaging private sector environmental firms to design, build and operate plants could be a good option and the same has two major advantages:

- Technology migration: Membrane based tertiary treatment technology is new to India. There is potential for significant efficiency gains from technology and process innovations which can be better delivered by private sector firms.
- Capital Investments: Tertiary treatment and reuse projects require huge capital investments. Given the high opportunity cost of public funds, private sector participation will lead to inorganic growth in wastewater treatment capacity.

PPP project structures can be defined based on how roles and risks (design, finance, asset ownership, construction, operation, revenue, etc.) are shared between public and private entities. Based on the viability considerations discussed earlier, there could be three project structures for implementing reuse projects under the PPP mode.

**8. Implementation of Policy:** As per the National Urban Sanitation Policy (NUSP) guidelines and Atal Mission for Rejuvenate and Urban Transformation (AMRUT) mission reforms it has made certain recommendation for respective states to have waste water recycling policy .The State Government shall implement following programmes for implementation of waste water recycling & improvement in the waste water / sewage treatment plant, preservation of water resources, waste water management, restriction of ground water by Industries etc.,

- Modifications in the existing laws and acts as per the necessities.
- Clear definitions of capacities, duties, responsibilities, rights –powers and jurisdiction of all the Government Organizations.
- Act shall be framed to implement policy, rules, etc. smoothly due to which rights of all the persons can be protected.
- Legal and legislative protection to use of water , waste water recycling, ground water
- Act for involvement of private sectors in development and operations of recycling plant of waste water and STP projects.
- Planning for ensuring effective participation of all stakeholders and their co-operation in decision making.
- Periodical review of waste water service user charge & selling price of treated water as well as sludge so as to meet with operational and maintenance expenditures, distribution of treated /recycle water on volumetric basis, creating awareness for efficient use of recycle waste water in users
- Implementation of legislative mechanisms for getting solutions of disputes.

Detailed strategies and operational Action Plans shall also be prepared by various departments and agencies related to waste water, STPs and use of recycling of waste water to get desired results. State Waste Water Recycling Policy shall be reviewed periodically as and when need arises.

**9. Governance Arrangement:**In draft Gujarat State Water Policy ,the State has already recognized and suggested need to have appropriate regulatory institutional and legal framework in the water sector, which consists of establishment of regulatory institute in water sector, Strengthening of Water User Organizations , Gujarat State Water Resources Council, River Basin Organizations (RBOs). Therefore these institution would have additional functions in regard to waste water and recycle of waste water

**10. Management Information System:** A well-developed data management and information system is a prime requisite for better management. Therefore, it is important to have data of waste water generation, treatment of waste water, recycle of waste water, method of waste water treatment plants, reuse of recycle waste water income, expenditure etc., For management of all these details a state level data center at Gandhinagar will be established Data so generated shall also be placed in public domain in order to ensure better transparency, utility and accountability. Available water resources are required to be planned and allocated for bringing under maximum utilization by assessment (projections) of demand of water for various uses in the future.

**11. Environmental Aspects:** The development of projects should take into account environmental aspects, including method of treatment storage & release of sewage & sludge and management, mitigation of environmental and ecological impacts Effective screening procedures should be in place to adequately factor environmental and social opportunities and concerns during all stages of all recycle waste water projects. In the operation of waste water recycle plants & infrastructure, appropriate measures will be taken to maintain ecosystem services and manage released & treated waste water quality for all end user & refuse. Adequate measures should also be taken to address the substantial waterlogged areas that are present in many irrigation commands as well as to regulate over-abstraction of groundwater. There should be due consideration to maintain and enhance the environmental functions of the State's water resources. Adequate measures must be taken to ensure the prevention of pollution of the State's surface and ground waters, water bodies and coastal zones. Efforts should be undertaken to control point and nonpoint source pollution from industrial, domestic, agricultural, and other sources that pose that threat to public health and ecosystems. Regulation and control of pollution of surface and groundwater are done by the ' Gujarat Pollution Control Board' under the Environment Department. All guideline, norms & advisory by the GPCPB must be strictly followed for managing waste waster Work system shall be introduced such that reuse of water can be done. Effective programme shall be evolved to keep vigilance and evaluate quality of both surface and groundwater periodically and improvement in the quality of recycle waste water. Monitoring shall be done for quality of surface and groundwater and soil. Time bound programme shall also be framed for improvement in the quality of recycled wastewater. Measures shall be taken to treat the refused & surplus effluents up to acceptable and recognized standards and levels and then discharging the same into natural streams.

**12. Capacity Building, Research & Development** The frontiers of knowledge in water and allied sectors shall be pushed forward through focused action research, development and promotion of state of the art technology and training for effective and economic management of water resources. A perspective plan for training shall be worked out for Planners, Directors, Managers, designers and users, by coordinating with Water and Land Management Institute (WALMI) with Gujarat Engineering Research Institute (GERI), Staff Training College (STC), Gujarat Jal Training Institute (GJTI) and Hydrology Department of all Agriculture Universities and Engineering Colleges for getting optimum productivity and maximum utilization of water. Importance shall be given to the latest technological systems.

**13. Public Awareness:** Public awareness is essential component to promote and developing level of acceptance of use of recycle waste water. Education is the key to overcoming public fears about a reuse system, particularly fears that relate to public health and water quality. A broad, in-depth public relations programme and a demonstration project are especially helpful when the reuse project. Therefore, it is desired to have very strong I-E-C programme and waste water management plan after public consultation and clarity about use of recycle of waste water It must be designed to:

- Raise public awareness of waste water issues and needs to foster support for solutions
- Educate the public and identified target groups in order to increase awareness and encourage behavioral changes
- Coordinate with other public as well as private entities to outreach optimum use of recycle of waste water

**14. State Waste Water Recycling Policy review:** The state waste water recycling Policy would be a dynamic policy document, and would be periodically reviewed, as and when needed, to meet the future waste water recycling technology development and management challenges.

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