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Treated Waste Water- an alternative source of water

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Water is a critical resource for social and economic development of any region besides being elixir of life. Water resources are getting depleted due to adverse changes in climatic conditions, scanty and erratic rainfall, increasing industrialization, population growth, exploitation of ground water, increasing demand for domestic purposes etc. This problem is getting amplified due to uneven natural distribution (availability) of water resources in different regions of the state mainly due to diverse topography.

Municipal Water and Waste Water Scenario in Gujarat

Presently fresh water use in Municipal Corporation, Municipality and Panchayat rurban area is 5244 MLD. Presently, Underground drainage system is available in all 8 municipal corporations, 154 out of 162 municipalities and 85 rurban areas. These systems collect sewerage which is treated through STPs established for the purpose. Presently about 2600 MLD sewerage is being treated through 52 STP. In addition to the above, 20 STP are under planning/execution in municipal corporations.

Underground drainage network projects are implemented in 154 municipalities under "Swarnim Jayanti Mukhya Mantr iShehri Vikas Yojana" (SJMMSVY). Presently STP is available in 18 municipalities and are in construction phase in 20 municipalities under AMRUT and SJMMSVY

In addition to the above, 121 STP are under planning in municipalities, out of which 14 STP have been started, 37 STP are in various stages of approval and 55 STP tenders are under invitation process.

Thus, 161 STPs are under planning or execution which will add to about 2800 MLD treatment capacity within a span of 2 years. With this the total TWW availability will rise to more than 5000 MLD in the state. This offers a tremendous opportunity to use TWW and augment water resources economically.

Treated Waste Water as alternate source.

Apart from the need of reducing the pollution of surface and ground water, world over the municipal waste water is increasingly seen as a water resource for reuse of water that can ideally be utilized for non-potable purposes. The treated waste water(TWW) produced by treating municipal sewage can provide a reliable source of water. Hence, there is an ardent need to adopt new perspective towards municipal waste water and its reuse.

Use of treated waste water will generate a new revenue stream for local bodies which will ensure that operation of STP can be undertaken on financially sustainable basis.

Initiative by the State Government.

The Water Supply Department took up the initiative for reuse of treated waste water in the state. A primary policy was framed in 2017, However, a detailed policy was framed and launched in May-2018 The policy for reuse of treated waste water was launched by Hon Chief Minister, Gujarat State on 28th May, 2018.

The policy for promotion of use of treated waste water is prepared with a vision to maximize the collection & treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on fresh water resources. Further, the policy promotes use of treated waste water as an economic resource. To achieve this vision, the policy lays a time-bound and systematic plan with an ultimate goal of reusing treated waste Water fully by 2030.

Salient Features Of Policy.

VISION

"The policy envisions maximizing the collection

and treatment of sewage generated,

and reusing the treated waste water on a sustainable basis,

thereby reducing dependency on fresh water resources;

and to promote treated waste water

as an economic resource"

Objectives

- To reach minimum 80% coverage and collection of sewage in all municipal towns
- To reach a level of 100% treatment of collected sewage as per the prescribed standards
- To reuse at least 25% of total fresh water consumption from TWW within the time limit set under policy by every municipal body
- To reuse 70% of TWW by 2025
- To reuse 100% of TWW by 2030

Users

- **Thermal Power Plant**
    - It shall be mandatory for all the Thermal Power Plants within a distance of 50 km from the STP or city limits to use TWW.
- **Industrial Units**
    - It shall be mandatory, for all Gujarat Industrial Development Corporation (GIDC) estates, all industrial units in Special Investment Region (SIR), Industrial parks and large industrial units which are consuming minimum one lakh litre of fresh water per day for non-potable purpose, and which are situated within 50 km distance from STP or city limits to use TWW.
- However, it shall not be mandatory to use TWW wherever it comes in direct contact with human beings or is used in processes resulting in products for human consumption.
- **Construction activities**
    - Provide facility for filling tanker with TWW to construction sites on payment.
    - Lay special supply lines for TWW in developing areas, if found feasible.
- **Large Commercial or Institutional users**
    - Lay TWW pipeline to business district having large number of such users.
    - It shall be mandatory for such users to use TWW for the purpose of flushing, watering green areas, water for fire hydrants etc. on availability of TWW.
- **Municipal uses**
    - Maintenance of parks and gardens and developing urban landscaping.
    - Rejuvenation of ponds, lakes and rivers.
    - Supplying water for emergency purposes like fire brigade etc.
- **Other non-potable use**
    - Any other user for non-potable use found in local context
- **Agriculture/Irrigation**
    - TWW can be used for agriculture/Irrigation purposes provided surplus water is available after above mentioned uses

Potable use

- Considering social sensitivities and the public perception towards treated waste water, presently it shall not be used for potable purposes and uses which involve direct human contact.However, in future with the increase in water demand, advancement in treatment technology, competitive rates and change in public perception, TWW may be used for potable purposes.

Allocation of TWW

- On availability of TWW, fresh water supply shall be discontinued for users.

Project

- Projects for Reuse of TWW shall be made based on profile of user and local body. SHPC will give in principal approval to projects.

Governance arrangement

State level High Power Committee (SHPC)

- Apex body to take decision regarding implementation of the policy and project approval, TWW price determination, Allocation of water, Financial and management structure of the project, etc.

State level Technical Committee (STC)

- Shall provide technical approval of projects, finalize formats of project agreements, monitor projects execution, lay guidelines for O&M etc.

TWW Cell

- Headed by officer of Chief Engineer level.
- Preparation of DPR, Providing secretarial assistance to STC/SHPC and project co-ordination and execution.
- MIS, Capacity Building, Research& Development, IEC activities& Public awareness

Implementation of policy

The projects for reusing of treated waste water have been initiated by the state government. Municipal Corporations and municipalities have been identified and project reports are prepared and some tenders have also been issued. Details of some identified projects are discussed below.

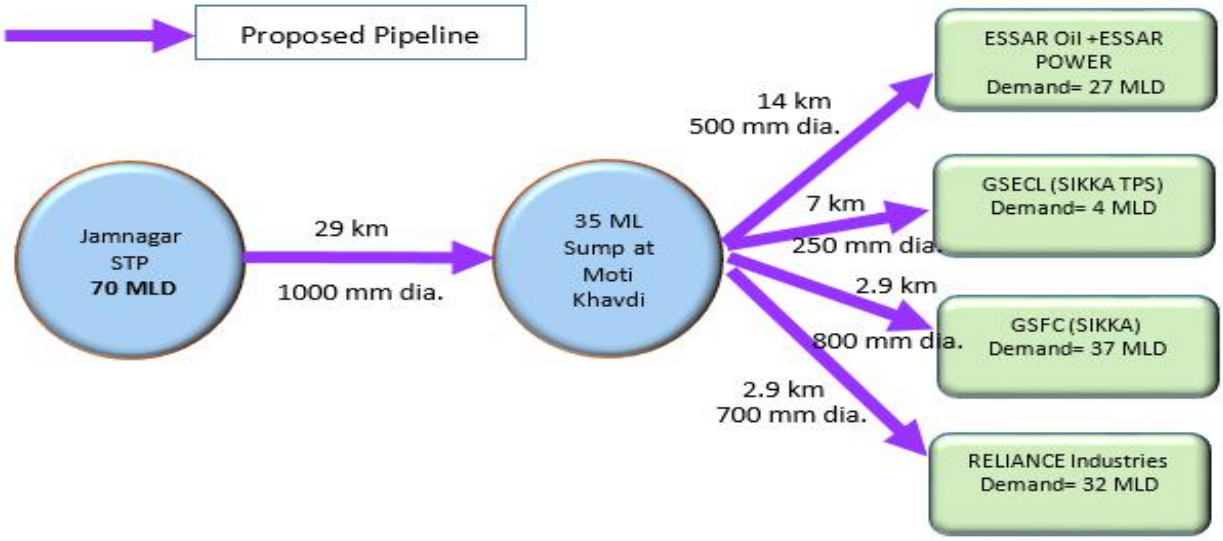
Jamnagar Reuse of Treated Waste Water Project

Stake Holders:	Jamnagar Municipal Corporation (JMC), GWSSB & Concessionaire	
User Details:	Essar Oil + Essar Power:	18 + 09 = 27 MLD
	Sikka Thermal Power Station (GSECL):	04 MLD
	GSFC (Sikka):	37 MLD
	Reliance Industries Ltd.:	32 MLD

Broad Components of work:

Renovation /modification of existing STP, construction of storage sump and pumping station near existing STP, laying of 29 km rising main to convey TWW from existing Jamnagar STP to sump at Moti Khavdi (near GWIL HWs), transmission and distribution networkup to door step of users and comprehensive O&M of complete project for 15 years.

Schematic diagram of the project:



Estimated Cost of the Project:

- Rs. 122 Cr
- The project has been approved by SHPC andSTC; and presently is in tendering stage

Financial Model of Project:

Proposed mode of implementation of this project is Hybrid Annuity Mode. GWSSB shall pay INR 70 Cr to Concessionaire as per various pre decided milestones. Rest of the capital shall be contributed by Concessionaire. concessionaire shall operate and maintain the complete plant for 15 years. For the same payment shall be done on per KL of water supplied at user's end.

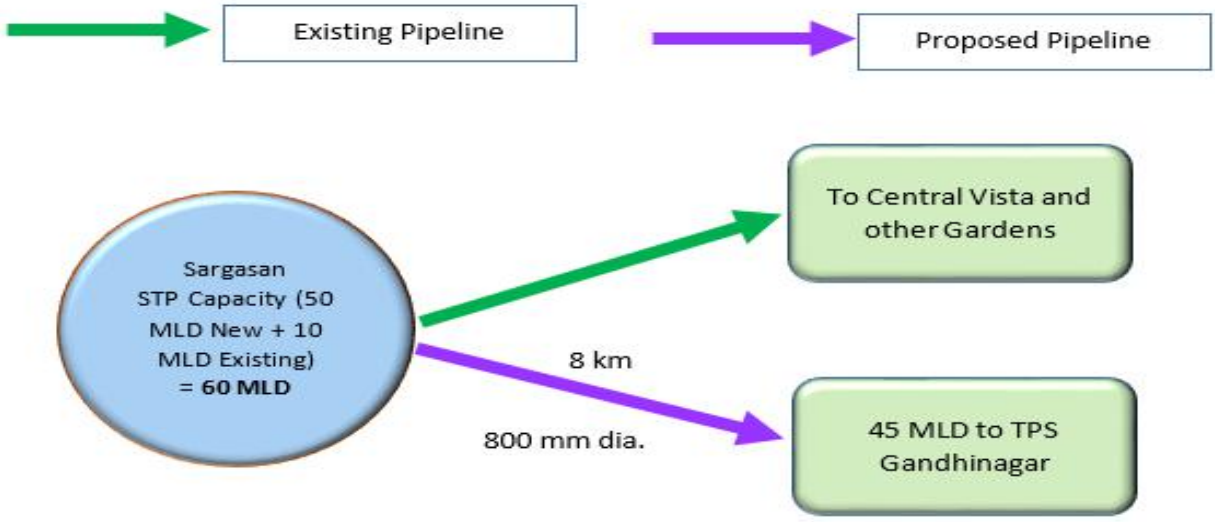
Gandhinagar Reuse of Treated Waste Water Project

Stake Holders:	Gandhinagar Municipal Corporation (GMC), R & B, GWSSB & Concessionaire	
User Details:	Gandhinagar Thermal Power Plant	45 MLD
	Green Space, Sachivalaya etc.	10 MLD

Broad Component of the Work:

Construction of new 50 MLD STP and refurbishment of existing 10 MLD STP, construction of storage sump and pumping station near STP, laying of 10 km rising main to convey TWW from STP to Thermal Power Plant and comprehensive O&M of complete project for 15 years.

Schematic diagram of the project:



Estimated Cost of the Project:

- Rs. 62 Cr
- The project has been approved by SHPC and STC; and is in tendering stage

Financial Model of Project:

Proposed mode of implementation of this project is Hybrid Annuity Model. The concessionaire shall operate and maintain the complete plant for 15 years. For the same payment shall be done on per KL of water supplied at user's end.

Bhavnagar Reuse of Treated Waste Water Project

Bhavnagar is fifth largest city of Gujarat. The Municipal Corporation has present population of approx. 6.80 lacs. Fresh water supplied is @ 130 MLD. It generates sewage around 81 MLD.

Out of generated sewage, two STPs are put in working condition in the year 2018 having capacity of 75 MLD (45 MLD + 30 MLD).

45 MLD STP is situated in the eastern part of Bhavnagar city. At present 40 MLD waste water is treated in this plant which is based on SBR (sequential batch reactor) technology.

It was planned to reuse treated sewage water for cooling purpose of Lignite based Thermal Power Plant by BECL Plant situated at Padva Village which is 28 Km away from Bhavnagar. Bhavnagar Energy Company Limited is now known as Gujarat State Electricity Corporation Limited (GSECL).It requires 40 MLD treated sewage water for their cooling tower. BMC has already laid 13.5 km, 800 mm Ø rising main pipeline up to sump near Budhel. There are two stages of pumping. One at 45 MLD STP Plant &another at – sump at Budhel. BMC has laid pipeline at the cost of BECL, of cost RS. 26 Cr and also established

pumping station at 45 MLD STP site where as other pumping near Budhel is about to be completed under the supervision of BECL.

The treatment cost of sewage water at BMC STP Plant outlet is approx. Rs. 3.6 per KL (which includes only O & M and Electric consumption) whereas total treatment cost is about Rs. 9.61 per KL (which includes O &M, Electric consumption and Expenditure incurred in collection of sewage).

BMC shall sell treated sewage water at the rate of Rs. 17 per KL and will get Rs. 17000 per ML. i.e. Rs. 6.80lacs per day (This is based on the maximum requirement of BECL 40 MLD per day). Thus yearly income is assumed to be up to Rs. 25crores which is quite important for BMC. At the same time this will lead to saving of potable water to the tune of 40 MLD.

The commissioning of the conveyance main is in final stage; Hydro test is already performed. Pumping machinery trial is also performed.

Reuse of Treated Waste Water in Gandhidham and Anjar

Stakeholders : Gandhidham Municipality, Anjar Municipality & concessionaire

Broad components of the work:

Arrangement for lifting waste water from pumping station of Gandhidham municipality and lifting from oxidation pond of Anjar municipality is made by private industry M/s. Wellspun Company which has constructed and commissioned @ 30 MLD STP at Varshamedi(about 7 kms from Anjar) in 2016. The O&M cost and pumping cost is borne by M/s Wellspun Company.

Wellspun Company utilizes @23MLD of treated waste water for Industrial purpose. It pays Rs 0.40/Kilo litre to the municipal bodies based on quantity lifted. There is an agreement for 30 years.

	Gandhidham	Anjar	Total
Details	Quantity in MLD	Quantity in MLD	Quantity in MLD
Fresh Water Used	49	15.4	64.4
Sewage generated	35	10	45
Sewage Collected	24	06	30
Sewage Treated	24	06	30
Waste water reused	20	3	23

Financial model: PPP

Besides the above projects; projects for Balasinor , Pethapur, Khambhat, Songadh municipalities are also identified and are under process.

Challenges for the implementation of the policy.

Like any new policy initial teething problems have to be tackled with utmost care. Few issues that need to be addressed are :-

1. Awareness drive for industries and other users and municipal bodies.

2. Capacity building of entrepreneurs to come up for execution and operation of these projects and maintaining quality of treated water.
3. Developing metering and monitoring mechanism.
4. Providing financial mechanism for win- win situation for operator and users.
5. Creating database and supportive infrastructure.
6. Alternate use of treated waste water in case of situations where pre decided units may due to some reasons are not able to use the treated water.
7. Accounting and control on individual use of ground water.

Way Forward.

I think we have reached to a time where the necessity has forced us to think on alternate source of water. Perhaps Desalination and Reuse of treated waste water are the two major alternatives and financially the reuse of Treated Waste Water is more attractive. The future indeed is for it.

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