

NATIONAL ROUNDTABLE

Decentralized treatment of wastewater and its bulk reuse

Consultation on technologies, standards and policies around the smaller STPs at institutional and residential levels

October 29, 2026

Maple Hall, India Habitat Centre, New Delhi

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Technologies, Standards and Policies

Date and venue: October 29, 2026; Maple Hall, India Habitat Centre

Background and Objectives

This document consolidates the minutes of three sessions of a stakeholder consultation on decentralized sewage treatment plants (DSTPs). The meeting brought together site owners, technology providers, regulators, policy-makers, researchers and resident representatives.

The consultation was organised in three sessions:

Session 1: Technology, reuse of treated used water and sludge and O&M in DSTPs

Session 2: Policy, regulation and institutions for DSTPs

Session 3: Summing up and scaling up

Session 1: Panel Discussion on technology, reuse of used water and sludge and O&M in DSTPs

After a CSE presentation and a technology round on working principles, moderators asked site owners and technology providers four questions in turn: how much treated water is actually used on site and what blocks full reuse; what the quality of reused water is and whether it is safe; which O&M models are in use and whether they are sustainable; and what happens to treated sludge.

National picture

- India treats no more than about 28% of its wastewater, a figure the presenter doubted. Groundwater recharge, extraction, wastewater generation and use do not add up in any city studied.
- Over 85% of DSTPs built were reported as non-operational or dysfunctional. These figures came from technology providers and people on the ground.
- NGT is becoming stricter on STPs in new buildings.
- Decentralized treatment was found cheaper than moving fresh water and wastewater to and from centralized STPs, and closing the loop is easier at the decentralized level.

Policy and market trends

- Liquid waste management rules have come in. Karnataka, Delhi and other states mandate 100% reuse, with more than 50% on site, and UP is moving the same way. OCMS mandates are spreading.
- Implementation lags because regulators lack manpower to monitor and handle complaints.

- There are no reuse standards for sludge or treated water. Treatment does not equal reuse, and treated water is often dumped in drains.
- Right-sizing and modularity are a concern. Builders install STPs without water audits, handover is poor, energy and O&M costs are ignored, and the market for surplus water is unexplored.

City observations

- **Pune and Guwahati:** Treatment happens, but there are no city-level water tariffs or registries and no way to move surplus water between premises, so treated water ends up in drains.
- **Bangalore:** One of the largest decentralized networks, with innovative models that are profitable for RWAs and include treated-water arrangements. How much is functional, and how to scale, remain open.
- **Delhi NCR and Jaipur:** Policies require 100% recycling and zero discharge, but roughly 70-80% of treated water was found going to open drains.
- Triggers, reuse obligations and overseeing bodies differ city by city, so a national mandate to bring states onto one platform is needed. Some officials in water-rich cities said a reuse market is hard to build.

Practitioner insights

- Failure is due to technology mismatch more than cost cutting. People pick what is prevalent (for example SBR, with a larger footprint and O&M burden) over smaller-footprint options that suit them. Technology itself is not the issue; O&M and operator training are.
- STPs installed before occupancy sit idle for 3-4 years, pumps deteriorate, and the plants are then overloaded.
- Water audits are not done, and there is no guidance on treated-water use models. Tanker conveyance beyond 5-10 km raises cost sharply.
- Nature-based systems are among the best options but must be engineered for reliability.
- OCMS and third-party testing were described as questionable.
- Dual plumbing in old apartments and local sharing of treated water remain ambiguous and hard to operate.

The technology debate and O & M bottle necks:

The moderator noted that cities tend to copy whatever technology a neighbouring project chose, and that O&M is a recurring problem.

- **Failure is about O&M, not technology:** Abundant technologies exist. What fails is O&M after handover: who maintains, who repairs a failed component, who buys replacements, and who removes the sludge.
- **Automated option:** It was discussed that a sensor-based, fully automated system needs no operator. Sensors flag poor water quality, electromechanical failure, when sludge needs removing, and when water should not be reused. About 60 projects were reported in the meeting with validated unmanned operation by the city representatives in the meeting.
- **Standard-setting view:** Concentration-based norms promote end-of-pipe treatment, not reuse. Standard-setting should be reviewed to bring in circularity.

- **Design-basis critique:** Many designs are thumb-rule or retention-time based, but kinetics differ (for example constructed wetlands below 10°C against 20-25°C), so footprints cannot be the same. Without nutrient removal, designs will not meet the standards and eutrophication will continue downstream. From reviewing thousands of residential STP proposals, the experts explained that most design bases were poorly understood.
- **Small versus large systems (a provider):** Small systems design for pollution board BOD norms and reuse within the premises (flushing, landscaping), so nutrient load matters less. Institutional and large systems discharging to water bodies need nutrient removal. A balance is needed.
- **Hybrids and emerging options:** Judicious anaerobic-aerobic hybrids save land and power.
- **Institutional versus small plants:** Institutional plants (for example a 1 MLD submerged MBR) are sustainable because budgets and expert access are available. Small residential plants struggle, especially after the builder's AMC team hands over to the RWA.
- **Operations versus maintenance:** Operation gets attention, but trained manpower, electricity, chemicals and repairs are underestimated. Maintenance is reactive and preventive maintenance is almost absent.
- **Performance data:** National evaluations find compliance at only about 60%, mostly due to poor O&M rather than design. About 80-90% of plants use aerobic pathways, and anaerobic options (suited to India's warm climate) are underused.
- **Contract models:** Deferred-payment and HAM-style contracts are used, and projects now ask for 5-10 years of O&M in the initial contract. Performance-based contracts (judged on treated water quality, reporting and energy efficiency) were seen as the way forward. O&M should be built into the DPR for at least 3-5 years, and decisions should use life-cycle cost rather than capex alone.
- **Operators and skills:** Bangalore has about 3,500 of such STPs, each needing a technician for three shifts, but trained technicians are not available, and the state's mandated 26-day training is hard to attend. Small plants run only in the daytime to save money, which hurts quality. Participants called for certification, training and online sensors sending data to PCBs.
- **Cost:** A study of about 400 STPs in Bangalore found electricity is 56% of cost (about ₹9/unit). Solar is promoted, but STPs are billed at commercial tariffs.

Why reuse stays partial

- **Bangalore experience:** STPs are mandatory for 120+ flats and flushing has been mandated since 2016. Practical reuse is only about 30% for flushing and 10% for gardening, leaving about 60% unused. Discharge to ground is not permitted, so the surplus goes untraceably to stormwater drains. Zero-discharge targets were said to be impractical, and the 60% is a major opportunity.
- **Water balance mismatch:** Non-potable use is about 40-50 lpcd, against a 135 lpcd supply and 100-110 lpcd of wastewater. CTO/CTE water balance charts claim 100% reuse, but actual reuse in plants seen is 30-50%.
- **Isolated planning:** Treated water exists in one place and demand in another (nearby parks, shopping centres and lakes use groundwater). A system to link supply and demand is missing.
- **Phased occupancy:** Plants are designed for full build-out, so early years run underloaded with poor quality. Modular or phased plants help. One example used the first 50-100 KLD module for a labour camp and added capacity later (Brigade and L&T projects).

- **Space and quality reliability:** Dual piping infrastructure and cost are lacking, and residents where dual systems exist remain sceptical about flushing water quality.
- **Scale definition:** What counts as decentralized differs (50 MLD in Delhi, but 1 MLD is large for 10,000 people). Industrial reuse examples are mostly centralized plants.
- **Low-hanging fruit:** Construction, parks and road cleaning exist in every city and still use fresh water.
- **Financial pull is missing:** Freshwater is too cheap for recycling to make economic sense, though tanker and groundwater alternatives show water is not actually cheap (Guwahati: about ₹48/kL JICA supply, about ₹108/kL tankers, fluoride in groundwater).
- **Quality, not price, is the main user concern:** Ready-mix concrete plants and others will take free treated water but worry about product impact. A stadium curator worried about nutrients and pitch quality. Monsoons limit landscape demand in places like Guwahati and Odisha.
- **Policy gaps:** Karnataka's 2024 policy lets a share of treated water be given to others (see Section 7 on 15% versus 50%). Environment clearances require treated water for construction, but no standard exists, so builders cannot comply. Participants said no treated-water action plan they had seen achieves 100% reuse.

Quality of reused water and sludge

- There is no fit-for-purpose standard, only the 2017 and NGT discharge norms. CPHEEO and MoHUA were said to be working on one. A standard tied to end use would also guide technology choice and enable mass production.
- Perception is a choice issue: people avoid hotel-level treated water but accept tanker water of unknown quality.
- Quality monitoring is lacking, which limits trust among users such as construction sites, stadiums and industry.
- **Current practice:** In Bangalore, apartments call BWSSB to take sludge by tanker for a fee, with no knowledge of its fate. Some sites (about ten) treat sludge on site and use it as manure, some press it into cakes for horticulture, and in Udham Singh Nagar sludge is moved to a larger plant every six months.
- **Centralized handling:** Several speakers preferred collection and central treatment. On-site disposal in horticulture is not feasible: in cities with only about 10% green area, dumping could raise ground level by 3-4 metres in five years. Small biogas plants also leave residue.
- **Safety and standards:** Heavy metals must be tested because industrial wastewater is often mixed in. The Hazardous Waste Rules (Schedule II) set limits, and sludge exceeding them should go to a TSDF. Sludge taken away is a soil conditioner, not manure. A ministry has set up a technical expert committee to develop biosolids standards for domestic sludge, and existing fertiliser and manure standards are used meanwhile. One vendor flagged antimicrobial resistance risk and keeps use to horticulture beds, not edible crops.
- **Frequency:** Prescribed removal intervals range from 6-8 months to about a year, and 10-15 months for anaerobic-aerobic systems. Aeration-based technologies generate sludge daily, and constructed wetlands need removal every 6-12 months. A distinction was made between wasting sludge, storing it and final handling.
- **Other:** Bar screen debris is cleaned daily and has to go to the city. Many sites have new filter presses that are never used.

Session 2: Policy, Regulation and Institutions for DSTPs

The presenter asked participants to react to each slide by confirming, contesting or adding information. The guiding questions were: Is the policy framework complete, too fragmented, or in need of a separate instrument? Are the guidelines enforceable, and are they mandatory at the housing and institutional level? Is there a coherent set of principles for someone who genuinely wants to comply, or must they run between many institutions? Who monitors, how often, and can existing institutions intensify their effort?

Ideas put forward

- Discharge compliance differs from fit-for-purpose reuse, and technology selection should consider the last mile of reuse.
- Treat treated water as an asset and match it to demand as close by as possible to reduce pipe cost. Bulk demand centres should be mapped.
- DSTPs should be seen as distributed point sources within a holistic municipal chain.
- CSE has prepared city-level reuse plans for Prayagraj and Agra, covering centralized STPs. Each maps bulk demand within a 5 km radius and checks the feasibility of moving the water there. Bengaluru has institution-level examples of treated water going to cooling towers.
- Processed sludge should be moved out of premises quickly and at a defined frequency, even though the volume is small.

A. Is there a standard for end use?

The moderator noted that sites rarely reuse 100% of their treated water and asked whether standards are end-use specific or generic.

- **Practice on the ground:** Flushing is generally designed for BOD below 10. Otherwise the SPCB discharge norms (about five parameters, including BOD, COD and TSS) are followed.
- **Standard should follow end use:** Groundwater recharge needs higher quality than flushing. Regulation should still exist, with the regulator acting as a facilitator.
- **Consent as the tool:** Consent to operate is the prevailing instrument. CPCB could issue an advisory, and bulk-user conditions could be written into consent orders.
- **"There is no standard":** It was discussed that there is no notified fit-for-purpose reuse standard. A letter circulated by a central body is used as a basis, but it is not binding and applies to centralized plants. The 2017 norms differentiated cities, and the NGT's 2018 order moved to uniform norms. EPA 1986 discharge standards prevail nationally, and states such as Delhi apply their own PCB norms, so what exists is a discharge standard, not a reuse standard. Industries have sector-specific standards, but domestic wastewater norms are broad.
- **Regulator's view:** A CPCB-side official said reuse must be fit for purpose, so no single national norm is needed, since CPCB guidelines, the CPHEEO manual and the national framework exist. A plant meeting the NGT norms can be used for any reuse category (fire fighting, vehicle washing, flushing and so on). Another participant said CPCB's 2013 reuse categories fit this role.
- **Counter-view:** Guidelines are not standards and are not legally binding, though states can adopt them and make them enforceable. Several participants wanted a national direction rather than

leaving everything to states. Others said a minimum national standard should apply to reuse as well as discharge, so nobody can argue that 30 or 100 BOD is acceptable for agriculture.

- **Repository idea:** A participant proposed a published repository of permissible uses and the norm for each (flushing, gardening, cooling towers, disposal), so users do not have to guess or misreport. Flexibility beats a single "below 10" rule.
- **Technology providers' confusion:** Providers offer products at BOD below 20, 10 and 5, with and without nitrogen removal, and buyers ask why they should pay for BOD below 10 or nitrogen removal for gardening. Technology is not the constraint; unclear targets are.
- **Karnataka and Bangalore:** Dual plumbing has been required since 2016, and a 2024 quality standard sets BOD below 10 for flushing. The policy allows up to 50% of treated water to be given or sold, but there is no standard for industrial or construction use, and builders will not accept water for other projects. Environment clearances say only treated wastewater should be used for construction, with no BIS standard linked to it.
- **TDS and construction:** In Noida and Gurgaon, treated water can have 3,000-4,000 TDS, and builders report concrete problems, so they install RO (about two parts reject to one part product). Participants said existing BIS standards (for concrete mixing water, drinking water and so on) can apply for specific uses.
- **Policy-maker's view:** Plants are designed to adjust to the receiving environment, and ultimately the river. Where demand is not continuous, water goes to the river, where nutrients matter.

Who monitors quality at the point of reuse?

- **Responsibility:** The builder or discharger is first responsible for compliance. The regulator may check at any time and penalize.
- **City role:** SPCBs have very few staff (about 5-15 for a state's work), so cities, which collect taxes and designed the city, should authorize and check. The moderator pressed for an outside monitor, not only self-monitoring.
- **Chain of direction:** CPCB directs SPCBs, which direct state departments, but implementation weakens down the chain.
- **Frequency:** Maharashtra monitors larger semi-government STPs about monthly, and city STPs may be visited about every three months in other states. Delhi monitors its centralized STPs monthly with online monitoring and a public portal, and monitors 52 drains daily. It does not monitor for reuse because no reuse standard exists. Twenty-nine DSTPs are proposed to be brought under monitoring in future.
- **Capacity building:** Engineering colleges and polytechnics could be empowered as monitoring labs. In Uttar Pradesh, NEERI helped set up more than 900 labs. Monitoring labs also need oversight.
- **Other sources:** River task force experience showed many diffuse polluters (bakeries, medicine stores disposing of expired drugs) with no identified monitor, such as the drug inspector.

Consent process and compliance

- **Sequence:** Consent to establish (before construction), consent to operate (before operation, after lab-tested samples), then renewal every 3, 5 or 10 years depending on the state and category. NOC conditions apply in some states (Goa, Maharashtra, Karnataka).

- **Environment clearance:** Projects under EC submit six-monthly compliance reports to MoEFCC, and SRO/RO visits also occur.
- **Third-party testing:** In some states (depending on red, orange or green category or CRZ location), accredited labs test monthly and submit reports to the board, although testing is often at the client's request.
- **OCMS:** Online monitoring applies above 100 KLD, so DSTPs below that fall outside it. A participant from Karnataka asked why a five-yearly consent renewal is needed when monthly reports and online monitoring exist.
- **Definition:** DSTPs were described as below 100 KLD, in-situ or ex-situ.
- **Self-compliance view:** A factory owner said owners already file periodic compliance and carry full responsibility. Others said not everyone does.
- **Open question:** Does the process check against a defined reuse standard, or only the design and discharge standard?

Standards, parameters and performance

- **History of norms:** Early norms had about eight parameters and a 30 BOD limit, assuming tenfold dilution. In 2000, in the Yamuna case, the Supreme Court pushed for stricter norms, and a 10 BOD direction was later withdrawn. The BIS issued elaborate parameters in 1982, but BIS is not an implementing agency.
- **Too few parameters:** Boards use only six to eight parameters, against hundreds in the US. Participants said health parameters, not only pollution parameters, should be considered, since a plumbing error in dual systems could affect a whole colony.
- **TDS and discharge norms:** An industry receiving freshwater with 3,000 TDS can fall out of compliance because the discharge norm is 2,100, forcing RO. Tanker water quality is also unmonitored.
- **Performance metric:** Evaluating STPs only on meeting concentration norms was criticized. Load-based measures (tonnes of BOD removed per day) and loading rates are better, especially for in-drain in-situ treatment, which should be seen as pollution load reduction.
- **Sludge:** Sludge is going to landfill, causing leakage risk and moving the problem from water to land. Standards focus on carbon, nitrogen and phosphorus.

Session 3: Summing up and Scaling Up

The moderator asked each participant to give his/her take on technology, O&M, and standards and regulation, plus views on scaling up from project level to city level.

Technology

- **Constructed wetlands** were proposed as low-cost, easy to install and operate. One compact variant (Eco-CW) needs about 650 m^2 per MLD, against roughly 1,300-1,400 m^2 earlier, with very low energy use.
- **Grey/black water segregation:** Grey water is about 105 of 135 lpcd and black water about 30 lpcd. Treating grey water separately gives cheaper flushing-grade reuse, with higher capex but lower O&M. It works only if plumbing outlets allow segregation at source, so participants suggested the National Building Code mandate it.

- **Technology choice:** Participants welcomed having many options and suggested screening on physical footprint and energy footprint before life-cycle cost (more energy means less land and vice versa). Non-biological options such as electro-oxidation produce less sludge, but the sludge may be toxic and needs checking. Technologies are largely imported and then adapted, with standards following. One participant noted that constructed wetlands were shown as cheaper than SBR, yet builders still chase SBR and package plants despite repeated failures.
- **Nature-based solutions** were said to be under-discussed. Bangalore case studies show lower O&M and electricity use where land is available.
- **Modular systems** were suggested for phased occupancy in new apartments.
- **Automation:** Fully automated plants with process control are a reality and can be retrofitted to existing plants.
- **Collaboration:** One participant urged complementarity rather than competition between technologies (for example one strong on BOD removal, another on nutrients), and linking the work to climate change.
- **Emerging approaches:** Off-grid, solar-powered, membrane or nano-filtration systems (South Africa, Toronto, China, Japan, Singapore) were mentioned.
- **Contaminants:** Pharmaceuticals, household chemicals and secondary pollutants are not captured by carbon- and solids-focused standards.
- **Final-tank design:** Some projects build two final tanks, one taking UF-filtered water for flushing and the other lighter-disinfected water for horticulture, which avoids over-treating water for uses that do not need it.
- **Self-set targets:** Some societies target BOD of 5 or even 3 mg/l for flushing water, against the 10 mg/l norm. UF at STPs was initiated by CPCB a few years ago and adds infrastructure cost.

Reuse and User Acceptance

- Smell and colour complaints quickly erode confidence, so consistent quality is critical. Users often see an STP as a headache (O&M, trained manpower, budgets), so a good first experience matters.
- **Phased reuse:** Start with horticulture, landscaping and firefighting, then move gradually to flushing and higher uses.
- **Flushing and dual plumbing:** Bangalore has had dual plumbing since 2016, with no smell and good acceptance. An operator managing 50 societies reported no objections, even in 30-40-year-old buildings. Rajasthan's high-rise policy offers a single-point water connection and subsidies for zero discharge.
- **Intermediate storage** (a lake or artificial reservoir) can reduce psychological resistance. Delhi's supply of treated Yamuna water was cited as proof of the country's treatment capability, and Singapore's NEWater (about 15% recycled) as an awareness example.
- **Bangalore initiatives:** A treated-water microgrid pilot covers 10 lakes (about ₹10 crore), treated water is being pushed for data centres, the flush norm has moved from 20 to 40 to 100 flushes, and an MoU has been signed between the apartment federation and BWSSB.
- **Standards apply on discharge:** Water reused within a premises may not need to meet discharge standards, so "repurpose" matters as much as "reuse".
- **Demand risk:** There is no standardized water quality for industry buyers. Demand is strong in cities like Bangalore and Pune but weak in others such as Guwahati.

- Decentralization also serves to keep storm drains clean and restore water bodies (Bellandur Lake was cited).
- **Retrofitting:** There is no clear policy for retrofitting dual plumbing in older buildings.

O&M and Sludge

- **Responsibility gap:** Builders maintain plants for 2-3 years, then hand over to RWAs who lack expertise, funds and trained staff, with small societies hit hardest. Some participants said the "builders cut costs" claim is a myth for large projects, while others said builders pick the lowest-cost technology because no clear mandate exists.
- **Shared and cluster O&M:** One operator can handle 30-40 plants (experience from about 1,500 plants). Clusters of 20-25 societies can be handled by 2-3 people on three shifts (Bangalore, Chennai). A city-led model could standardize on 2-3 technologies and operators.
- **Costs:** Power and manpower are the main costs, and electricity can be around 60% of O&M. Solar was suggested (about ₹2/kWh against about ₹8 grid), but vertical buildings have limited roof area. Some states charge STPs commercial electricity tariffs, which is a disincentive (Delhi NCR and Rajasthan use residential rates).
- **Long-term view:** Design for O&M, preventive maintenance and capital replacement (motors, filters, UF) from the start, and start capacity building at design stage.
- **Post-contract risk:** There is concern about what happens when long operating contracts end, for example a 15-year concession.
- **FSTP and septage:** FSTPs are under-utilized because oversized septic tanks produce concentrated sludge. A participant proposed a segregated design with periodic emptying, with transport cost estimated at ₹20-25k, which an RWA can bear, to be piloted first. Others raised social stigma and RWAs' limited ability to handle faecal sludge.
- **Manual scavenging risk:** Operators may refuse sludge work, and pushing RWAs to handle it could promote manual scavenging, which the Supreme Court has acted against. One participant guessed the Scavengers Act may not apply to processed STP sludge (to be verified).
- **Sludge disposal:** A city-level sludge collection system was proposed, similar to municipal solid waste. If there are no hazardous constituents, sludge can go to soil application or biogas plants, otherwise landfill, depending on composition. Filter presses were again reported as unused.
- **Skills:** There is no vocational training or ITI curriculum for STP operators (China was cited as a model). Capacity building was proposed at three levels: designers, approving and steering committees, and O&M staff.
- **Engineering versus policy:** An STP delivers what it is designed and fed for, but the policy that feeds it is never held accountable when it fails.

Standards and Regulation

- **Differing views:** Some argued for light-touch regulation, saying stringent rules raise costs and discourage adoption. Others said standards must tighten over time, because current ones focus on BOD and TSS and miss emerging pollutants. Some felt policy is already well placed and the focus should be on compliance. A middle path is a minimum national standard with states adopting stricter norms, tightening gradually over 5-8 years.
- **Evidence-based, differentiated norms:** Standards should rest on geography-wise studies of reuse demand, since setting BOD limits is easy but sustaining compliance and selling the water is

harder. A standard suited to Delhi, Mumbai or Bangalore may not suit Guwahati or Mysore. The 2017 MoEFCC norms differentiated million-plus cities from smaller ones, but the NGT later set a uniform approach, and MoEFCC has directed a review of ground realities. Mumbai's STP costs rising from about ₹10,000 crore to ₹26,000 crore over 10 years were cited (figures unclear).

- **Existing frameworks:** The Jal Shakti National Framework for Safe Reuse of Treated Water (2022) can bridge gaps through guidelines. MoHUA is working with Agriculture on reuse standards for centralized STPs. CPCB/PCB consents (CTO) bind plants today, and EC and CTO processes were described as streamlined. IS 18797:2020 covers package STPs, and one company is pursuing certification.
- **History of standards:** Early standards focused on carbon and suspended solids, with disinfection added later. Many were copied from abroad 30-50 years ago with little local research. Participants asked for more research and for independent experts on standard-setting committees.
- **Certification:** There was strong support for an ISI-type mark or third-party validation for technologies, contractors and operators, and an empanelment or registration scheme for O&M agencies.
- **Enforcement:** PCBs cannot monitor thousands of small DSTPs, so enforcement should be devolved to city, authority and society level. DSTPs emerged partly because municipal authorities (for example Noida) did not provide collection and treatment. There is no mechanism to verify that supplied water returns as expected sewage (for example 100 L in, 80 L out) with zero discharge events. Some societies have up to 7,000 apartments, and builders often cannot even provide the water supply.
- **Policy gaps:** Participants raised the lack of incentives (subsidized power, green credits, property-tax rebates) and of recognition for well-run societies. Those who can afford better treatment should pay for it, and apartments may need to charge a little more.
- **Who pays:** Both polluter-pays and user-pays principles apply, but decentralized STPs should not be expected to become revenue self-sustaining soon.

Scaling Up

- **Benefits framing:** Move from a compliance burden to benefits: alternative water, jobs (about 10,000 in Bangalore apartment federations alone, potentially a million nationally, including formalizing existing septic tank workers) and restoring water bodies.
- **Hub-and-spoke model:** Use existing centralized infrastructure and add decentralized capacity where it is missing. The centralized versus decentralized debate should end.
- **Water as a service:** The city or utility buys surplus treated water.
- **Mapping:** Make DSTP and bulk-user mapping part of every DPR, replicate DPRs through authorities, and scale with proven technologies.
- **City governments** should be involved in monitoring, CAPEX/OPEX and cluster management.
- **Dispersed cities (for example Guwahati):** Build a logistics system for treated water, modelled on faecal-sludge vehicles and pumping stations. Treated water would be collected at nodes, given tertiary treatment and TDS correction there, and distributed to users such as construction and stadiums. A dashboard or marketplace could match supply with buyers.

- **Highways and roads:** A pollution control board chairman suggested a treated-water pipeline for highways and road sprinkling, not inside cities, because of cross-contamination risk (the recent Indore incident was cited).
- **Odisha:** A participant proposed mapping DSTPs, certifying and training operators, and forming a federation like Bangalore's in each city.
- **Pilots and targets:** Pilot ideas before scaling (such as the segregated black/grey-water design), and set state-level publicity and reuse targets with sector-specific water consumption norms and revised concentration limits.
- **Recognition:** Public appreciation (press coverage, children proud of their society) and certification were described as strong motivators.