



Policy Brief Financing and Business Models for Faecal Sludge and Septage Treatment for Urban India

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In August 2014, Government of India launched a Swachh Bharat Mission (SBM) that aimed to make India open defecation free (ODF). However, to move towards “safely managed sanitation” as per target 6.2 of Sustainable Development Goal (SDG), it is necessary to also ensure that all faecal waste is safely collected and treated.

This policy brief identifies the possible financing options and business models for setting up Faecal Sludge Treatment Plants (FSTPs) as a part of citywide FSSM services. The research findings highlight that capital financing requirement for FSTPs is only a small proportion of total urban sector outlay at both the national and state levels. Thus, there is a need to create better awareness at both national and state levels to explicitly incorporate FSSM related components in national programs, such as SBM and AMRUT. It also suggests that financing requirements for treatment plants will mainly need to come from public funds and it will be essential to strengthen the local government capacity – both to finance and to manage these services through appropriate partnerships with the private sector.

1. Introduction – A study of FSSM financing in four States

This Policy Brief discusses potential financing options to ensure adequate funding and business models for setting up faecal sludge treatment plants (FSTPs) as a part of citywide universal FSSM.

As India moves to achieve its ambitious aim of making India open defecation free (ODF), there are concerns that greater efforts will be needed to ensure sustainability. One of the key aspects for this is to ensure that households and other users have access to an effective and affordable service to manage their wastewater and septage. There is a widespread realization that for universal access to safely managed sanitation across urban India, attention is needed on Faecal Sludge and Septage Management (FSSM) and not only centralized sewerage. This was reflected also in the adoption of a National FSSM Policy. Several state governments have also developed their own FSSM policies. The emerging momentum needs to be backed by adequate financing to ensure universal services.

This Policy Brief discusses potential financing options and business models for setting up Faecal Sludge Treatment Plants (FSTPs) as a part of citywide universal FSSM. It is based on a study carried out in four

states – Andhra Pradesh, Odisha, Maharashtra and Tamil Nadu.¹ The study assessed financing requirements and potential sources of funds for both capital and operating expenditure. The study findings and emerging recommendations also benefitted from stakeholder consultations.

The study findings clearly highlight that financing requirements for universal FSSM services are not high in relation to allocations being made for urban flagship programs. However, an emphasis on small and medium towns is needed. It also emphasizes that public financing is essential for FSSM especially in view of the large public benefits of FSSM services. While private sector participation is essential in construction, operations and management, there are limited opportunities to mobilize private financing due to the lack of an effective revenue model for faecal sludge treatment. Besides capital expenditure, however, funding of operations and maintenance are critical to ensure sustainability. As FSSM is mainly a local service, focus is needed on local government finances, particularly for financing operations and maintenance.

2. Financing FS Treatment – Financing requirement for universal FS treatment is not high and can be met largely through public funds. However, advocacy and earmarking are essential at all levels: Centre, State and Urban Local governments.

This study developed detailed estimates of FSSM financing requirements for both capital and operating expenditures for both conveyance and treatment for FSSM. The assessment was done for different city categories across the four states.

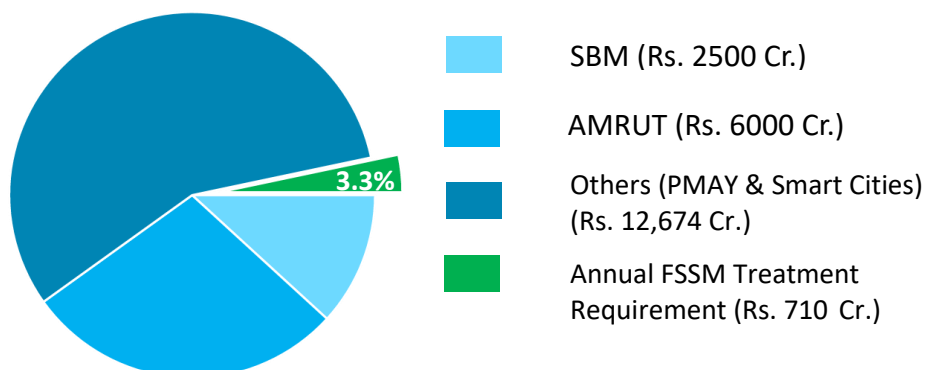
Need for a focus on public finance for FS treatment: The analysis and findings show that financing requirements for universal and citywide access to treatment are not high, especially when compared to public funding allocated for urban infrastructure in India and across the four states. The study also highlights that while resource recovery and reuse remain important objectives, there is no clear revenue model possible from this at present. Similarly, while tipping fees in principle can be a source of revenue, these are not widely used and maybe difficult to implement in practice. Thus, financing for treatment facilities will largely need to be mobilized from public funds.

¹ These four states are focus states of Bill and Melinda Gates Foundation in India for FSSM related work.

National level financing requirements for FSTPs are not high in comparison to the national flagship programs: To achieve universal coverage for treatment facilities across all cities in India which rely on onsite sanitation systems is estimated to be Rs. 7,100 crores over a 5-year period from 2018-2022. To support financing of access to FSTPs for all cities, a national program by the Government of India (GoI) will help to place priority on FSSM. It will also encourage both the State and local governments to put their own share of funds for building treatment facilities. Such a program will need to focus on small and medium sized cities as larger towns generally have their own STPs where the collected faecal sludge can be treated. Such a budgetary allocation could be through a new AMRUT Program or by adding a special FSM component in the flagship SBM, which already includes Solid Waste Management.

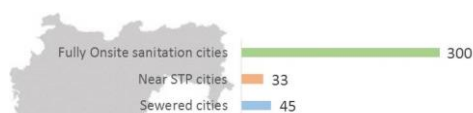
The total requirement is estimated to be Rs 7,100 crores or Rs. 1,420 crores per annum. This would mean less than 8.3% of total budget allocations of Rs. 8,500 crores in 2018-19 of the two main flagship programmes. Across all flagship programs, it is less than 3.3% of allocation, considering 50:50 share of central government.

Figure 1: Union Budget for Flagship Programmes and Financing Requirements for FS Treatment



Source: Based on Ministry of Housing and Urban Affairs Union Expenditure Budget 2018-19, accessed from: <https://www.indiabudget.gov.in/vol2.asp?pageid=5> on 19th July, 2018

Findings from studies across the four states suggest that financing requirements for FSTPs is only 1 to 5% of state's UDD budgets: The four-state research study assessed financing requirements for universal access to faecal sludge treatment plants (FSTPs) in cities that do not have access to existing sewage treatment plans (STPs). It also assumed that cities within a 20 km range of existing STPs can do co treatment at these, rather than build their own new FSTPs. The capital financing requirements for new FSTPs range from Rs. 166 crores in Odisha to Rs. 1111 crores in Tamil Nadu.



“Over 27 lakh households rely on onsite sanitation”

In **Maharashtra**, 45 larger cities already have sewerage system and their own STPs, which give access to sewerage to about 100 lakh households. Those relying on onsite sanitation in these cities can also be covered through co-treatment. In addition, 36 cities are within a reasonable distance from existing STPs and will also be able to do co treatment. Government of Maharashtra has already issued a Government Resolution for this. In the remaining 300 cities over 27 lakh households rely on onsite sanitation. For these, an estimated capital investment of Rs. 600 crores and operating expenses of 170 crores for next five years will be required for new FSTPs². In Maharashtra, there were several programs such as Sant Gadge Baba Abhiyan, Nagarothan and Vaisithpurna Yojana which provide funds for urban infrastructure. However, over the past decade, the state funding has mainly focused on meeting the state share for projects under the national flagship programmes such as JNNURM, AMRUT and SBM. Thus, a new central program that focuses on FSSM in all cities, especially the small and medium ones, will help mobilize state share for such projects.

The FSTPs can also be funded through ULB resources, mainly from the 14th Finance Commission grants accruing to local governments. Government of Maharashtra has suggested to ULBs to use 50% of these funds for sanitation related activities. Also, as large municipal corporations are not allocated the 14th FC funds, their share is distributed to other smaller cities which helps to increase the total funds available for other smaller municipal councils. Over the next one year, these ULBs will receive Rs. 2979 crores as basic grants from the 14th FC allocations. In addition, they will also receive about Rs. 400 crores as Incentive Funds provided by the Government of Maharashtra to all ULBs that have become ODF. Thus, small and medium sized ULBs in Maharashtra will have access to considerable funds to meet the capital finance costs of FSTPs. As for state funds, the focus will need to be prioritizing funding of FSTPs in their cities.



“Over 7.8 lakh households rely on onsite sanitation”

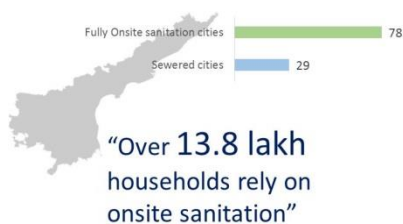
In **Odisha** only 10 cities have existing or proposed sewerage covering about 1 lakh households. Nearly 7.8 lakh other households across 100 cities need access to FSSM services. For them, a capital investment of Rs. 166 crore and operating expenses of Rs. 46 crores will be required over the next 5 years. The State government has so far used the AMRUT program funding of about Rs. 28 crores to build FSTPs in 9 cities. The state government has made a representation to the 15th

² Detailed analysis of FSTP costs in Maharashtra suggests that per KLD cost of FSTP is likely to be lower as compared to average value of Rs. 6 lakh per KLD considered during this study. The key reasons for lower costs are due to selection of treatment technologies as suggested by state government and local construction costs.

FC, where Odisha state government indicated a demand of Rs. 340 Crore for state-wide FSSM coverage. Besides allocation from the state budget, potential public funding for FSSM is also available through the District Mineral Fund in Odisha. Using this source, Rs. 20 Crore have been allocated for FSTPs for five ULBs. However, so far only Rs. 1.3 crore has been sanctioned.³



For **Tamil Nadu**, at Rs. 1111 crores, capital financing requirement for FSTPs is high compared to other states. This is mainly due to the large number of small urban areas. While about 61 large cities have sewerage, these serve 41 lakh households. On the other hand, nearly 600 cities with 50 lakh households depend on onsite sanitation systems. The operating expenses of these FSTPs are estimated at Rs. 309 crores for five years. While the Government of Tamil Nadu (GoTN) plans to have FSTPs for a cluster of small cities, the financing requirements are likely to remain the same as these are linked to total capacity required. The state is planning to finance these FSTPs from the funds available in Integrated Urban Development Mission (IUDM) (GoTN 2018).



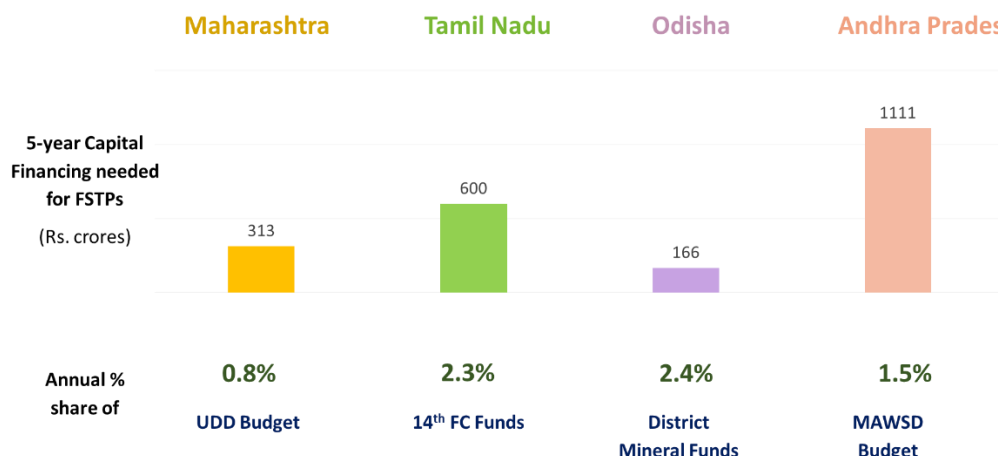
In **Andhra Pradesh**, 29 large cities have sewerage systems and their own STPs, which serve about 30 lakh households. However, the remaining 78 cities require FSTPs for about 13.8 lakh households that are dependent on onsite sanitation systems. The total capital funding requirements for FSTPs in these cities is estimated to be Rs. 313 crores. The Government of Andhra Pradesh (GoAP) has set up the Swachh Andhra Corporation (SAC), a state entity for SBM. It has invited private sector participation through a Hybrid Annuity Model (HAM) approach for building and managing FSTPs for 76 cities with a total estimated cost of Rs. 91 Crores. This is through a cluster approach with each tender package covering about 11 cities. Under this HAM model private sector enterprise is expected to bring 50% of funds. They will be repaid by SAC through annuities over a 10-year period, along with O&M fees. GoAP has made a specific budget allocation of Rs. 40 crores for this in its 2018-19 budget. This approach will help assess the possibility of private sector interest in making partial capital investments in FSS treatment. It is likely that the private sector bid prices will be higher to cover their own debt costs and returns on equity. (CEPT, 2018)

Our overall analysis suggests that in all the four states FSSM funding requirement is not very high and comprises only 1 to 5% of their urban development budget. So far only AP has made an allocation of

³ <http://dmf.orissaminerals.gov.in/website/sectors.aspx?sid=20>

Rs. 40 crores in its state budget for 2018-19 which is planned to be used for FSTPs under the HAM Model. To get state governments to prioritize FSSM in their budget allocations, a specific FSSM component in a flagship program will help put priority in state and local budgets. In addition, other sources such as the 14th FC funds as being used in Maharashtra and the District Mineral Fund in Odisha are also important additional public sources that can be tapped.

Figure 2: State wise Capital financing requirements for FSS Treatment and potential sources

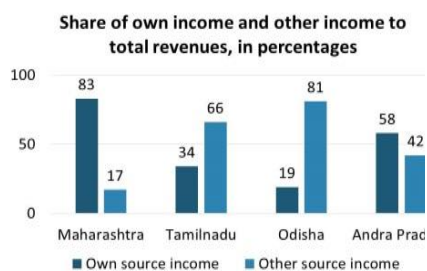


Sources: CEPT study on financing FSSM services across four states, Based on UDD budgets: Maharashtra UDD Budget 2017-18; For Tamil Nadu MAWS 2017-18 Budget; For Andhra Pradesh MAUD Budget 2017-18 and Odisha UD and Housing Budget 2017-18

3. Ensuring adequate financing for operation and maintenance to ensure sustainability

One of the key reasons for the common spectre of non-functioning STPs across India is inadequate funds available for their operation and maintenance. A study by Central Pollution Control Board (CPCB, 2013) reports that majority of State Governments or the implementing agencies are not able to provide sufficient and regular funds for O&M of STPs. This results in their unsatisfactory performance.

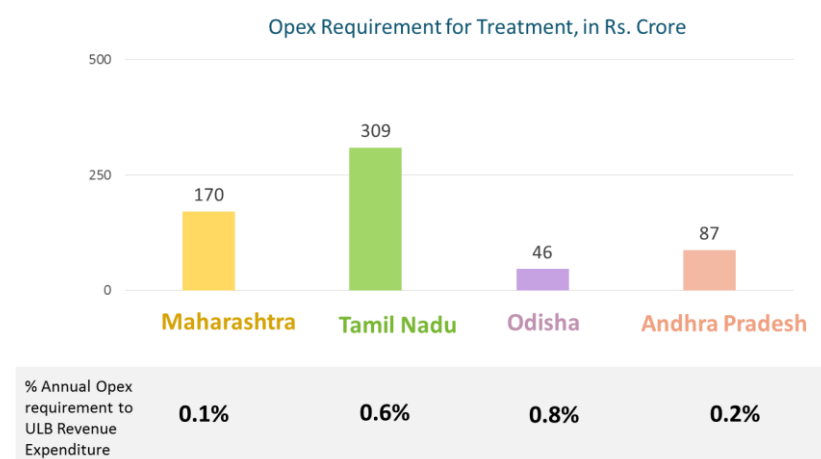
“Though more than 500 STPs are operational in India, a majority of them do not meet their capacity of treating sewage. The problem of costly maintenance of STPs is the most damaging as many STPs shutdown due to their inability to bear the functioning costs” as reported by Mr. Akolkar A B, Member Secretary, Central Pollution Control Board” (NDTV, 2017). To avoid a similar situation for FSTPs, it is critical to ensure that adequate funding is available to meet their operating expenditure.



FSSM is generally the responsibility of local governments and therefore the onus is on them to ensure proper O&M of FSTPs. In most

cases, local governments contract private enterprises to build FSTPs and to manage their operations. However, except in the case of HAM approach in Andhra Pradesh referred above, both capital and O&M funding comes from public sources. Thus, it is essential to strengthen the local government capacity – both to finance and to manage the private sector providers.

Available information from Maharashtra, Andhra Pradesh and Tamil Nadu suggest that ULBs in these states are financially strong and have the capacity to meet the O& M costs of FSTPs. The findings suggest that annual operating expenditure of FSTPs is only 0.1 to 1.0% of their annual revenue expenditure.



Thus, it is possible to meet this additional requirement from municipal revenues. To further ensure sustainability, ULBs can be supported to improve on their property tax collection. In these states, property tax is a major source of revenue for ULBs as it constitutes more than a third of own revenue income for ULBs. Several studies show that there is scope to improve property tax revenues especially through improved collection efficiency.

Two cities in Maharashtra have introduced sanitation tax in their cities to recover the operating expenses for conveyance and FSTP plant. The sanitation tax is essentially a part of the overall property tax, and is generally billed together with the property tax. A review of municipal legislations across four states suggests that there are provisions to introduce sanitation taxes in all the four states.

Odisha and Andhra Pradesh however plan to rely on state sources for operating expenditure. In Odisha, funding of FSTP operations is through the national program. This will be available for the next 5 years. After this period, however, appropriate local sources for operating expenditure will be needed. As per the Hybrid annuity model of Andhra Pradesh, opex will be financed by the state government for next 10 years through Swachh Andhra Corporation.

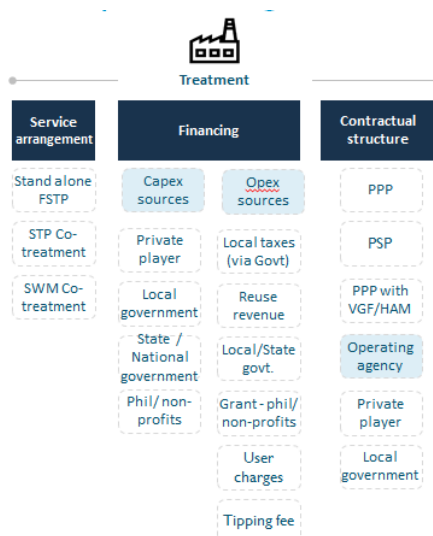
For O&M of treatment plants, other potential sources for recovering operating expenses are revenues from reuse of treated products from wastewater and septage. However, based on field inquiries, it appears that these revenues are currently small and do not constitute a good revenue model. Tipping fees is another potential source, charged as a fee to septic tank emptiers at the time of disposal at the FSTP. However, this can work as a disincentive for private operators and may result in inappropriate disposal of untreated sludge.

Thus, it will be essential to ensure performance and sustainability in different approaches emerging across the four states. These will need to ensure appropriate private sector participation and adequate resources for O&M to ensure good performance and sustainability.

4. Business models of Faecal Sludge treatment: Preparedness of States and ULBs to plan and implement FSSM services is critical to ensure that projects are taken up, implemented and appropriate private sector participation is developed to ensure sustainability

Besides ensuring adequate funding, adequate capacity is needed to both plan for and implement FSSM services at local level. While sanitation and FSSM are key responsibilities of local governments, it is also important to identify role of private sector and other stakeholders in managing and financing these services. Appropriate business models will help define ways to provide citywide sanitation services in an equitable, cost effective, and sustainable manner - which can be scaled up across cities and states.

Core parameters to define business models



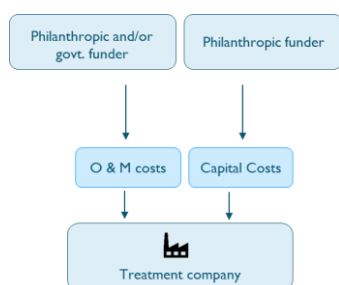
A business model is defined as a Service Model for a public service and outlines the manner in which a service is structured, financed and management arrangements for its delivery.

The business models are defined around three core parameters:

- **Service arrangement-** Determine factors such as individual FSTPs, Co-treatment at STPs, integrated desludging and treatment
- **Financing-** Flow of finances within business models determine factors such as capex and Opex sources, availability of reuse markets, financial capacity of ULBs, willingness to pay by households etc.
- **Contractual structures-** define project structuring and identify responsibilities of players involved in the project. Drive the terms of the contractual arrangement e.g. long term public-private collaboration through PPP or PSP, or a license to operate.

An iterative process was followed for defining core parameters of business models, mapping available case studies of these models and identifying prototypes. Table 1 identifies 6 business models that are applicable in different settings and stages of development. It also shows related examples of these models in practice from India and other parts of Asia.

Philanthropic funded treatment model- Critical for pilots and demonstration projects



Different business models in Table 1 were reviewed from emerging experience in FSSM from national and international case studies. This suggests that philanthropic and public funding are critical in initial stages since there is limited commercial return and technologies are still in a nascent stage. The philanthropic or non-profit funded models have played a catalytic role for pilots and demonstration projects in cities of Devanhalli, Wai, Trichy, Dhenkanal, Narsapur and Warangal. However, for scaling up, more sustainable models involving public and/or private sector funding will be needed. Several states intend to scale up across all cities. While emphasis is placed on rapid and state-wide implementation, it is important to ensure that these result in good performance and sustainable services.

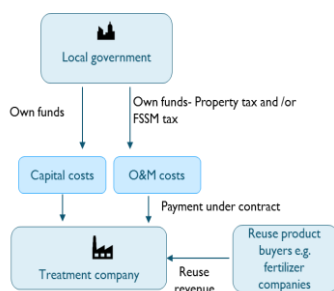
Based on this approach, applicability of different business models were identified across the four states considering state sanitation strategy, presence of private service providers and local government financial and managerial capacity.

Table1: Service/Business Models for Faecal Sludge Treatment

Model Description	Benefits	Need to address	Applicability	Cases
1. Philanthropic funded treatment facility: Treatment plant capex and initial Opex by philanthropic and operations by private	Plugs the funding gap for new treatment technologies and models; No financial or implementation burden on governments	Not a sustainable source of funds for the long term or for established technologies/ models	Philanthropic funding typically drives capex investment, and supports opex recovery in the short / medium term	Wai, Narsapur, Warangal
2. State government funded through national/ state programs for capex and opex: Treatment plant capex by state government, Opex by State or local government and operations by private	Govt. participation in capex funding incentivizes private participation	Requires allocation of public funds; The limited role of ULB in implementation and monitoring may challenge sustainability	Relevant where Government has some funding capacity but limited operating capacity and where private sector participation is considered important from an operations perspective.	Odisha, Chhattisgarh, UP
3. Local Government funded for capex and opex: Treatment plant capex and Opex by local government and operations by private	Govt. participation in capex funding incentivizes private participation; Sustainable plant operations since implementation is with the private operator	Requires allocation of public funds for FSSM capex; Need to assess ULB financial capacity to finance Opex of treatment plants.	Relevant where local government has funding capacity but limited operating capacity	Sinnar and Umred in Maharashtra
4. Partially funded by private sector and state government and operated by private: Treatment plant capex by private and state government; and Opex by state government and operations by private	Reduces the initial capex burden for governments	Difficulty in finding players with the financial and technical capacity; May discourage small players with low financial capacity	Relevant in scenarios where private sector participation and part funding is prioritized and government support is needed to bridge viability gap funding and justify commercial return	Andhra Pradesh and Telangana
5. Integrated model for scheduled desludging and treatment: Same private firm operates both desludging and treatment service for one city	Integrated models offer efficiencies, convenience, and easier contracting, with the same private provider	dependency on a single player (1) compounds risk of non-performance, and (2) crowds out existing smaller players	There are private players with capacity to manage both treatment and desludging operations	Leh, J&K
6. Integrated model with a cluster based approach: Same private firm operates both desludging and treatment service for a group of nearby cities	Cluster approach and co-treatment can provide efficiencies in treatment facilities	Co-operation among cities, efficient road connections	As above, but where the nearby cities are willing to come together for a cluster approach	Thongthawil Service Co. Ltd, Thailand

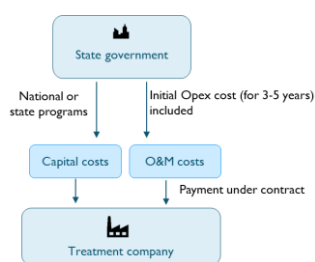
Source: *Based on the Landscape studies for Business Models across 4-states by CEPT University (2019a, 2019b).(pps 110-118)*

Maharashtra- Local government funded business model for treatment



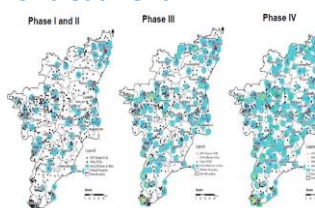
In **Maharashtra**, the State government is in the process of developing a state-wide FSSM strategy. It focuses on the State Government supporting cities with wider policies (such as the ODF sustainability charter highlighting FSSM and the ODF+/ODF++ approach) and capacity building support for planning and preparing detailed implementation plans and using model tender documents to ensure sustainability and performance. For treatment, full or partial capex support is expected from the state government and partial by local government. Land for treatment will be provided by ULBs. Local government will be responsible for managing, monitoring and O&M funding of FSTP. The operational cost recovery is typically expected from local governments through sanitation and property tax. The government of Maharashtra (GoM) has also enhanced the availability of 14th FC funds for small and medium sized cities and provided Incentive Funds to all cities that become ODF. The GoM recognises that FSSM is essentially a local government service, as are water supply and sanitation. This means that ultimately the local government will need to plan, finance, implement and manage these services. Thus, the state or local government funded treatment models emerge as the key business models for Maharashtra.

Odisha- State government has funded both treatment facilities and purchase of septic tank emptier trucks



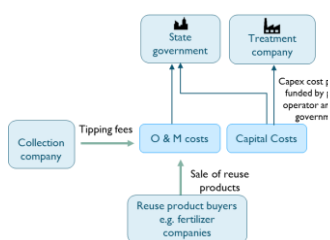
In **Odisha**, faecal sludge treatment plants are funded through AMRUT Program grants (50% Centre and 50% State). Odisha follows a state led approach and a state agency (OWSSB) carries out all activities for design, implementation and monitoring of projects. The role of ULB is mainly limited to providing land for FSTP. Given the relatively lower financial capacity of ULBs and limited presence of private sector service providers in Odisha this was probably considered necessary. However, it will be important to build ULB capacity in Odisha to operate and manage the FSTPs, either on their own or through appropriate contracts with private sector operators. The state government funded model emerges as most sustainable business model for Odisha.

In Tamil Nadu, the state government has adopted a cluster based approach for treatment



In **Tamil Nadu**, the state government has adopted a cluster based approach for treatment i.e. a common FSTP for a cluster of cities. To optimize investments the cluster approach is divided into 5 phases. The first two phases are cluster approach near existing and proposed STPs. In the third phase, cluster approach is around municipalities with secured SWM sites where FSTP will be constructed. Phase 4 & 5 involve small cities i.e. cluster of TPs with Resource Recovery Park (RRPs) greater than 1 acre and catering other remaining ULBs, who are not covered under other categories. This approach will need to ensure that the private desludgers dispose the collected septage only in the assigned FSTPs. The capital funds for the FSTPs is planned to be

In Andhra Pradesh, the state government has played an important role in funding of FSTPs in 78 ULBs through a hybrid annuity model (HAM)



given by the state government. The operational costs will be borne by the ULBs, as their financial and managerial capacities are good. Thus, state government funded and clustered model for treatment emerges as the most applicable business models for the state.

In **Andhra Pradesh**, the state government itself plays an important role in funding of FSTPs in 78 ULBs through a hybrid annuity model (HAM). It envisages the role of private sector to provide partial funding (50%) and to operate the services for 10 years. The budget allocation by the state government will help cover both partial upfront capital costs to meet the government share (50%) as well as O&M costs. The private sector will be repaid through annuity payments over 10 years. A concern in this approach is that the role of ULBs may be minimized and be limited to provision of land. The private sector operators will report to and be funded through Swachh Andhra Corporation, a state government entity. It will also require considerable monitoring from the state entity at local level to fulfil the performance-based payment mechanisms.

Based on the lessons of these four states, Government funded treatment plants with O&M through a private operator, remains the most common model. Non-profit funding models are important when new treatment technologies are being explored, but government funding is crucial for long term sustainability. This is especially important as commercial recovery from sale of reuse products has not seemed viable in these early models.

The experience of Leh in an integrated model for scheduled desludging and treatment by the same service provider can also be explored in states like Maharashtra and Andhra Pradesh. The cluster based model serving more than one city and treatment plant serving rural and urban areas appears to be emerging treatment business models.

5. Key Recommendations

A number of key recommendations are identified for use of different business models to develop faecal sludge treatment capacities across cities:

- **For ensuring infrastructure and services for faecal sludge treatment, financing will mainly need to come from public funds.** Advocacy efforts are needed with central government for national flagship programs **to focus on FSSM and on small and medium cities.** Local governments can also fund their share from grants such as from the 14th Finance Commission. Each state government will also need to identify its own sources for matching funds or for its own program.
- **The operational cost for treatment is often difficult to recover** through reuse revenue or user charges through tipping fees. Reuse of treated sludge and water also requires developed markets, in view of the prevailing subsidies for chemical fertilizers.

Thus, it is important that this has to be funded by local government as FSSM is largely a local service. **More advocacy and innovation are needed to support development of reuse markets and with state and local governments to allocate resources for FSSM.**

- For operational sustainability, it is essential **to support ULBs to enhance their own incomes by improving sanitation tax, property taxes and revenues from other sources of own income.**
- **Innovative financing models** can be explored as being tried in Andhra Pradesh. The Hybrid Annuity Model is a step in this direction to revive private sector investment in treatment plants. It will be useful to watch the AP experience to assess the appetite for such private sector funding. Impact investment can be explored for treatment through a DIB /SIB structure.

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The Center for Water and Sanitation (C-WAS) at CEPT University carries out various activities – action research, training, advocacy to enable state and local governments to improve delivery of services. In recent years C-WAS has focused its work on urban sanitation.

Citation suggestion:

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