

# Business Models for Faecal Sludge and Septage Management (FSSM)

A landscape study of four Indian states

June 2019

# **Business Models for Faecal Sludge and Septage Management (FSSM)**

## **A landscape study of four Indian states**

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The study was carried out by the Center for Water and Sanitation (C-WAS), Centre for Research and Development Foundation (CRDF), CEPT University as a part of the project on 'Financing FSSM Services' funded by the Bill and Melinda Gates Foundation (BMGF).

# Acknowledgements

Faecal Sludge and Septage Management (FSSM) has been recognised as an important means to achieve the Sustainable Development Goal (SDG) 6.2 of “safe sanitation management”. In recent years, there has been an increased attention on FSSM within the wider national priority through the Swachh Bharat Mission (SBM) on urban sanitation. This has led to a national FSSM policy and many states have their own FSSM policies. State governments have used 14 FC funds, AMRUT funds and other funds for construction of Faecal Sludge Treatment Plants (FSTPs).

This study explores FSSM business models and private sector engagement in FSSM in both conveyance and treatment parts of the FSSM service chain. It identifies relevant business models, which will help ensure that FSSM services are provided in a sustainable manner, and the related institutional and financing arrangements fit within the prevailing regulatory regimes.

The study was carried out under the project “Financing Faecal Sludge and Septage Management (FSSM) services” funded by the Bill and Melinda Gates Foundation. The report is based on studies by the team at Center for Water and Sanitation (C-WAS), CEPT University and specific studies done by the Dalberg Global Advisors for CEPT. The Technical Support Units in the four focus states of BMGF have contributed by sharing data and insights. The CWAS Team included Meera Mehta, Dinesh Mehta, Dhruv Bhavsar, Upasana Yadav, Jigisha Jaiswal, Aasim Mansuri and Dhvani Shah.

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# Introduction and overview

- **Faecal sludge and septage management (FSSM) did not receive adequate attention in the past, but is now gaining momentum nationally as well as in the focus states of Maharashtra, Tamil Nadu, Odisha and Andhra Pradesh.**
  - Flagship sanitation programs such as the Swachh Bharat Mission did not include FSSM as a focus area.
  - There is increasing recognition of the importance of FSSM, guidance and funding for FSSM, such as:
    - At the national level e.g. National FSSM Policy 2017, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) provides funding for septage management
    - Many States have their own FSSM policies and initiatives
- **Effective business models are a basic driver to scale FSSM solutions, and require appropriate models across the service chain for both conveyance and treatment.**
- **Currently, the most common model is on-demand desludging in conveyance and FSTPs in the pilot stages supported by non-profit funding in Treatment**
  - On-demand desludging: In this model, desludging is done only when households demand it, which is typically when septic tanks are overflowing. Desludging is typically done by small-scale private service providers. A key challenge is that desludging is done infrequently (e.g. at a minimum of 5 years) resulting in environmental and health hazards.
  - FSTPs with non-profit support: Pilot plants are currently often supported by non-profit funding, given the nascent and evolving stage of treatment technologies

# Study objectives and approach

This study explores FSSM business and operating models for conveyance and treatment. The study also aims to understand if the private sector is capable and well positioned to take on a larger role in FSSM.

The scope of this study includes three key questions:

1. What is the broad landscape of business models prototypes for conveyance, treatment and integrated approach?
2. What is the broad landscape of private sector presence across FSSM value chain and assess their potential role and challenges from perspective of different business models?
3. Which business models are best suited in context of states priorities and policy decisions, level of local government financial and managerial capacities and presence of private sector across four states?

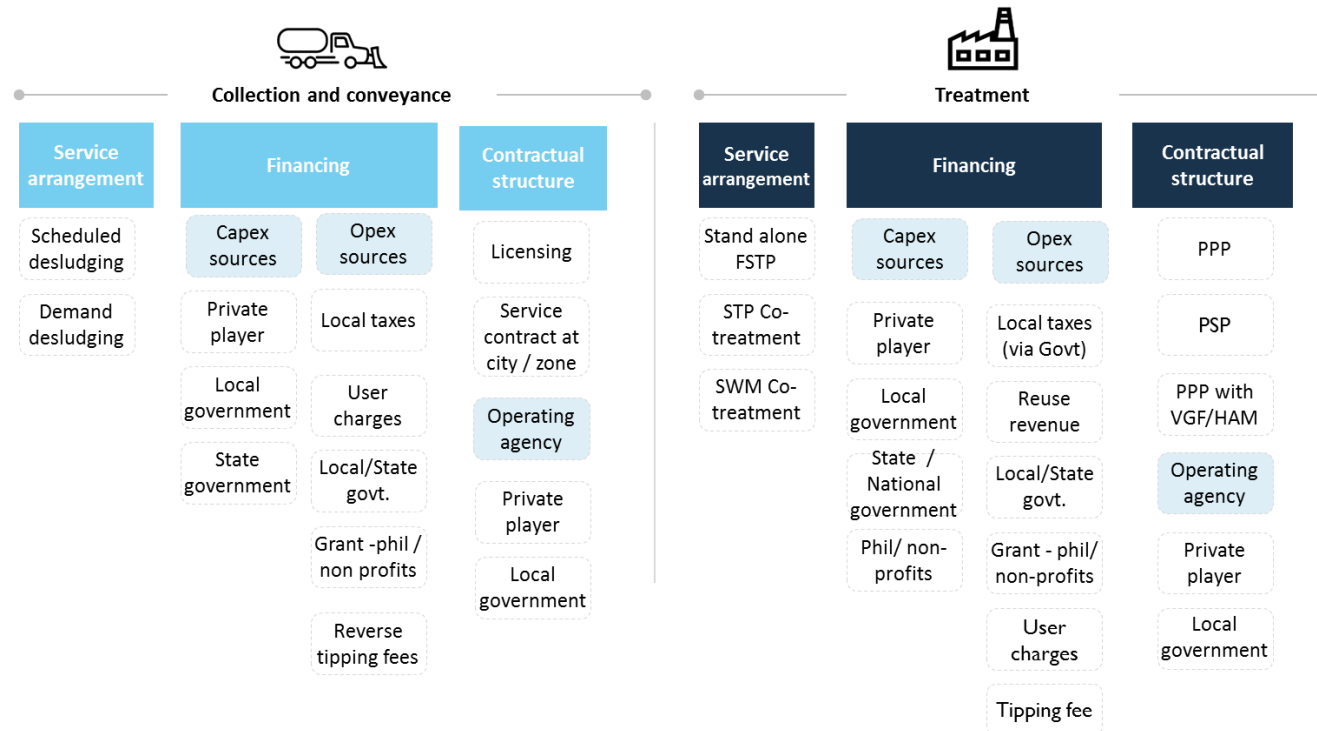
An iterative process was followed for creating the conceptual definition of a business model, mapping available cases of these models and identifying prototypes. A mix of desk research and field research was adopted for this study. Interviews were conducted with diverse stakeholders including government officials at state and local levels, private operators, sector experts, TSUs, CSOs, investors, funders etc.

# Defining a business model for FSSM

A **business model** in this slide deck is defined as a Service Model for a public service outlines the manner in which a service is structured, financed and management arrangements for it delivery. Sanitation, and FSSM in particular, require this approach.

These 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 defining business models



Business models prototypes are developed for conveyance, treatment and integrated approaches



# Conveyance business models and prototypes

Business model prototypes	Examples	Applicability
<b>Demand based desludging</b>		
<b>1. Full Private model</b> <i>Truck capex by private and Operations by private</i>	Andhra Pradesh, Tamil Nadu	Applicable in cities where ULB financial and operational capacity is less and presence of private sector desludging operator is available.
<b>2. Full government model</b> <i>Truck capex by government and Operations by government</i>	Small cities in Maharashtra	Applicable in cities where ULB financial and operational capacity is more and presence of private sector desludging operator is not available.
<b>3. Government-owned vehicles and leased to private players for operations</b> <i>Truck capex by government and Operations by private</i>	Odisha	Applicable in cities where ULB financial is more but operational capacity is less and presence of private sector desludging operator is available.
<b>4. Call Centre with price negotiation model</b> <i>Truck capex by private and Operations by private with call centre set-up by local government</i>	Dakar	Applicable in large cities where there are multiple private players present and competition among them. Eg: Bangalore, Delhi, Hyderabad, Pune, etc.
<b>Scheduled based desludging</b>		
<b>5. PPP Annuity model</b> <i>Truck capex and Operations by private with performance based annuity contract with local government</i>	Wai and Sinnar, Maharashtra	Presence and willingness of private sector to invest in trucks capex and take on contracts. Local government has capacity to monitor operations.
<b>6. PSP Annuity model</b> <i>Truck capex by government and Operations by private operator with performance based annuity contract with local government</i>	Leh, J&K, Gevrai, Maharashtra	Private sector presence, but low capacity to invest, while local /state government has financial and monitoring capacity. Government capex may incentivize private players to participate.
<b>7. Scheduled desludging on requisition</b> <i>Online platform for Desludging requisition created by local government and services provided by either government or private operators</i>	Indonesia	Applicable in areas where there is considerable variations across properties in containment sizes in a given city

**Key prototypes** were identified using key prioritization criteria: *existing proof of concept, environmental/health outcomes, equity and potential for cost recovery, contextualization of stakeholder capacity and willingness to participate*

# Treatment and integrated business models and prototypes

Business model prototypes	Examples	Applicability
<b>Treatment Business models</b>		
<p><b>1. Philanthropic funded treatment facility</b>  <i>Treatment plant capex and initial Opex by philanthropic and Operations by private</i></p>	<p>Wai, Narsapur, Warangal</p>	<p>Philanthropic funding typically drives capex investment, and supports opex recovery in the short / medium term, driven by the recognition that reuse / tipping fees are unlikely to fund all or a significant proportion of opex. Opex funding is short / medium term, local governments may need to take over thereafter</p>
<p><b>2. State government funded through national/ state programs for capex and opex</b>  <i>Treatment plant capex by state government, Opex by State or local government and Operations by private</i></p>	<p>Odisha, Chhattisgarh, UP</p>	<p>Relevant where Government has some funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective</p>
<p><b>3. Local Government funded for capex and opex</b>  <i>Treatment plant capex and Opex by local government and Operations by private</i></p>	<p>Sinnar and Umred in Maharashtra</p>	<p>Relevant where Government has funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective</p>
<p><b>4. Partially funded by private sector and state government and operated by private (similar to HAM)</b>  <i>Treatment plant capex by private and state government; and Opex by state government and Operations by private</i></p>	<p>Andhra Pradesh and Telangana</p>	<p>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</p>
<b>Integrated Business models</b>		
<p><b>1. Integrated model for scheduled desludging and treatment</b>  <i>Same private firm operates both desludging and treatment service for one city</i></p>	<p>Leh, J&amp;K</p>	<p>Relevant in areas where there are private players with capacity to manage both treatment and desludging operations.</p>
<p><b>2. Integrated model with a cluster based approach</b>  <i>Same private firm operates both desludging and treatment service for a group of nearby cities</i></p>	<p>Thongthawil Service Co. Ltd, Thailand</p>	<p>Relevant in areas where there are private players with capacity to manage both treatment and desludging operations. Also where the nearby cities are willing to come together for a cluster approach; or where a private provider has the capacity to work with several nearby cities.</p>

# Key observations: on business models for conveyance, treatment and integrated models

## Conveyance business models

- High level of private participation reflects high business opportunity in this portion of the value chain.
- Current practice of On-demand desludging through private operators or ULBs is the most prevalent model across cities and states in India. However, scheduled desludging is needed to ensure regular and timely desludging, helps achieve equitable services, including the poor; positive environmental impact; removes the need for manual labour and help build a good database on real situation of onsite facilities
- Limited need for government investment is needed for conveyance

## Treatment business models

- Government and philanthropic funding critical in initial stages, since there is limited commercial return potential
- Opex for treatment is often difficult to recover through reuse revenue or user charges. This has to be partially funded by local government.
- Treatment operations are always outsourced, due to ULB's limited resources, financial and technical capacity.

## Integrated business models

- Efficiencies, convenience and easier contracting
- Interesting options for opex funding of treatment from households –through efficient implementation of bundled pricing
- Dependency on single player compounds risk on non-performance
- Currently there are limited private players who have capacity to manage both conveyance and treatment operations.

# Landscape study of private players in FSSM across four states (1/2)

Interviews with private sector service providers were done to assess their potential role in FSSM. This has helped develop mutually beneficial business models for FSSM based on local contexts and needs.

## Conveyance business

- The conveyance stage is quite profitable however it is treated as largely informal and the size of the opportunity is not fully understood by both local and non-local medium and large players. **Dissemination and awareness** activities are required for private enterprises in view of the nascent stage of the FSSM sector.
- There is a **spectrum of participation across States** ranging from a large number of private operators in AP, strong private ecosystems in Maharashtra and Tamil Nadu, whereas greater participation is actively sought in Odisha. Players use own funds or from financing companies e.g. Shriram Finance to finance trucks
- Some **players ready/plan to expand their conveyance operations** in other cities, many want to build and run treatment plants. Existing informal players are ready to entered into formal contract with local government.
- **Appropriate regulatory and policy guidelines at the state level to minimize risks:** : In order to mitigate payment risks, there is a need for regulatory measures and formulation of guidelines at the state level for engagement of private sector. Possibility of guarantee fund also need to be explored.
- **Bundled contracts** to offer larger conveyance contracts to induce larger operators and **Scheduled emptying models for zones in large cities** emerges as most promising models.

# Landscape study of private players in FSSM across four states (2/2)

## Treatment business

- **Awareness and capacity building of private players:** FS treatment is nascent, with some technologies being piloted by a few direct players. Many small-medium proximate players (eg: engaged in STP business) are interested in FS treatment. Capacity building for creating an awareness and demand for FSSM solutions is required at all levels.
- **A state level strategy for FSSM treatment at scale:** A clear sanitation strategy by States outlining how many FSTPs are being planned, clear guidance on technology and funding will greatly induce private operators to bid for such contracts. Direct players are dependent on creation of opportunities for FS treatment by States/ULBs – have limited ability to scale without state / non-profit support given the lack of commercial economics in the space. The lack of financial returns and reliance on public support may be dampeners for some private player.
- **Catalyzing reuse markets:** The operational cost for treatment is often difficult to recover through reuse revenue or user charges through tipping fees. More advocacy and innovation is needed to develop these markets.
- **Single city versus large multi-city tenders:** The average FSTP capex cost is too small to induce medium and large players who are used to significantly larger MSW / STP contracts. Governments should create bundled contracts with multiple cities to make this a viable opportunity for larger players. On the other hand, if the state / region has good small contractors to build and manage operations and maintenance, single city contracts with greater ULB ownership would be preferred.
- **“Planning and data collection”** followed by scientific assessment, are important and necessary tasks.

# Applicability of business models across four states (1/2)



## Scheduled desludging with PPP annuity model for conveyance and local government funded treatment model emerges as the strongest recommended prototype

- The emerging experience of the cities of Wai and Sinnar in Maharashtra in providing citywide scheduled services using a PPP model with a performance linked annuity model has help address concerns of both equity and affordability.
- The idea of scheduled emptying service was recognized by the state in its draft FSSM policy.
- Also local governments in Maharashtra is better positioned, primarily due to the relatively stronger financial and implementation capacities.
- Local government is responsible for managing, monitoring and O&M funding of FSSM services



## Full private sector led desludging model for conveyance and state government funded clustered model for treatment emerges as the strongest recommended prototype

- On-demand desludging, with heavy private participation and opex recovery from user charges will continue as the relevant model for the near term, given the ecosystem of entrenched private players in conveyance and a current government preference for on-demand desludging.
- However Tamil Nadu state is better positioned to move to scheduled desludging with opex recovery from taxes in the long term.
- Treatment plants are to be established based on cluster based approach (assuming travel distance of 10 km) and funding is mostly planned to be given by state government
- ULBs in Tamil Nadu have significant dependence on State Transfers; this is partly due to timely composition and devolutions from SFC.

# Applicability of business models across four states (1/2)



## **Govt. owned vehicles leased to private player model for conveyance and state government funded treatment model emerges as the strongest recommended prototype**

- The government is leasing trucks to private players to encourage private participation in conveyance— this also remains relevant for the longer term until financial and managerial capacity of ULB is developed.
- OWSSB, State level agency to monitor construction, O&M and performance of FSTPs. Treatment plant funded through AMRUT Program grants (50% Centre and 50% State).
- The role of ULB is to provide land for FSTP. Majority of the functions are state led only.



## **Full private sector led desludging model for conveyance and Hybrid Annuity model (partial funding by private and partial by government) for treatment emerges as the strongest recommended prototype**

- Predominance of private players across most ULBs in the state. Conveyance for septage is considered to be carried out by private sector players through on-demand desludging.
- The state is better positioned to move to scheduled desludging
- Swachh Andhra Corporation(SAC) has issued tenders to set up FSTPs under a Hybrid Annuity Model (50% capex through private and 50% capex through government).
- SAC will fund, monitor construction, O&M and performance of FSTPs
- The Hybrid Annuity Model is the step in the direction to revive private sector investment in treatment plants.

# Recommendations to improve business model performance (1/2)

- **Improved contracts for PPP/ PSP contracts:** For prototypes that have some form of private sector participation, contracts to capture service level agreements (SLAs) with performance linked features are needed.
- **Encourage private sector participation through information, consultation and capacity building:** For encouraging entrepreneurs/ private sector to enter this market, better information about emerging opportunities need to be made available. At the same time, capacity building support for private sector will also be needed.
- **Access to funds for private enterprises:** Need to increase awareness about the investment opportunities in FSSM among **potential funders, bankers and other lenders, impact investors, and corporates** who can support the sector through **CSR funding/ impact investment**.
- **Impact investment for sanitation:** Impact investment model such as Development Impact Bonds (DIB) or Social Impact Bonds (SIB) can be explored for urban sanitation particularly FSSM. Investors who want both impact and profits in this sector can participate through impact bonds. Through DIB it is possible to introduce a rigorous monitoring system which is easily possible but somehow missing in the sanitation sector.



# Recommendations to improve business model performance (2/2)

- **Encourage social entrepreneurs in the conveyance stage:** Current social entrepreneur activity is restricted to the treatment stage whereas, in the coming years, thousands of trucks are needed across the four states.
- **Invest in centralized helpdesks and data platforms:** For well structured business model prototypes identified in this research, good data is critical and ranges from city level information on properties, finances, land availability and characteristics etc are essential.
- **IT based monitoring systems to help improve operational performance:** Performance of both emptying treatment services can be improved significantly with well-designed As an indirect benefit, this will also help improve prestige of sanitation workers.
- **Address difficulties in access to good repair services in small and medium towns.**
- **Encourage use of PPEs:** Awareness about use of PPE and training in their use will help protect worker health and may also help increase prestige of sanitation work.
- **Role of Women in Sanitation businesses:** It is important that Local community groups, women's SHG groups are involved by the ULB during the implementation of FSM activities.



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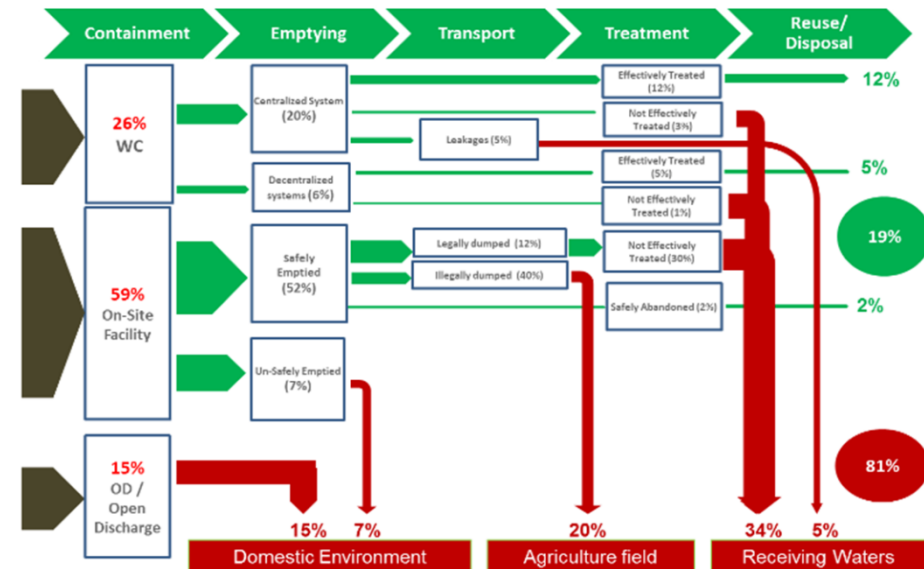
# Sustainable Development Goal (SDG) and safely managed sanitation



➤ The SDG 6 is the Water Goal. Target 6.2 states ‘by 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation’. Target SDG 6.3 states that by 2030, ‘improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally’.

➤ The Joint Monitoring Program (JMP) of UNICEF and WHO defines safely managed sanitation as “Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite”. Due to lack of data, they have been able to estimate this for Urban India.

➤ The Shit-flow diagram (SFD) for India also suggests that 80% of faecal sludge and septage remains untreated.

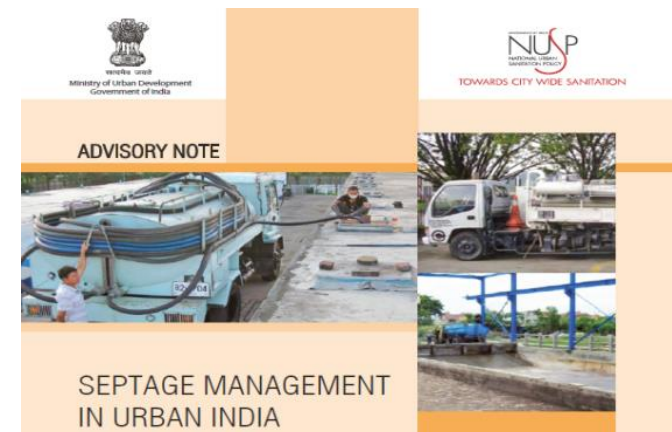


# FSSM did not receive adequate attention in the past

- Flagship sanitation programs such as the Swachh Bharat Mission did not include FSSM as a focus area, while under AMRUT and Smart Cities programs city and state governments have usually not sought funds for FSSM
- While various laws and policies did address some components relevant to FSSM (e.g. pollution control norms, septic tank construction guidelines) but the sector in the past did not receive dedicated attention.
- This has changed over the past two years as FSSM has received increasing attention and a national FSSM policy has been adopted. With increasing recognition of the need for FSSM solutions, financing sources and models have become important for planning and implementation.
- The Service Level Benchmark (SLB) indicators of the GOI, which are being used to monitor performance of services also use only sewerage. However, now special San Benchmarks have also been developed by CEPT University which recognize FSSM services as safely managed sanitation.

# There is now a greater attention to FSSM in recent government policies

- There is increasing recognition of the importance of FSSM, guidance and funding for FSSM:
  - The National FSSM Policy 2017 has reinforced standards related to FSSM, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) provides funding for septage management
  - State level policies and initiatives that range from setting up faecal sludge treatment plants (FSTPs) to providing desludging trucks to ULBs
- Government of Maharashtra pioneered the concept of ODF+ and ODF++ where cities can have citywide FSSM or sewerage to become ODF+/++. These concepts are now widely used.
- Swachh Sarvekshan 2019 had several questions and some weightage on FSSM, with a clear focus on FSSM in ODF++ certification.
- These nascent efforts will need to be augmented at state level based on state specific contexts and requirements.



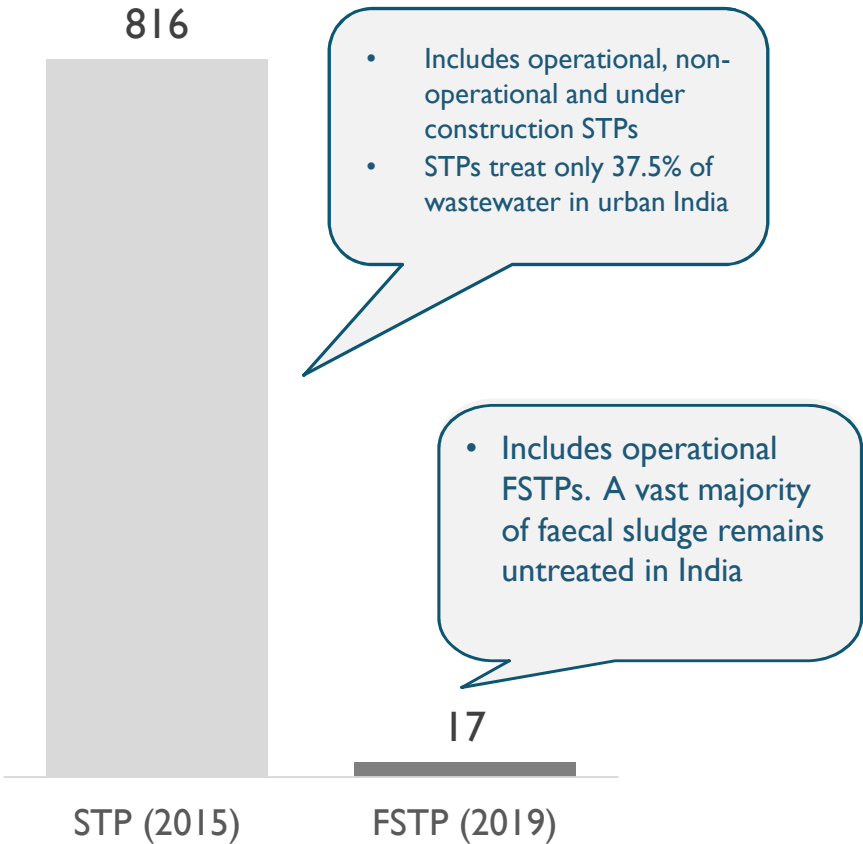
# Recent attention on FSSM has still not converted to significant public or private investments

- As FSSM is typically viewed as a public good, public financing will be important – and a range of funds are available for sanitation through national, state or local budgets. However, the predominant focus has been on access to toilets under SBM and on sewerage under other programmes, but funding targeted specifically to FSSM is very low. This is partly due to the lack of government focus in the past and that AMRUT funds for FSSM are only available to larger cities.
- While unorganized private sector participation is prevalent for conveyance (desludging), organized participation is low on both conveyance and treatment. For conveyance, the unorganized nature of work and low return expectations, act as constraints. For treatment a limited understanding of the sector and concerns for payment delays limits the private sector funding. However, some emerging initiatives such as the performance linked annuity model (PLAM) for scheduled desludging in two cities in Maharashtra and the Hybrid Annuity Model (HAM) for clustered treatment projects in Andhra Pradesh and Telangana provide possibilities for getting private sector participation for FSSM.

# While sanitation and sewerage networks have received priority, FSSM has seen relatively low public or private investments in the past

Historical underinvestment in FSSM, as evidenced by low investment in treatment infrastructure

Number of STPs and FSTPs



## Key drivers

- Relatively low government focus in policy and funding. Emphasis so far has been on access (toilet construction) and sewerage
- Capacity gaps in implementation e.g. low ULB resources and capacity
- Low understanding of the sector. FSSM is still a nascent sector, with limited understanding of issues and solutions by both ULBs and other stakeholders
- Significant data gaps. Fundamental data is often unavailable, driving many mainstream investors like banks away. Low data intensity also leads to capacity and knowledge gaps, and inefficiency in investment.
- Limited participation by the organized private sector, given low understanding, high perceived risk, lack of self sustaining business case, especially on the treatment side . This is true for both sewerage and FSSM.

• Does not refer to other planned FS treatment options such as co-treatment at STPs

• Source: Ministry of Urban Development (2017) “National Policy on Faecal Sludge and Septage Management”, New Delhi; CPCB (2015) “Inventorization of Sewage Treatment Plants”; Dalberg interviews with state TSUs

# The momentum for FSSM is now building up in several states

- AMRUT funds are increasingly being used for FSSM. e.g. to build new faecal sludge treatment plants in Odisha,
- From other states: a) Government of Tamil Nadu has identified funds for FS Treatment facilities from sanitation related allocations; b) Government of Andhra Pradesh has a state wide policy on FSSM and has allocated funds through its budget to the Swachh Andhra Corporation for FSSM under the HAM model; and c) Government of Maharashtra has asked ULBs to use 50% of 14<sup>th</sup> Finance Commission grants for sanitation, including for FSSM.
- There is emerging interest in FSSM by private sector – a) emergence of large operators on the cleaning and transportation side, (e.g Sumeet Facilities and 3S in Maharashtra), b) presence of private service providers in the treatment sector (e.g. Blue Water Company, Tide Technocrats, 3S and Panse in Maharashtra), and c) increasing interest from private enterprises in solid waste management (e.g. Ramky) to explore FSSM sector.
- There is continued support from the non-profit /philanthropic community – a) BMGF support for construction of FSTPs and state support programs in 5 states and b) CSR grant from HSBC CSR grant for city level FSSM



# As FSSM gains traction, there is need to identify and catalyze appropriate business models

**Effective business models are a basic driver to scale FSSM solutions. Appropriate models are needed across the service chain for both conveyance and treatment.**

**For conveyance - the most common model is on-demand desludging through complaint redressal**

- On-demand desludging involves desludging only when households demand it, which is typically when septic tanks overflow. Desludging is typically done by small-scale private service providers or the local governments themselves. Key challenges include infrequent desludging (e.g. often extending to 8-9 years) which leads to environmental and health hazards, and increases the need for manual labour. Also, user charges are high because of distress pricing and inefficiencies in operations due to inadequate and unknown demand. To overcome these problems, there is a need to promote scheduled desludging as a regular public service and not only as complaint redressal.

**For treatment – so far, the most common approach for financing has been technical and funding support by Foundations to develop pilot projects.**

- Such support has involved grants for pilot plants, given the nascent and evolving stage of treatment technologies
- There is a need to increase public finance as being done in a few states along with local private sector to implement and operate varied technologies. Private participation and possibilities of resource recovery based revenue models should also be explored in future.

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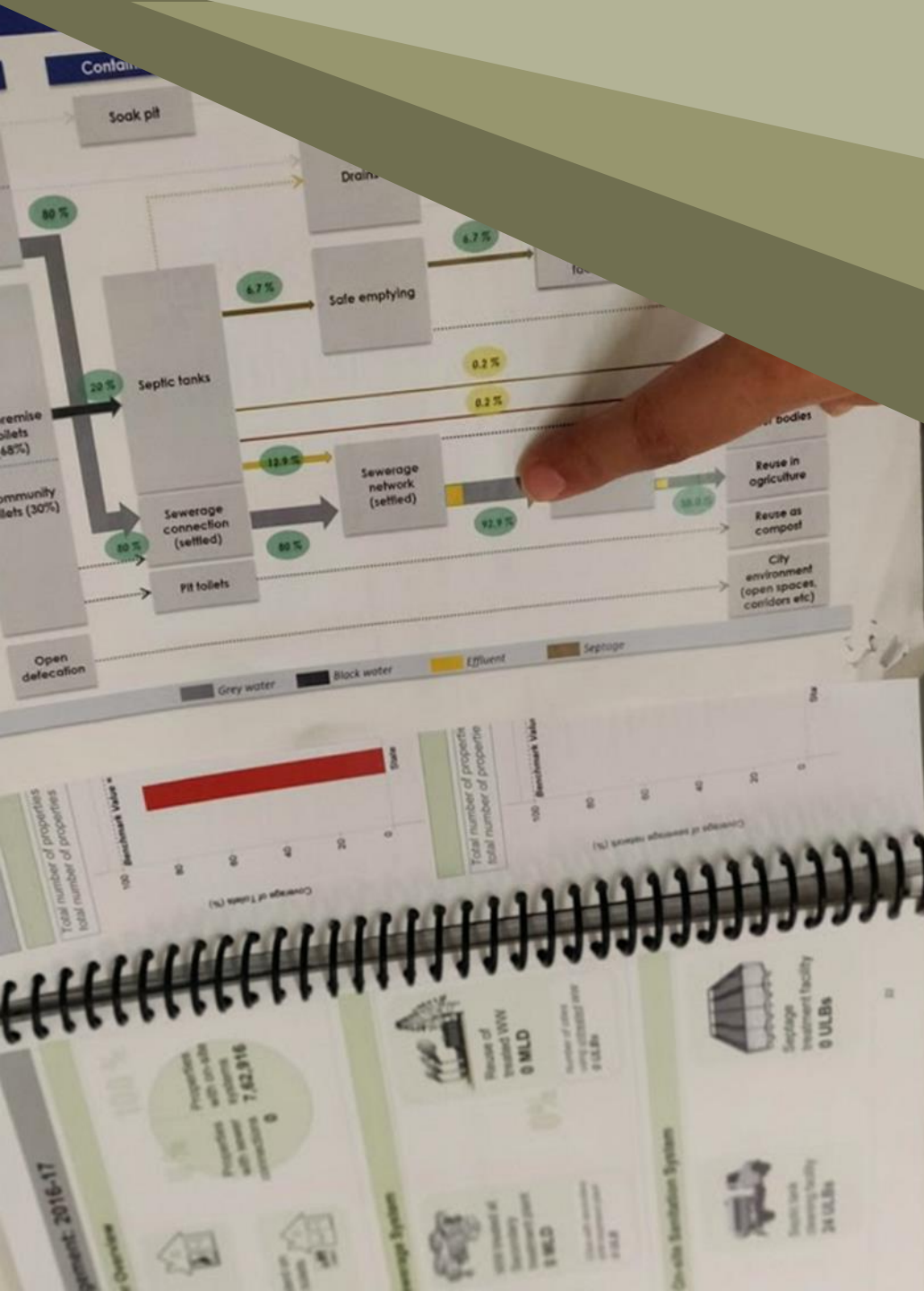
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# Study objectives and key questions

This study explores FSSM business models for both conveyance and treatment by addressing three key questions

1

**Business models prototypes for conveyance and treatment**

What is the broad landscape of business model prototypes for conveyance, treatment and integrated approaches?

2

**Private sector landscape**

What is the broad landscape of private sector presence across the FSSM value chain? What is their potential role and challenges from perspective of different business model prototypes?

3

**Applicability of business models across four states**

Broad brush analysis of suitability of business models in context of priorities and policies of State governments, local government financial and managerial capacities and the presence of private sector across four states?

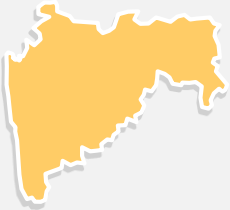

# Overview of FSSM situation and progress in the four States

Recognizing the importance of non-sewered sanitation solutions for India, BMGF is supporting initiatives for FSSM in India through its focus states of Maharashtra, Tamil Nadu, Odisha and Andhra Pradesh. These states have put in place policies for FSSM and have initiated a range of initiatives along the FSSM value chain.

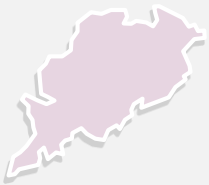
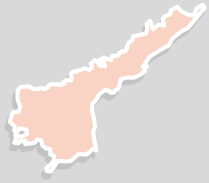
Maharashtra	Tamil Nadu	Odisha	Andhra Pradesh
<p>A move to <b>scheduled desludging and new FSTPs</b> in two ULBs</p> <p><b>ODF+ / ++ framework</b> recognizes FSSM, <b>14<sup>th</sup> FC</b> funds and <b>Incentive grants</b> can be used for FSSM</p>	<p>Starting to set up <b>FSTPs</b>, <b>philanthropic funded treatment</b> in 2 ULBs, <b>experimenting with a cluster based approach</b></p>	<p><b>Distribution of state-owned trucks to cities, Faecal sludge treatment plants through AMRUT program</b></p>	<p><b>State-wide roll-out of FS treatment plants via HAM model</b> (50% private funding, 50% government funding)</p>

Source: MOUD (2013) "Advisory Note on Septage Management in Urban India"; Atal Mission for Rejuvenation and Urban Transformation (AMRUT) SAAP documents for each state; Ministry of Urban Development (2017) "National Policy on Faecal Sludge and Septage Management", New Delhi

# Demographic profiles and urbanization levels in the four states point to different needs and contexts for urban FSSM solutions (1/2)

State	Urban profile	Current scenario	Future scenarios
<b>Maharashtra</b> 	<ul style="list-style-type: none"> <li>• 27 Municipal Corporations (population: 360 lakh),</li> <li>• 363 other ULBs (population: 120 lakh)<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• ~75% of urban population resides in Municipal Corporations with existing or planned sewer networks. 25 lakh households of this corporations depend on FSSM. Of all FSSM dependent Households ~47% households are in the smaller cities with no current or planned sewerage.</li> <li>• <b>Conveyance:</b> Mix of public and private desludging trucks, with ~56% ULBs owned trucks, and rest with private operator trucks. A move to scheduled desludging in Wai and Sinnar.</li> <li>• <b>Treatment:</b> FS treatment infrastructure in Wai and Sinnar. GR for Co-treatment at own and nearby STPs is passed by the state government.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Scenarios:</b> Large cities are significant drivers of conveyance needs. GoM envisages scheduled desludging to be taken up statewide. GR for Co-treatment at own and nearby STPs is passed by the government which makes it likely for cities to adopt co-treatment option for FS collected.</li> <li>• State planning to roll out phase-wise strategy for FSTPs in all the cities.</li> </ul>
<b>Tamil Nadu</b> 	<ul style="list-style-type: none"> <li>• 12 Municipal Corporations (population: 100 lakh)</li> <li>• 709 other ULBs (population: 200 lakh)<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• ~54.7% of the urban population resides in Municipal Corporations or Councils with existing or planned sewer networks. FSSM requirements predominate in smaller cities with no current or planned sewer systems.</li> <li>• <b>Conveyance:</b> Most ULBs have private operators for emptying services.</li> <li>• <b>Treatment:</b> One existing FSTP and two planned. Planning to adopt a cluster based approach for FSTPs</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Scenario:</b> Smaller cities are drivers of conveyance needs, but costs are typically lower in these cities. Setting up new FSTPs, standalone for each ULB or under a cluster approach, is key for smaller cities with no existing or planned sewer networks. Co-treatment can be promoted in other areas</li> </ul>

# Demographic profiles and urbanization levels in the four states point to different needs and contexts for urban FSSM solutions (2/2)

State	Urban profile	Current scenario	Future scenarios
<b>Odisha</b> 	<ul style="list-style-type: none"> <li>• 6 Municipal Corporations (population: 20 lakh),</li> <li>• 107 other ULBs (population: 40 lakh)<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Odisha's urban population is balanced across large and small ULBs.</li> <li>• <b>Conveyance:</b> Private participation has not picked up except in Bhubaneswar, Rourkela, Cuttack. Distribution of state-owned trucks (~86) to ULBs, to spark private sector interest.</li> <li>• <b>Treatment:</b> 6 FSTPs operational and 4 other FSTPs are planned for AMRUT towns.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Scenario:</b> Conveyance needs are relatively balanced across large and small ULBs. By 2022, it is expected that Municipal Corporations, and a substantial proportion of Municipal Councils would be sewered. FSSM requirements would be driven by smaller cities with no existing or planned sewerage.</li> </ul>
<b>Andhra Pradesh</b> 	<ul style="list-style-type: none"> <li>• 15 Municipal Corporations (population: 70 lakh),</li> <li>• 96 other ULBs (population: 60 lakh)<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• ~68% of urban households are living in Municipal Corporations. However population dependent on FSSM is largely split across Municipal Corporations with existing or planned sewerage, and smaller cities with no sewerage connections.</li> <li>• <b>Conveyance:</b> Private operators are predominant.</li> <li>• <b>Treatment:</b> STPs in AMRUT cities are being upgraded for FS co-treatment. 78 FSTPs are planned for non-AMRUT cities through Hybrid Annuity Model (HAM).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Scenarios:</b> Plans for a comprehensive solutions via a hybrid annuity PPP model to fund treatment, with private sector continuing to operate in the conveyance space. By 2022, while sewerage connectivity is expected to increase in large cities, majority of the population is expected to be dependent on FSSM via co-treatment in STPs.</li> <li>• Warangal is planning for scheduling desludging services.</li> </ul>

# Study was conducted through desk research and interviews



1

## Desk research

- Accessed documents from different sources for secondary research.
- Points of inquiries were to understand the FSSM landscape, gaps, needs, and relevant business and service models to address these gaps and needs

2

## Expert interviews

- Interviews with TSUs, private operators, CSOs, investors, funders, and sector experts.
- Points of enquiry were to understand FSSM gaps and needs, relevant business models (details of the model and context and why these are considered relevant), learnings from models

3

## Field research

- In-person meetings with government officials (state and ULB level), TSUs, and private operators
- Points of enquiry were to understand the current and planned approach for FSSM including business models in the states, details of context and working of these models, and perspectives on other potential models.

# Interviews with private sector service providers were done to assess their potential role in FSSM and in different business models

The study focused at three aspects for exploring private sector participation in different business models for conveyance and treatment



## Landscape of operators

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- Who are the private operators in FSSM and parallel sectors such as SWM?
- Specifically, what are the roles, activities, enterprise sizes, and scale of operations of players for conveyance and for treatment - along the FSSM value chain?



## Plans and interests

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- Are private operators interested in expanding their roles, scale, or geographies of operation in FSSM?
- What are their specific preferences and underlying reasons?



## Inducements and constraints

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- What are the constraints faced or anticipated in achieving these plans?
- What inducements are needed to unlock value for private operators and enable participation at scale?



# Questions were asked to map capacity, constraints and inducements to types of players, and trends identified across and within states

## Illustrative questions

### Overall background

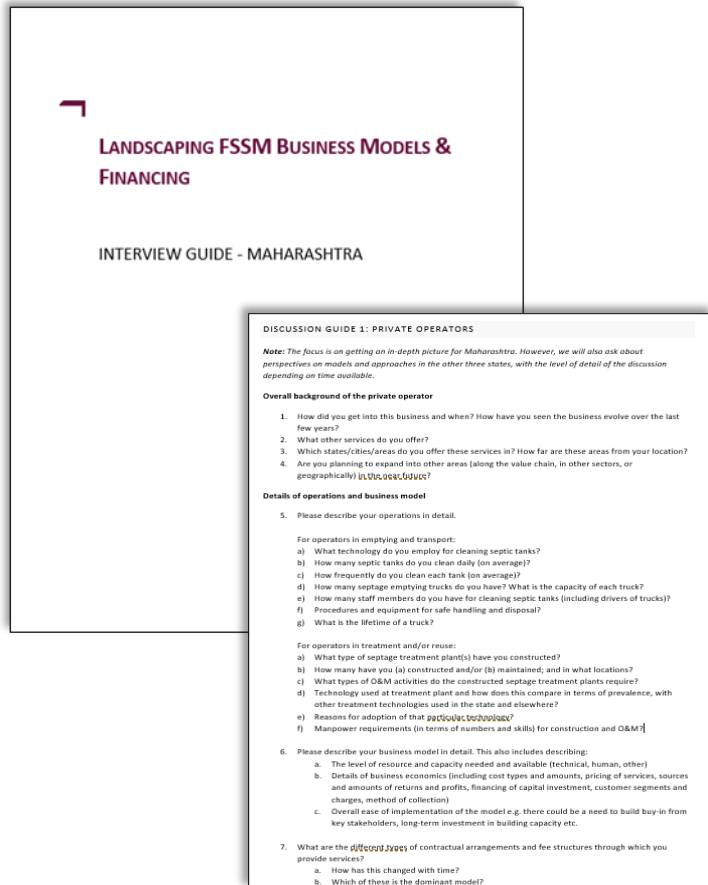
- What FSSM services do you offer? Other activities/businesses?
- Since when have you been in the business?
- In which geographies do you operate?

### Details of operations and business models

- **Conveyance:** How many tanks are cleaned daily? Average tank and truck volumes? Average number of trips in a month?
- **Treatment:** What types of septage treatment plants, or other treatment plants have you constructed? How many, and where? What types of O&M activities, if any, are undertaken?
- The level of resource and capacity needed and available (technical, human, funding, other)? Details of business economics?
- Typical contracting terms? Experience and perspectives on operations with the government, other stakeholders?

### Plans, inducements and constraints

- Interest in providing other services along the value chain, why or why not?
- What policy or ecosystem-level initiatives would incentivize your business or enable greater private participation in general in yours/associated businesses?
- Perspectives on specific business models and their application (or not) to the business or sector?



Questions included asking for perspectives on the applicability of specific conceptual and existing business models along the value chain

# A range of stakeholders were contacted and interviewed for this study

	Rationale	Examples
<b>Technical Support Units (TSUs)</b>	The TSUs are working closely with State governments in the focus States to support FSSM planning and implementation	<ul style="list-style-type: none"> <li>• CEPT,- AILSG (Maharashtra)</li> <li>• IIHS (Tamil Nadu)</li> <li>• ASCI (Andhra Pradesh)</li> <li>• EY (Odisha)</li> </ul>
<b>Government</b>	Governments in the focus States are fundamental decision-makers and have in-depth insights into current status and envisioned end states for FSSM	<ul style="list-style-type: none"> <li>• TUFIDCO, TNUIFSL (Tamil Nadu); OWSSB, Bhubaneswar Municipal Corporation (Odisha); Chief Resilience Officer, Pune (Maharashtra); Swachh Andhra Corporation, Director of Municipal Administration (Andhra Pradesh)</li> </ul>
<b>Development finance institutions, Investors</b>	Funders focused on development sectors, ranging from impact investors to DFIs, have targeted insights, preferences and experience in funding FSSM or comparable sectors	<ul style="list-style-type: none"> <li>• Aavishkaar</li> <li>• Social Finance</li> <li>• World Bank</li> </ul>
<b>CSOs, NGOs</b>	CSOs and NGOs working in the sector have experience and insights into details of cost drivers along the value chain, and funding sources and models that may or may not work	<ul style="list-style-type: none"> <li>• CDD Society</li> <li>• Practical Action</li> <li>• WaterAid India</li> <li>• WASH Institute</li> </ul>
<b>Private operators</b>	Private operators have roles in various parts of the FSSM value chain, are able to take on capex/opex and/ or need/expect funding support in others	<ul style="list-style-type: none"> <li>• Private operators in Conveyance and Treatment ranging from small local players to large players in FSSM or parallel sectors e.g. 3S/Saraplast, Ramky, Sumeet Group</li> </ul>

A detailed list of stakeholders is provided in Annex I



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# Business models as ‘service models’ for sanitation and FSSM

In *The New, New Thing*, Michael Lewis refers to the phrase *business model* as “a term of art.” And like art itself, it’s one of those things many people feel they can recognize when they see it (especially a particularly clever or terrible one) but can’t quite define. (Source: <https://hbr.org/2015/01/what-is-a-business-model>). Some also argue that “a business model isn’t just about how a company makes money. But also the kind of incentives it is able to create for its users, the distribution networks it is able to tap into and the key partnerships a business can leverage on.” (Source: <https://fourweekmba.com/what-is-a-business-model/>)

In the case of sanitation, and particularly FSSM, it is important to recognize that sanitation is foremost a public service. For example, the new WHO Guidelines for Sanitation and Health suggests to “Define sanitation at sub-national level as a basic service for which local government is responsible and accountable.” WHO (2018), p. 21. n

In doing so, the local government can plan to engage the private sector to provide this service. Such a private service provider will need to be compensated adequately to ensure safe, affordable and consumer friendly service.

A **business model** in this slide deck 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. Sanitation, and FSSM in particular, require this approach.

These 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.

# An iterative process was followed to identify business model prototypes



What are the relevant parameters to define a business model e.g. service arrangements, type of service providers, capex and opex sources, and contract structures?

What are the service arrangements and what aspects affect economically viability?



Which permutations of model components are relevant, including in terms of state contexts and scalability?

What are benefits, constraints and applicability of different business model prototypes?

# Core parameters to define business models in FSSM

## Parameter

## Rationale

### Service arrangement



- The type of service delivery in Conveyance (e.g. scheduled vs. on-demand desludging) and type of service arrangement in Treatment (e.g. FSTPs, co-treatment at STPs) are key determinants of environmental outcomes
- Service type or arrangement are key drivers for the other parameters e.g. capex and opex funds needed and the types of operators that are willing and able to implement the projects

### Financing



- There are a range of potential actors to fund capex e.g. government, private, philanthropic
- Their relevance is determined by the nature and quantum of funding and commercial viability of the model e.g. philanthropic funders likely to fund pilot treatment technologies, private conveyance operators are likely to own/lease vehicles and therefore fund it etc
- There are a range of potential sources of opex funding e.g. taxes, user charges, grants, reuse
- There are wide range of factors such as availability of markets, financial capacity of ULBs, willingness to pay of households etc, that determine opex funding options. e.g. for FS treatment opex funding more likely sourced through govt. grants or taxes

### Institutional/ contractual structure

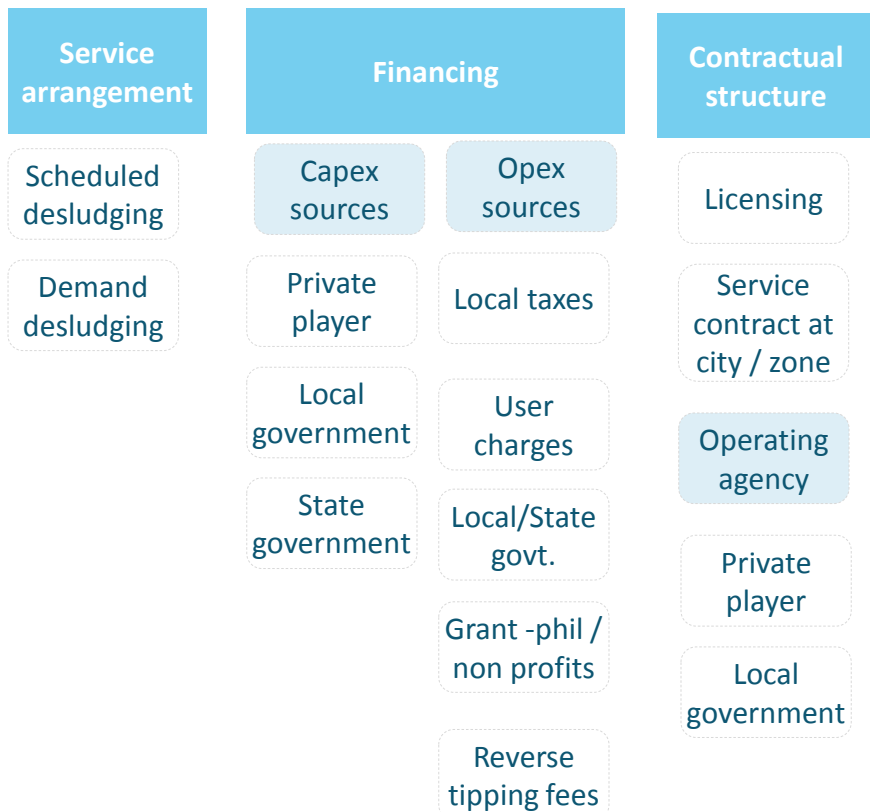


- This parameter will be crucial to define project structuring and identify responsibilities of players involved in the project.
- It will help to define who will be responsible for construction, operation and maintenance and monitoring aspects of project.
- These will drive the terms of the contractual arrangement e.g. long term public-private collaboration through PPP or PSP, or a license to operate.
- Different types of operating agencies have diverse willingness and ability for implementation, including financial capacity e.g. a private conveyance operator looks for commercial viability whereas a government operator looks to ensure services for all

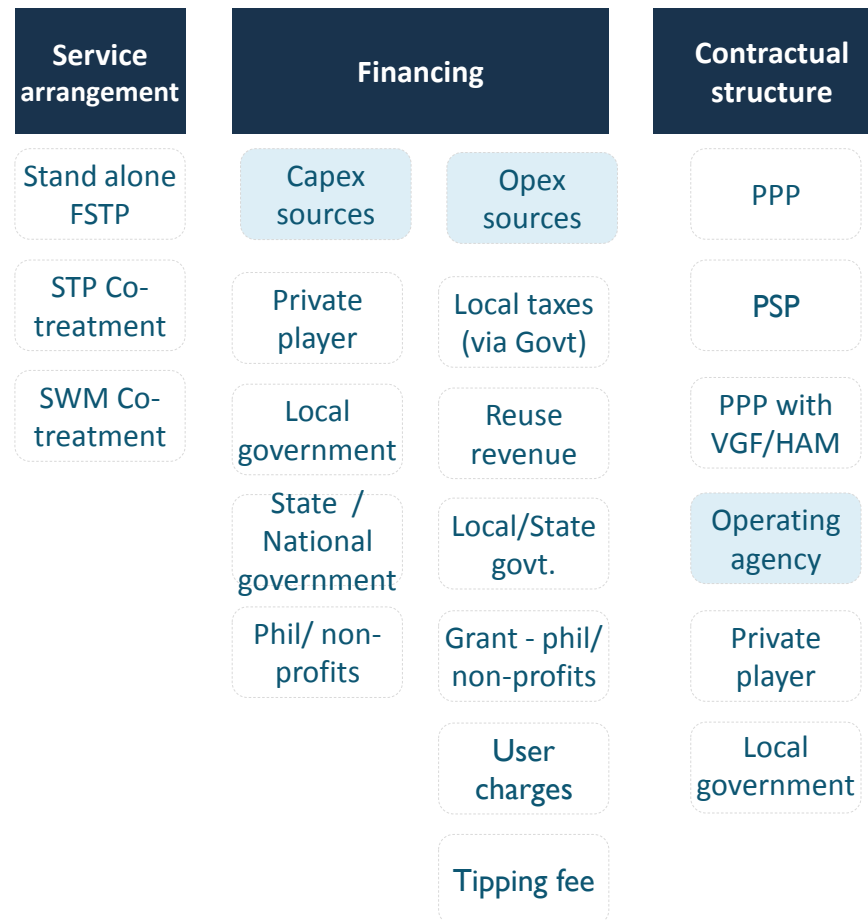
# Business models are designed separately for conveyance and treatment; though there is also possibility of an integrated model



## Collection and conveyance



## Treatment



# Conveyance business model parameters and a range of options within each parameter

The current practice is demand desludging by private operators, charging users per service

Service type	Financing	Contractual structure
<p><b>Demand driven:</b> Cleaning is done when households/users call for services and typically When their septic tanks are full.</p> <p><b>Scheduled desludging:</b> Regular cleaning/emptying of septic tanks on pre-defined interval (e.g. every 3 to 5 years)</p>	<p><b>CAPEX Sources</b></p> <p><b>Private player:</b> Vehicles and equipment are purchased by private desludging operators.</p> <p><b>Local government:</b> ULBs purchase using own funds. ULBs may also operate or lease operations to private players.</p> <p><b>State government:</b> Purchases are financed from state govt. funds e.g. Odisha state govt. has bought and distributed trucks to the ULBs.</p> <p><b>Grant -phil / non profits<sup>1</sup>:</b> Grants from non-governmental, non-private organizations, with no return expectations</p> <hr/> <p><b>Opex Sources</b></p> <p><b>User charges:</b> Per service charges collected by private or government desludging operators, from HHs</p> <p><b>ULB taxes or own sources:</b> Charges collected regularly (typically by ULBs) from HHs, wholly or partially used to fund FSSM.</p> <p><b>Local/State govt:</b> Transfers from government funds (typically ULB or state govt) e.g. from govt. budgets.</p> <p><b>Grant -phil / non profits<sup>1</sup>:</b> Grants from non-governmental, non-private organizations, with no return expectations</p>	<p><b>Licensing:</b> A right from the government to the licensee to undertake desludging according to the terms of the license. The licensee usually pays a small license fees.</p> <p><b>Service contract:</b> Agreement between the govt. (typically ULB) and operator for desludging services in the city.</p> <p><b>State /ULB :</b> The activity can be led by a state agency or by the local government – in which case instead of a separate contract, it can be a part of Citizens’ Charter</p> <hr/> <p><b>Operating Agency</b></p> <p><b>Private player:</b> Private desludging operators, that operate their own vehicles or leased vehicles from ULBs</p> <p><b>Local government:</b> ULBs operate their own desludging vehicles</p>

1. 'Phil/non-profits' refer collectively to funding from NGOs/CSOs/foundations/philanthropies and other forms of such funding other than from the government, private enterprises, or households/users

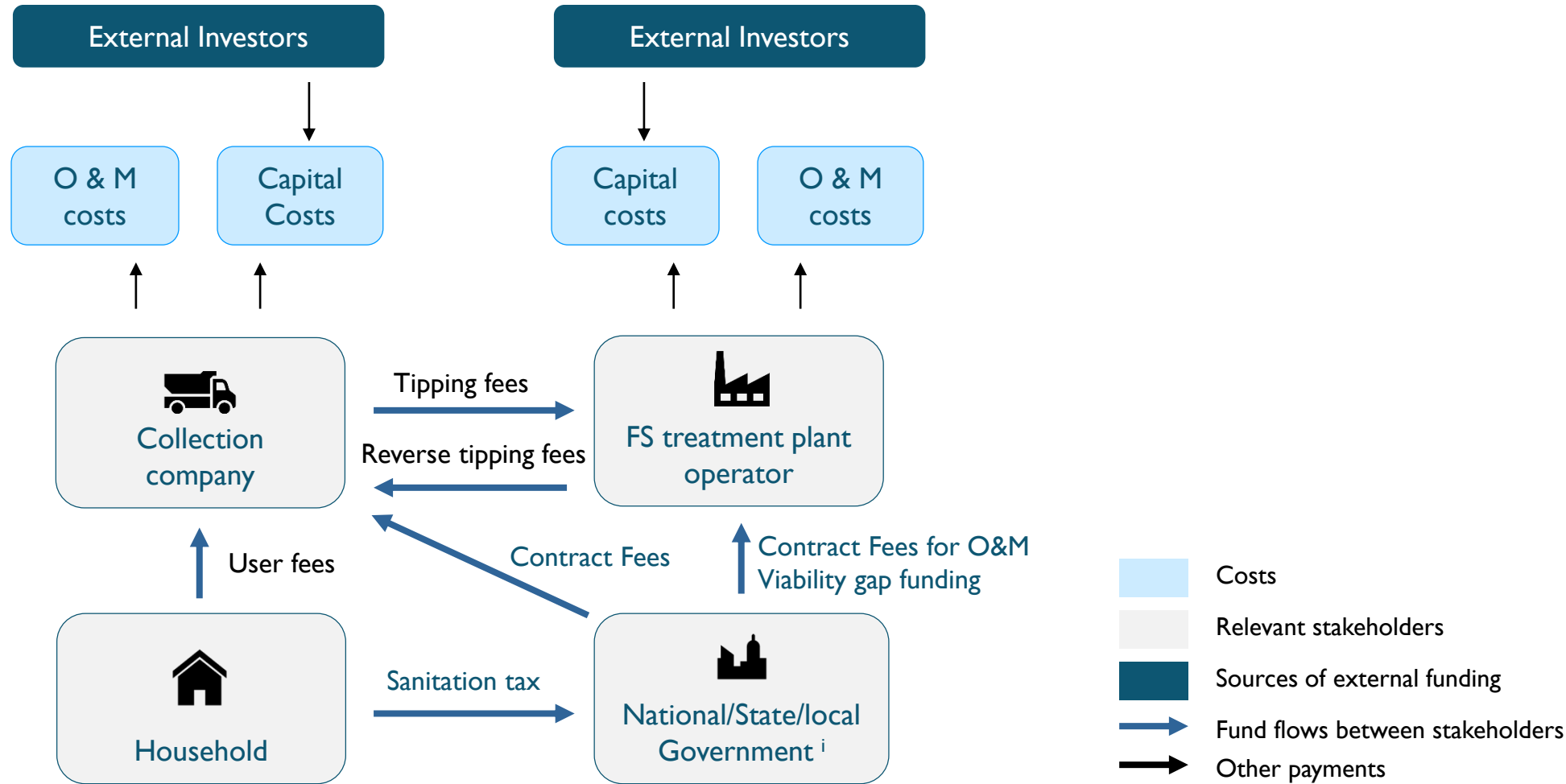


# Treatment business model parameters and a range of options within each parameter

## The typical model involves government funding, with O&M by a private player

Service arrangement	Primary capex financier	Contract structure	
<p><b>FSTP:</b> Specialized plant for FS treatment, which can utilize a range of technology e.g. sludge drying beds, thermal technology,</p>	<p><b>CAPEX Sources</b>  <b>Private player:</b> Private operators fund plant capex, fully or partially with the remainder typically from the govt.  <b>Local government:</b> ULBs fund plant capex from own funds  <b>State government:</b> Capex funded from the state govt. such as by transfers under budget allocations or schemes  <b>Phil/non-profits<sup>1</sup>:</b> Such funding is typically seen only in plant pilots</p>	<p><b>PPP:</b> Contracts for long term public-private participation, in which the government and private sector typically share risk and capital commitments  <b>PSP:</b> Contracts for private sector participation, where the government typically acts as a regulator, and the private players operate independently  <b>State /ULB :</b> The activity can be led by a state agency or by the local government – in which case instead of a separate contract, it can be a part of Citizens’ Charter</p>	
<p><b>STP co-treatment:</b> Treatment of FS along with sewage at sewage treatment plants (STPs)</p>			<p><b>Operating Agency</b>  <b>Private player:</b> Private player is responsible for plant O&amp;M, under contract with ULB  <b>Local government:</b> ULB is responsible for plant O&amp;M</p>
<p><b>SWM co-treatment:</b> Co-composting of FS along with solid waste, typically at SWM plants</p>			
	<p><b>Opex Sources</b>  <b>Sanitation / FSSM taxes:</b> Charges collected regularly (typically by ULBs) from HHs,  <b>Reuse revenue:</b> Revenues from sale of products post-treatment e.g fertilizer, water, energy  <b>Local/State govt. :</b> Transfers from government funds (typically ULB or state govt) e.g. from govt. budgets.  <b>Grant -phil / non profits<sup>1</sup>:</b> Grants from non-governmental, non-private organizations, typically only for the short term.  <b>User charges:</b> User charges collected from Conveyance services can be used to fund treatment opex in integrated models  <b>Tipping fee:</b> Fees paid by Conveyance operators to dispose collected FS at the plant</p>		




# Flow view of finances in conveyance and treatment (Business model canvas)



i. Govts. at any of these levels could provide funds for treatment, although national and State governments are the more likely sources. Govt. funds in turn are from various sources including specific taxes levied for FSSM.

# Key drivers for business model prioritization: Contextualization of stakeholder roles, equity, and economic considerations

## Parameters for prioritization of models, and rationale

Prioritization criteria	Rationale
Existing Proof of Concept ✓	<ul style="list-style-type: none"><li>• These are already proven models and/or may have a higher likelihood of scaling</li></ul>
Strong environmental outcomes 	<ul style="list-style-type: none"><li>• These models offer solutions to achieve the desired overall FSSM goals</li></ul>
Equity and potential for cost recovery 	<ul style="list-style-type: none"><li>• <b>Equity:</b> Approaches factoring in equitable opex burden sharing between various customer segments, government, and other stakeholders are preferred</li><li>• <b>Potential for cost recovery:</b> Core determinant of commercial viability. This factor depends on the opex amount to be recovered, customer segment and willingness to pay and mode of recovery e.g. direct charges or taxes</li></ul>
Contextualization to stakeholder capacity and willingness to participate 	<ul style="list-style-type: none"><li>• Refers to models that factor in the interest and capacity of relevant stakeholders and take into account their preferences, for long term sustainability</li></ul>



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# Conveyance business models

There are two types of service arrangements in conveyance. One is demand based emptying while other is scheduled based emptying.

## Demand desludging

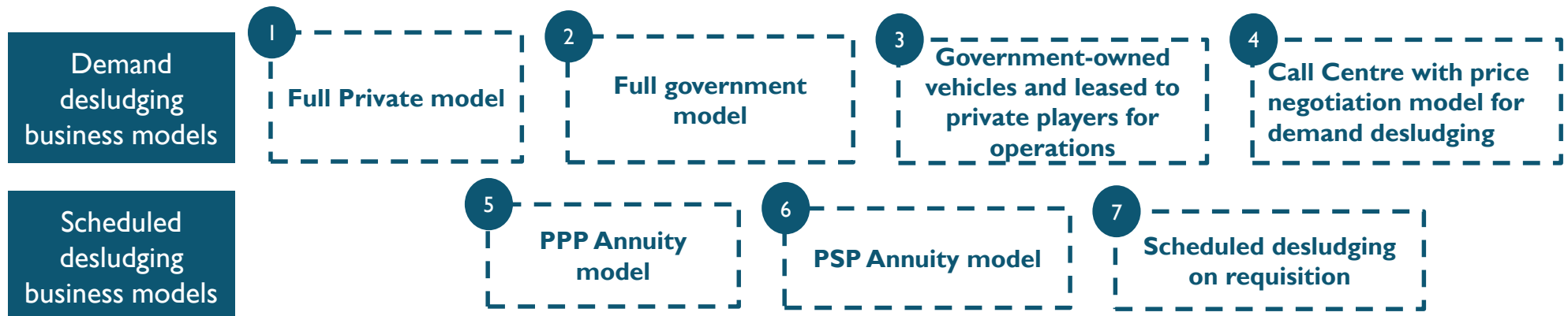
Cleaning/emptying is done when households/users call for services and typically when their septic tanks are full.

## Scheduled desludging

Regular cleaning/ emptying of septic tanks on pre-defined interval (e.g. every 3 to 5 years)

The conveyance service is provided either by ULBs or private operators

Based on the above criteria's different business models are identified, which has the potential of scaling up in cities and states.



# Current practice of 'On-demand desludging through private operators or ULBs' is the most prevalent model across cities and states in India

**Households or property owners call for desludging service when needed, typically infrequently and when tanks are overflowing.**

This service is provided either by ULBs or private operators:

- Private operators own and operate desludging vehicles, funding themselves via market driven user charges (sometimes restrictions are encountered). This model is easily implemented: no government participation other than monitoring private players for safe disposal, commercially viable for private operators.
- In case of ULB service, trucks are bought with public funds. ULB staff provide a service based on complaints, at times through a complaint call centre.
- In some cases ULBs enter into contract with private sector to provide service using their vehicles as in about 50 cities in Maharashtra.
- In Odisha, the state government has bought trucks and plan to lease it to private providers.
- In many cases, the private providers have to get a license with the local government.

# Variations in on-demand desludging business models across different states

## Andhra Pradesh and Tamil Nadu

- Most of ULBs have active private players for emptying services.
- The private Operators have to register with the ULB and are only allowed to operate within the ULB limits.
- Tipping fees are not applicable since as part of the registration to operate a truck, there is a condition to dump at the treatment site.
- Costs are recovered through user charges (Rs. 1000-2500 per trip)

## Odisha

- Mix of private sector led service using ULB trucks on a contract basis and also a fully government emptying model
- State government had purchased emptying trucks and allocated them to ULBs based on estimated sludge generation.
- Government trucks are contracted out to private operator for 7 years operations
- User charges (Rs. 900 per trip) are collected from household either by ULB or private players depending on contract/ licensing terms

## Maharashtra

- There are two models that are most prevalent in state. First, ULB operate their own vehicles or ULB enter into labour contracts with private players for operations of own emptying vehicles. Second, private providers provide demand based services
- User charges are collected from households to meet costs and range from Rs. 1000-25000 per trip, but sometimes reach Rs. 7000 in small towns.
- Two ULBs (Wai and Sinnar) have initiated scheduled emptying service models which is first of its kind in India.

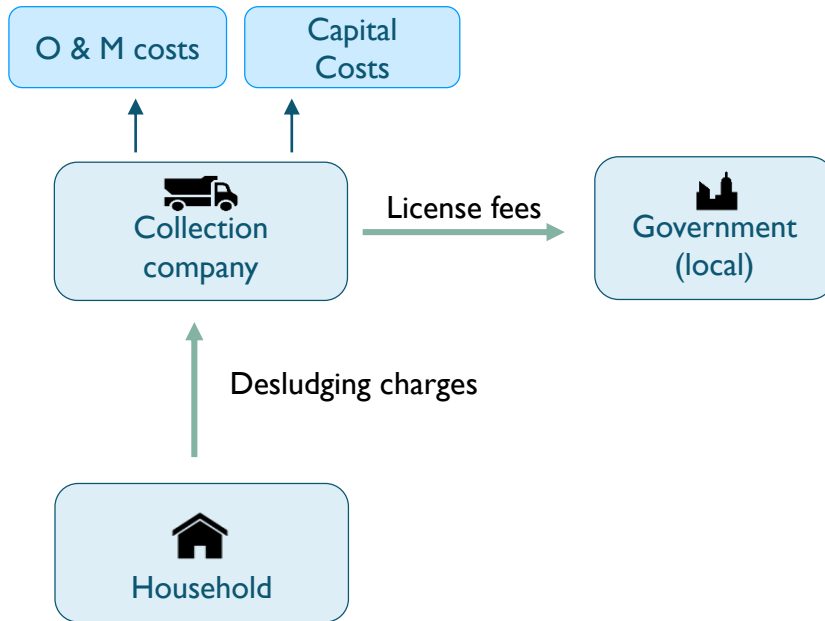
# Business model prototypes for demand based desludging

## Demand based desludging prototypes

- 1 Full Private model (e.g. Andhra Pradesh, Tamil Nadu)**  
*Truck capex by private and Operations by private*
- 2 Full government model (e.g. Small cities in Maharashtra)**  
*Truck capex by government and Operations by government*
- 3 Government-owned vehicles and leased to private players for operations (e.g. Odisha)**  
*Truck capex by government and Operations by private*
- 4 Call Centre with price negotiation model for demand desludging (e.g. Dakar)**  
*Truck capex by private and Operations by private with call centre set-up by local government*



# Conveyance prototype I: Full private model for demand desludging



## Primary capex financier

Private player

Private operators buy their own desludging trucks through self-financing or market debt.

## Operating agency

Private player

Private operators undertake cleaning in response to service requests from HHs. Collected FS is dumped at designated sites, if available, or open areas.

## Opex funding

User Charges

Cleaning charges are market-based and factor in distance traveled and difficulty of access of tanks.

## Contract structure

License

The private operator gets license from the city to undertake desludging operations within city limit. The licensee usually pays a small license fees.

## Model description

HHs request for desludging, typically only when tanks overflow. Private enterprise- desludger buys own trucks; undertake desludging operation after licensing or registration from local government and collects user charges from households.

## Benefits

- **Commercially viable** since charges are market based
- **Low ULB financial and implementation capacity needs** since asset ownership and operations are undertaken by the private operator

## Challenges

- Environmental and health hazards from tank overflows
- Profits from the Conveyance stage get appropriated by the private sector
- User charges are higher than needed due to inadequate demand and need for adequate profit margins
- May lead to open defecation by low income customers as they do not want the tank to get full and pay high prices
- Essential for ULBs to provide designated disposal sites and effectively monitor safe cleaning and disposal practices

## Applicability

Applicable in cities where ULB financial and operational capacity is less and there is a presence of adequate number of private sector desludging operator(s)

# Andhra Pradesh and Tamil Nadu – Full private based demand desludging

## Tamil Nadu

- Other than Chennai (Chennai Metro Water has their own trucks) and a few corporations, most ULBs have private operators for emptying services.
- Private players have to register with the government. This has to be done annually and fees are Rs. 2,000 per year. However, it is likely that many operators are not registered.
- Opex is recovered through user charges (Rs. 2000-2500 per trip and vary with distance)

## Andhra Pradesh

- Most of ULBs have active private players for emptying services.
- The private operators have to register with the ULB and are only allowed to operate within the ULB limits.
- Tipping fees are not applicable since as part of the registration to operate a truck, there is a condition to dump at the treatment site.
- Opex is recovered through user charges (Rs. 1000-2500 per trip)
- Warangal in AP is planning to introduce scheduled desludging

# Kumasi, Ghana- Licensing desludging service provider

- In Kumasi, Ghana, private truck operators have to obtain licenses from the Waste Management Department (WMD) at Kumasi Metropolitan Assembly (KMA).
- City authority moves away from providing direct services and facilitate participation of the private sector in providing desludging services.
- WMD in KMA has set rules for private sector participation and vets the operator before issuing a license.
- Truck operators have to comply with KMA regulations to prevent license being revoked.
- Private truck operators have to pay disposal fees to KMA for disposing the sludge at the treatment plant managed by KMA.
- In Kumasi, strict monitoring combined with the threat of the license being revoked, which would highlight failure to comply with the regulations and community shaming, has drastically reduced illegal dumping of FS.

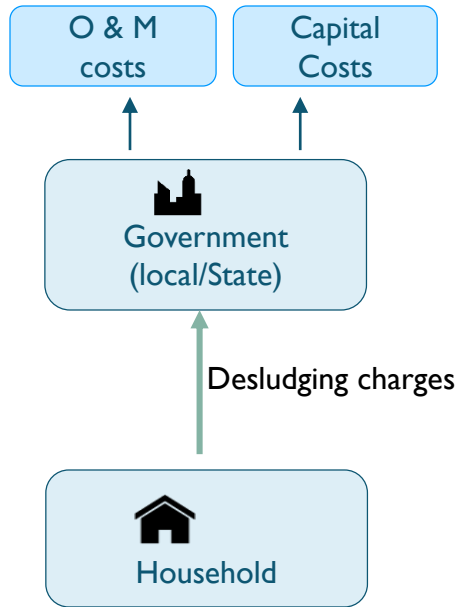


# Business model prototypes for demand based desludging

## Demand based desludging prototypes

- 1 Full Private model (e.g. Andhra Pradesh, Tamil Nadu)**  
*Truck capex by private and Operations by private*
- 2 Full government model (e.g. Small cities in Maharashtra)**  
*Truck capex by government and Operations by government*
- 3 Government-owned vehicles and leased to private players for operations (e.g. Odisha)**  
*Truck capex by government and Operations by private*
- 4 Call Centre with price negotiation model for demand desludging (e.g. Dakar)**  
*Truck capex by private and Operations by private with call centre set-up by local government*

# Conveyance prototype 2: Full government model for demand desludging



## Model description

HHs request for desludging, typically only when tanks overflow. The local/state government buys own trucks; undertake desludging operation and collects user charges from households.

## Benefits

- Financially feasible for the government since charges factor in opex recovery
- No contracting and monitoring arrangements needed between multiple players since the govt. is the single service provider

## Challenges

- High implementation capacity required from the ULB
- Capex and opex burden is on the ULB
- Possibly low service delivery levels of publicly owned trucks and not maintained and if response to HH demand is inefficient

## Applicability

Applicable in cities where ULB financial and operational capacity is more and presence of private sector desludging operator is not available.

### Primary capex financier

Local/State Government

Government purchases desludging trucks. Funding could be at the State or local govt. level, depending on financial capacity.

### Operating agency

Local government

ULBs operate the desludging vehicles and provide cleaning in response to service requests from HHs.

### Opex funding

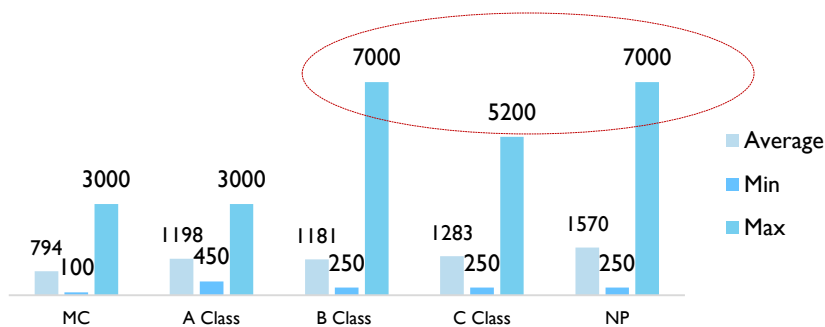
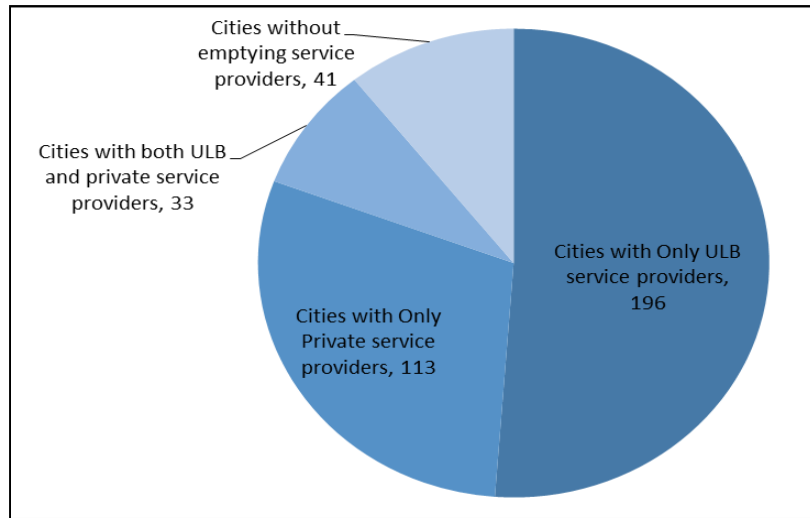
User Charges

Cleaning charges are market-based and factor in distance traveled and difficulty of access of tanks.

### Contract structure

-

# Maharashtra – Local government based demand desludging model



- Large number of medium and small size cities in Maharashtra are dependent on local government for desludging services.
- Local government mostly has 1-2 trucks which provide emptying service on the demand of HHs.
- User charges are collected at the time of emptying services based on the number of trips and distance covered.
- In some cities, private sector are also present but without any **licensing and registration process**. Currently only 9 cities have private operators on contract basis.

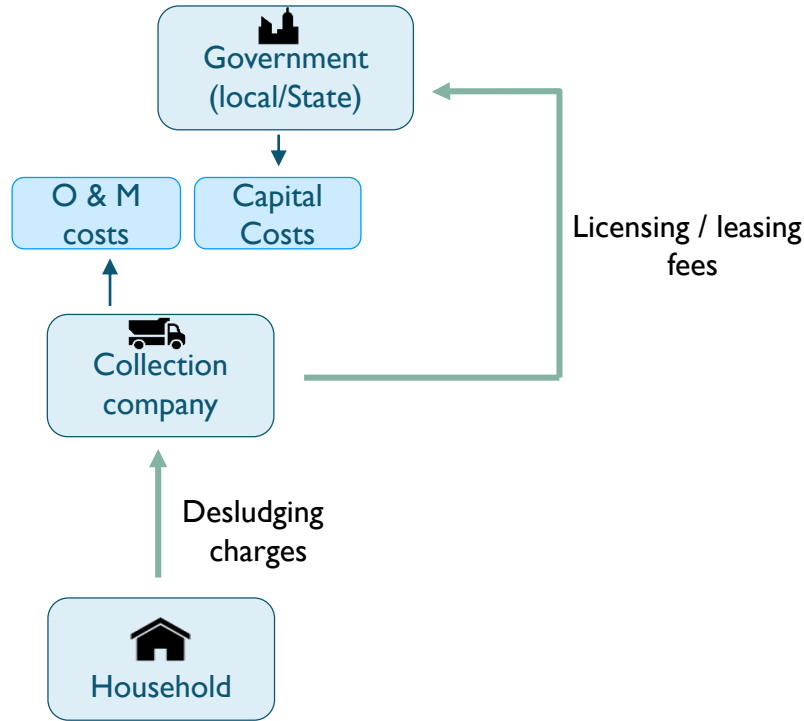
Desludging user charges are higher in smaller cities

# Business model prototypes for demand based desludging

## Demand based desludging prototypes

- 1 Full Private model (Eg: Andhra Pradesh, Tamil Nadu)**  
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- 3 Government-owned vehicles and leased to private players for operations (Eg: Odisha)**  
*Truck capex by government and Operations by private*
- 4 Call Centre with price negotiation model for demand desludging (eg: Dakar)**  
*Truck capex by private and Operations by private with call centre set-up by local government*

# Conveyance prototype 3: Government-owned vehicles and leased to private players for operations using demand based desludging



Primary capex financier	Operating agency	Opex funding	Contract structure
Government	Private player	User Charges	Service contract
Government purchases desludging trucks using own funds.	Private operators lease vehicles from the government. Provide cleaning in response to service requests from HHs. Collected FS is dumped at designated sites, if available, or open areas.	Cleaning charges are market-based and factor in distance traveled and difficulty of access of tanks.	The private operator enters into service contract with ULB trucks and performance based contract with the local government

## Model description

HHs request for desludging, typically only when tanks overflow. Private enterprise lease vehicles from the government. Provide cleaning in response to service requests from HHs. User charges are either collected by private operator or by local government.

## Benefits

- **Commercially viable** since charges are market based
- **Low ULB implementation capacity needs** since operations are undertaken by the private operator
- Likely high performance levels due to the private sector operations and incentives

## Challenges

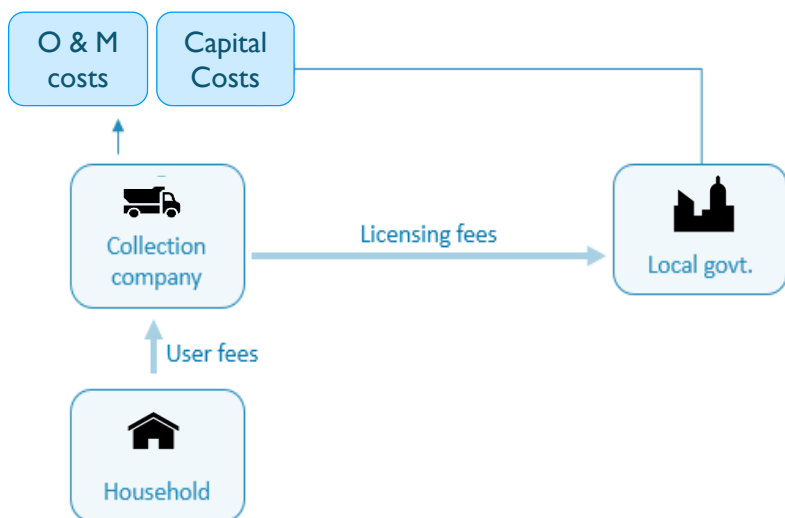
- Capex burden is on the ULB
- Equity can be a challenge in the absence of rate cards
- Requires high contract monitoring capacity within ULBs

## Applicability

Applicable in cities where ULB financial is more but operational capacity is less and presence of private sector desludging operator is available.



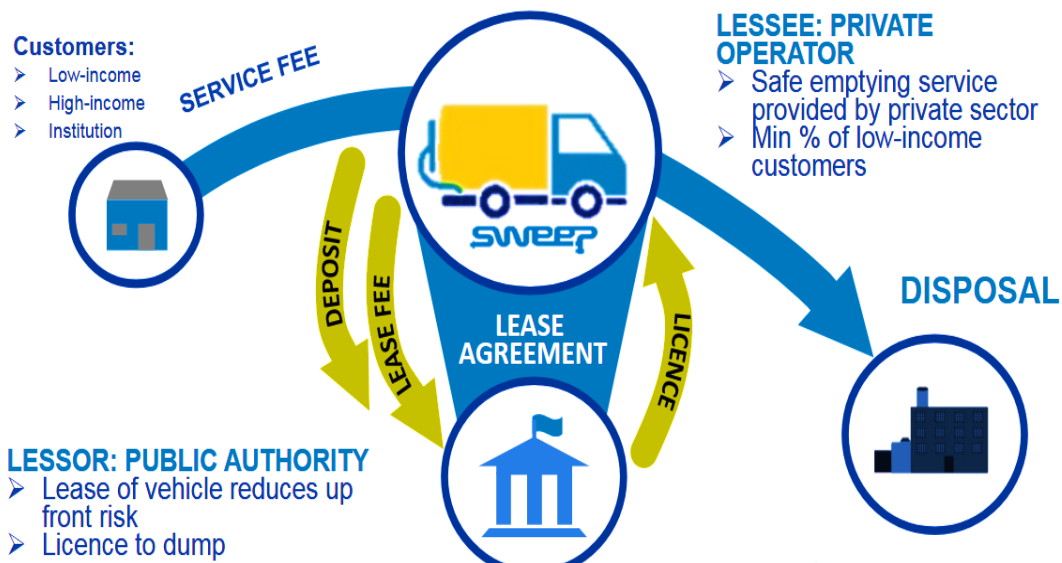
# Odisha- Government owned vehicles and leased to private with user charges



- **OWSSB (State government agency) had purchased emptying trucks** and allocated them to ULBs based on estimated sludge generation in their cities. The OWSSB used OUIDF funding to buy trucks.
- Local Government had issued tenders for inviting private operators to operate these vehicles. Only 15 ULBs out of 43 ULBs have received response from private operators.
- The key reason is low presence of private operators, low business in smaller cities due to high presence of insanitary toilets and high security deposit against leasing of trucks.
- **The ULB has a contract with the private player**, where the private player will operate the trucks and carry out desludging services in the city and charge a cleaning fee from the households.
- **User charges (Rs. 900 per trip) are fixed by government** and are collected from household either by ULB or private players depending on contract/ licensing terms
- As per the tender, it is expected that the operator does 6 desludging operations per vehicle per day. Private agency are responsible for these activities for a period of seven years.
- **Local governments have to monitor** the entire service and conduct various awareness generation programs through IEC modes.

# Dhaka, Bangladesh- PPP arrangement with private sector with service fee

- In Dhaka in 2015, WSUP designed a PPP to be delivered through a lease contract between DWASA and a cleaning services business with well-defined roles and responsibilities
- Under this agreement, DWASA provided the company with two 2,000 litre vacuum tankers to use under the 'SWEEP' brand.
- Until recently, focus was on medium and large customers to establish commercial viability. New clause introduced in mid-2017 mandating 30% of customers from low-income Communities. For service fees to be paid by consumers, differential pricing model was introduced to facilitate service offering to low-income customers. Entrepreneurs have flexibility to set price and respond to the market accordingly



## Faridpur, Bangladesh

- Two groups of pit emptiers are formalised into cooperatives and lease equipment from the municipality. Cooperatives provide mechanical desludging for a fee.
- Performance-based contract, with targets for quality control and safe disposal at a new treatment plant.

### Positive results !

	11,122m <sup>3</sup> FS safely managed
	257,011 customers served
	US \$ 112,064 revenue earned
	US \$ 20,121 profit generated

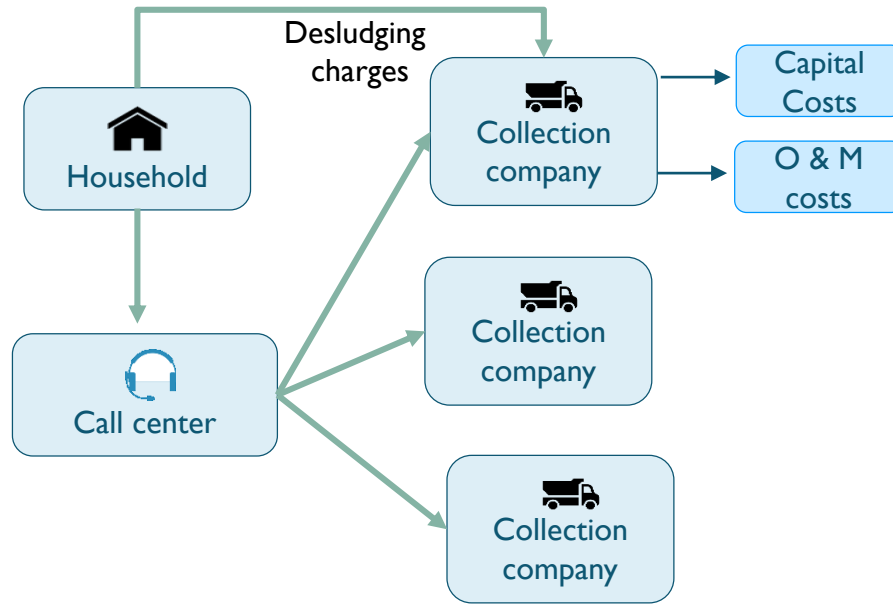


# Business model prototypes for demand based desludging

## Demand based desludging prototypes

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*Truck capex by government and Operations by private*
- 4 Call Centre with price negotiation model for demand desludging (eg: Dakar)**  
*Truck capex by private and Operations by private with call centre set-up by local government*

# Conveyance prototype 4: Call center with price negotiation model for demand desludging



## Model description

In this model, a call center is established for linking HHs with private desludging operators with the mechanisms of emptying charges negotiation. In this, HHs send the desludging request to the call center. The call center contacts the emptier in vicinity of households for quotations. The emptiers send their quotation to the call center. The center then sends the lowest quotation to the HHs. On confirmation of Households, the center assigns the service to the private player. The center also checks the quality of service and HHs satisfaction.

## Benefits

- **Easy access to emptying services**
- **Creating consortium of emptiers**
- **Service at reasonable cost through healthy competition**
- Likely high performance levels
- Help to provide more **equitable and affordable** emptying service
- This business model can potentially reduce the emptying fee and help to provide more equitable and affordable emptying service.

## Challenges

- Requires high level of monitoring and implementation capacity

## Applicability

Applicable in large cities where there are multiple private players present and competition among them. Eg: Bangalore, Delhi, Hyderabad, Pune, etc.

### Primary capex financier

Private player

Private operators buy their own desludging trucks through self-financing or market debt.

### Operating agency

Private player

Private operators undertake cleaning in response to service allocated by call centre.

### Opex funding

User Charges

Cleaning charges will depend on negotiations and lowest bid quoted by private players

### Contract structure

Service contract

The private operator enters into service contract with ULB. Private sector players need to register for provision of services at the call centre.

# Dakar, Senegal- Call center model for market based desludging services

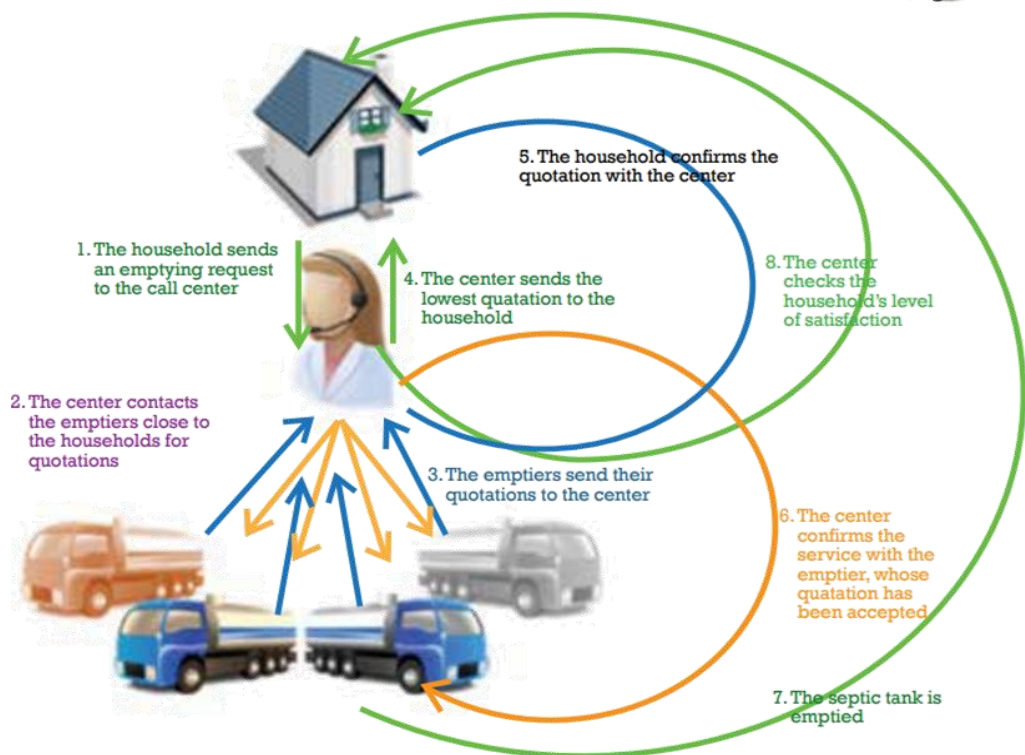
The PSMBV (Program for Market structuring of faecal sludge management) has initiated innovative activities, including the establishment of a call center to connect Faecal sludge emptying operators to households in need on mechanical emptying.



## What has been achieved:

- ✓ **Easy access to emptying services-** Call center Services available all around Dakar
- ✓ **Creating consortium of emptiers** - 138 emptying trucks are listed in the call center platform database
- ✓ Transferred sludge volumes at stations have increased since the scaling of the call center
- ✓ The average price of the emptying service through the call centre has declined from USD 56 (before program) to USD 46 (between 2012 and 2016, a drop of 18%).

In Kampala , a call centre links private sanitation service providers with customers. The city has been divided into FS emptying zones and FS operators have been designated for specific zones.



# Business model prototypes for scheduled desludging

## Scheduled desludging prototypes

- 5 PPP Annuity model for Scheduled desludging (e.g. Wai and Sinnar, Maharashtra, Metro Manila Philippines)**  
*Truck capex and Operations by private with performance based annuity contract with local government*
- 6 PSP Annuity model (e.g. Leh, J&K, Gevrai, Maharashtra)**  
*Truck capex by government and Operations by private operator with performance based annuity contract with local government*
- 7 Scheduled desludging on requisition (e.g. Indonesia)**  
*Online platform for Desludging requisition created by local government and services provided by either government or private operators*

# A citywide scheduled emptying services has emerged as a viable option for FSSM conveyance services

**In scheduled emptying model, Septic tanks or pits are regularly cleaned on a pre-determined schedule as per the recommended cleaning cycle of 2-3 years.**

- The scheduled for regular emptying can be worked out based on zoning of the city. Scheduled emptying could be fully financed by private sector and repaid through levying a tax or surcharge on water.
- The potentials benefits for moving towards scheduled emptying includes:
  - **Equitable and affordable service:** All households / properties are covered by services. Services are offered at lower prices, due to efficiency gains. Tax, if levied could be graded to make them affordable to all
  - **Infrastructure optimization:** More predictable loads for treatment facility and route optimization of trucks
  - **Environmental Benefits:** Likely reduction in BOD and coliform in septic tank effluent, and removes the likelihood of septic tank overflows
  - **Removes need for manual labour** due to regular cleaning

# Despite its widespread use, demand based emptying poses many serious issues of equity and negative environmental impacts

## Low frequency of desludging

On-demand desludging  
 = only done when septic tanks overflow  
 = frequency of 8-10 years+  
 CPHEEO norm is 2-3 years

## Environmental impacts of poor quality effluent

Low desludging frequency  
 = poor efficiency of septic tank  
 = poor quality of supernatant / effluent  
 overflow being released in rivers

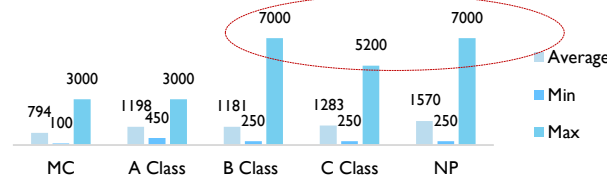
## Increased chances of Manual Scavenging

Low desludging frequency  
 = sludge hardens in the tank  
 = requirement of manual labour to remove it

## High costs per desludging

Desludgers find it difficult to achieve economies of scale.  
 Cannot optimize trips or have assured amount of business in on-demand service

## Small towns pay higher prices



## High desludging charges may discourage HHs from using toilets

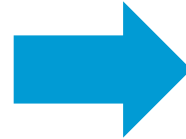
Adversely affects ODF sustainability

- This is the common business model and is based on user charges levied at the time of emptying. In most cases charges are high ranging from Rs. 1000 to Rs. 1500. In some cities it is reported that a very high fee of Rs. 7,000 is charged. Desludging charges are generally higher in smaller cities and in areas outside the ULB jurisdiction.
- Households are generally willing to pay these high charges as they have no other recourse but to pay whatever the emptier demands.



# Scheduled desludging can achieve regular emptying as recommended by CPHEEO

## On-demand desludging



## Scheduled desludging

- 1 Desludging is done **on-call** by the household, who do not see the need for regular cleaning
- 2 Private sector participation, but often **unregulated**; In some cases ULBs provide services
- 3 Houses pay ~ Rs.1000-3000/trip, and get tanks emptied only once in more than 8-10 years

- 1 Septic tanks desludged once in 3-5 years on a **pre-determined schedule**. **Regulations and penalties** to ensure compliance  
**Awareness generation** for regular desludging
- 2 **Good business prospects** for private sector participation with **regulation**
- 3 All property owners (residential and non-residential) pay a special sanitary tax or a fixed surcharge on water

# Scheduled emptying services has been adopted in many cities and there are some lessons for scaling up this practice

**Scheduled emptying has been practiced** in Wai and Sinnar in Maharashtra, Leh in J&K, Philippines, Malaysia, Vietnam and Indonesia.

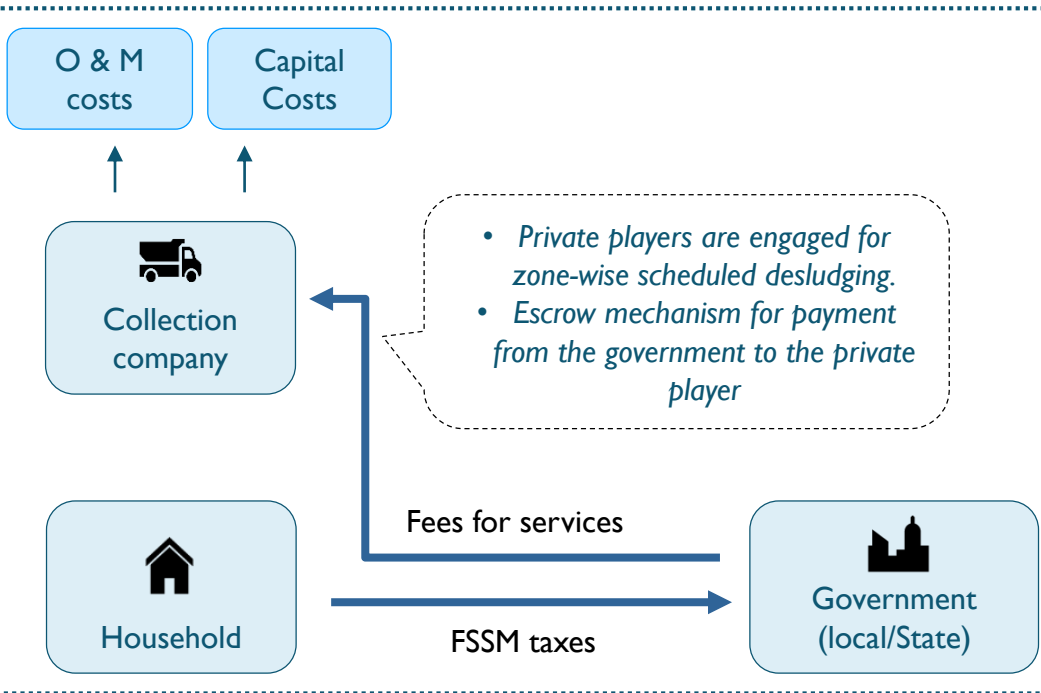
- **Wai and Sinnar:** Citywide scheduled desludging of septic tank once every 3 year through private sector engagement. Payments to private company are linked to performance i.e. based on targeted number of septic tanks emptied and compliance to standards. No fee at time of desludging. Instead, a small 'sanitation tax' levied on all properties in the city. This fund are used to pay the private company.
- **Leh, J&K:** Scheduled desludging is practiced for two days a week while for remaining 3 days on-demand desludging is practiced. Private company is contracted for desludging operations using government trucks.
- In **Philippines**, scheduled desludging is practiced through National government program. Services provided by private concessionaire (Manila) or city water district (Baliwag, Dumaguete). They are levying an environment fee of 20% of water bill or a tariff linked to water consumption for regular desludging services
- In **Indonesia**, scheduled desludging is provided to households on their requisition.
- In **Vietnam**, in Hai Phong city, scheduled desludging is practiced at interval of 5 - 6 years for household septic tanks, and for communal apartments once in 1 - 2 years

# Business model prototypes for scheduled desludging

## Scheduled desludging prototypes

- 5 PPP Annuity model for Scheduled desludging (Eg: Wai and Sinnar, Maharashtra, Metro Manila, Philippines)**  
*Truck capex and Operations by private with performance based annuity contract with local government*
- 6 PSP Annuity model (Eg: Leh, J&K, Gevrai, Maharashtra)**  
*Truck capex by government and Operations by private operator with performance based annuity contract with local government*
- 7 Scheduled desludging on requisition (Eg: Indonesia)**  
*Online platform for Desludging requisition created by local government and services provided by either government or private operators*

# Conveyance prototype 5: PPP Annuity model for scheduled desludging



## Model description

Private service provider bring trucks and operate through a performance based contract to carry out scheduled desludging on pre-determined schedule set by local government. Fees as per the bid are paid to private operators per septic tank or per trip emptied. The city collects a special tax or a surcharge on water to cover the payment of fees. For large cities and for metropolitan areas where partial sewerage network is present, scheduled desludging model can be explored for areas with onsite sanitation systems. These could be through zonal contracts with private operators.

## Benefits

- **Reduces the capex burden** for ULBs
- **Generates revenue** through taxes to pay for service
- **Performance based contracts** tend to lead to higher service levels
- Guaranteed revenues **can induce higher private sector** participation

## Challenges

- Deploying this model **requires high-levels of ULB capacity**
- Significant **behaviour change needed** to mobilize the tax
- **Limited government capacity**, especially in small cities, to design and implement such contracts
- **Monitoring of private operations** and ensuring that de-sludge septage is disposed at treatment site

## Applicability

- Presence and willingness of private sector to invest in trucks capex and take on contracts.
- Local government has capacity to monitor operations

### Primary capex financier

Private player

Private operators buy their own desludging trucks through self-financing or market debt.

### Operating agency

Private player

Private operators are given a contract and a license to operate in the city and carry out desludging operations in close coordination with the city cell.

### Opex funding

FSSM taxes

The city collects a special tax from households to finance the operations. Predetermined fees are given to the private operators

### Contract structure

PPP

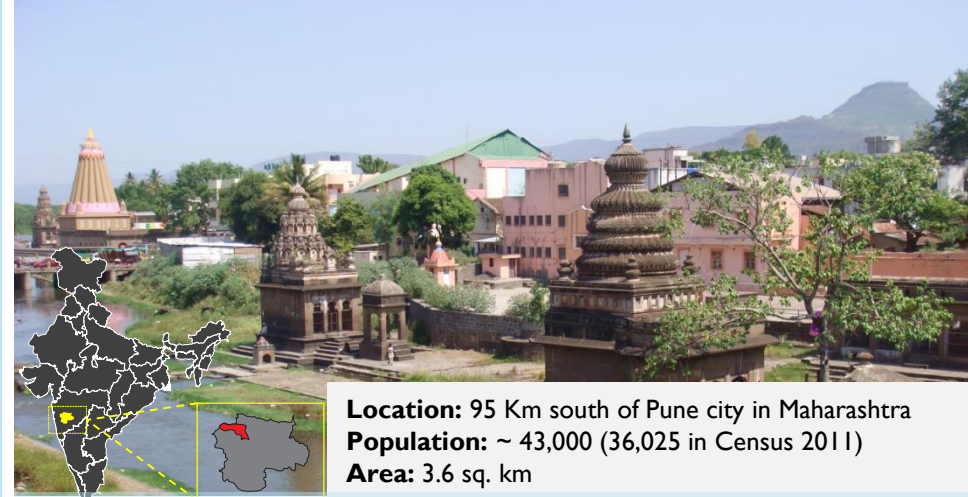
The private operator enters into performance based contract with the local government

# Wai - PPP annuity model for scheduled desludging

In Wai, ULB appointed the private player to carry out scheduled emptying service in the city. The Capex cost of the truck and Opex cost of the emptying service will be initially mobilized by the private player which will be paid back by the local government using annuity payments. The private player will be paid against performance linked to the number of septic tanks emptied. The household will pay sanitation tax to the local government, which will ensure that adequate funds are available to recover the cost of emptying service. The risk of late payment raised by private players is attempted to be mitigated through an escrow account mechanism.

## Benefits

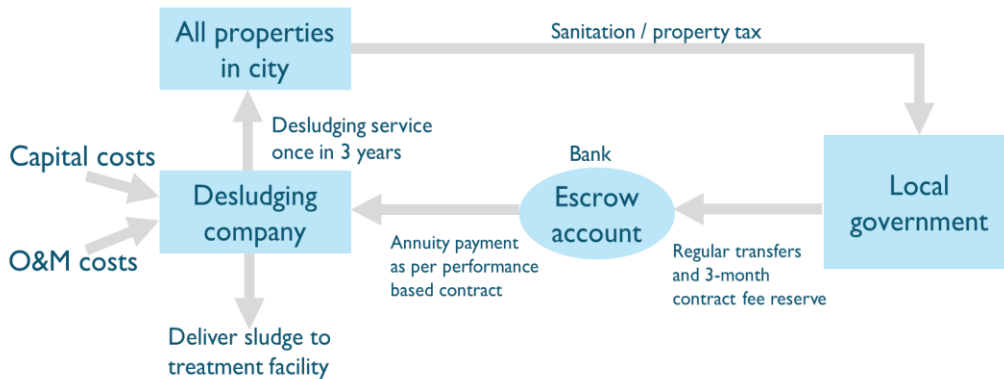
Thus, with a performance-based contract, customers are assured of a high-quality service with low prices paid through sanitation tax. Lower prices are due to economies of scale, lowering the charge per individual emptying.



**Location:** 95 Km south of Pune city in Maharashtra  
**Population:** ~ 43,000 (36,025 in Census 2011)  
**Area:** 3.6 sq. km

On May 30, 2018, Wai Municipal Council in Maharashtra became the first city in India to start a Scheduled Desludging service.

## Performance Linked Annuity Model (PLAM) for conveyance in Wai



## Positive results !

- ✓ Scheduled emptying since June 2018
- ✓ 500+ scheduled desludging done in 8 months
- ✓ 7-8 septic tanks deslugged per day as compared to 7-8 per month in 2017 when demand desludging was happening.
- ✓ 2.5 million liter septage delivered to treatment facility
- ✓ 90%+ acceptance rate from HHs for scheduled service
- ✓ Sanitation workers now wear safety gear regularly
- ✓ Households pay sanitation tax instead of high user charges for desludging



# Philippines - Scheduled emptying by private concessionaires through environment tax

Description	Baliwag	Veteran Village (Maynilad)	Dumaguete
Desludging cycle	5	5	5
Start year	2013	2012	2010
Responsibility of desludging	Baliwag Water District	Maynilad Water Services Inc	Dumaguete City Water District
Capex Funding	Baliwag Water District invested in 2 trucks of 5 m <sup>3</sup> capacity each	Maynilad invested in 27 trucks	Water district invested in 7 trucks of 3 m <sup>3</sup> size.
Opex Funding	10% of water bill	20% of water bill	Tariff of 2 PHP per cubic meter of Water Consumed

- National legislation (Clean Water Act) recognized the full service chain of sanitation and scheduled septic tank desludging cycle
- Private firms operate under a concession agreement with the Metropolitan Waterworks and Sewerage System, originally a public organization privatized in 1997
- Services provided by private concessionaire (Manila) or city water district (Baliwag, Dumaguete)
  - In Manila Metro – scheduled desludging by two private concessionaires; Manila Water Company and Maynilad Water Services, Inc.
  - In Dumaguete – similar model but with Water District Authority. The water district was responsible for collection and transportation of sludge while Dumaguete City local government unit (LGU) responsible for O&M of treatment plan. Capital cost shared by the water district and the LGU.
- Tariffs are set by law to allow these companies to cover capital and operating costs, with some built in profit. Levying an environment fee of 20% of water bill or a tariff linked to water consumption for regular desludging services
- Effective awareness programs and IEC activities
- Charges and penalty norms for denial of desludging service
- Safe desludging practices like use of safety gears in place



# Business model prototypes for scheduled desludging

## Scheduled desludging prototypes

**5 PPP annuity model for Scheduled desludging (Eg: Wai and Sinnar, Maharashtra, and Metro Manila, Philippines) )**

*Truck capex and Operations by private with performance based annuity contract with local government*

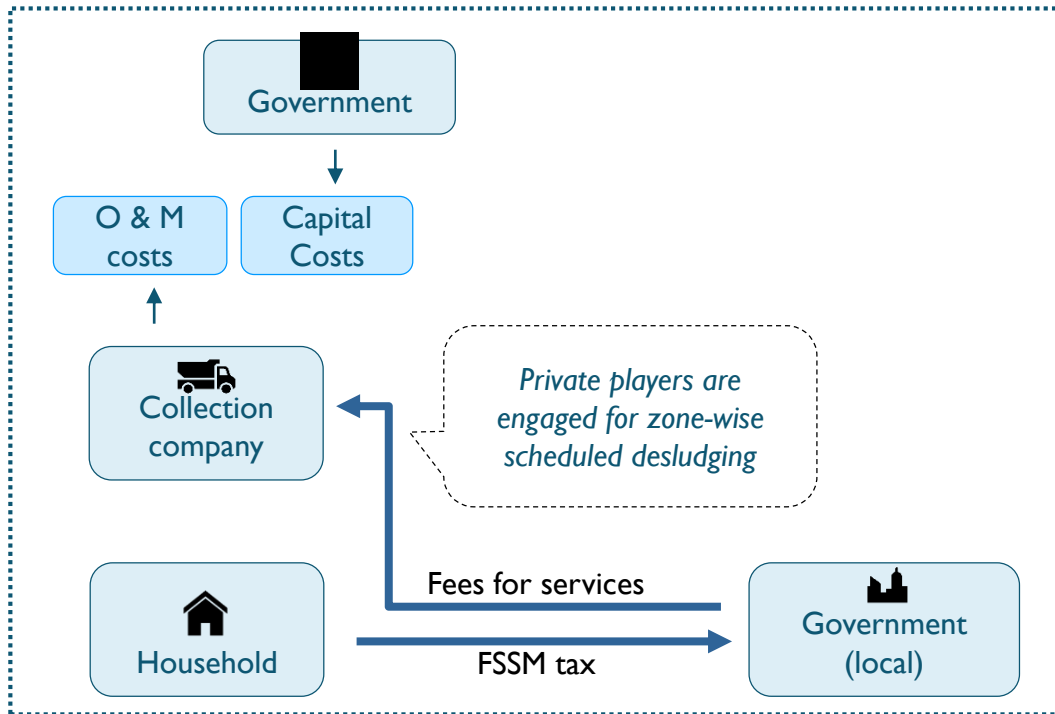
**6 PSP annuity model (Eg: Leh, J&K, Gevrai, Maharashtra)**

*Truck capex by government and Operations by private operator with performance based annuity contract with local government*

**7 Scheduled desludging on requisition (Eg: Indonesia)**

*Online platform for Desludging requisition created by local government and services provided by either government or private operators*

# Conveyance prototype 6: PSP Annuity model for scheduled desludging



## Model description

Private service provider leases or operates local /state government trucks and carry out desludging operations on a performance based contract. Fees determined as per the bid. to private operators per septic tank or per trip emptied. The city collects a special tax or a surcharge on water to cover the payment of fees.

## Benefits

- **Generates revenue** through tariffs to pay for service
- **Performance based contracts** tend to lead to higher service levels
- **Covers service gaps** where there are few private players or players with low financial capacity

## Challenges

- Deploying this model requires **high-levels of ULB capacity**, both from a **financial and technical** perspective
- Significant **behaviour change needed** to mobilize the tariff
- **Monitoring of private operations** and ensuring that they are not dumping openly becomes essential
- Government capex may incentivize more and smaller private providers to participate

## Applicability

- Private sector presence, but low capacity to invest, while local /state government has financial and monitoring capacity
- Government capex may incentivize private players to participate

### Primary capex financier

Government

The government purchases desludging trucks using own sources.

### Operating agency

Private player

Private operators lease trucks from the government and carry out desludging operations in close coordination with the city cell.

### Opex funding

FSSM taxes

The city collects a special tax from households to finance the operations. Predetermined fees are given to the private operators

### Contract structure

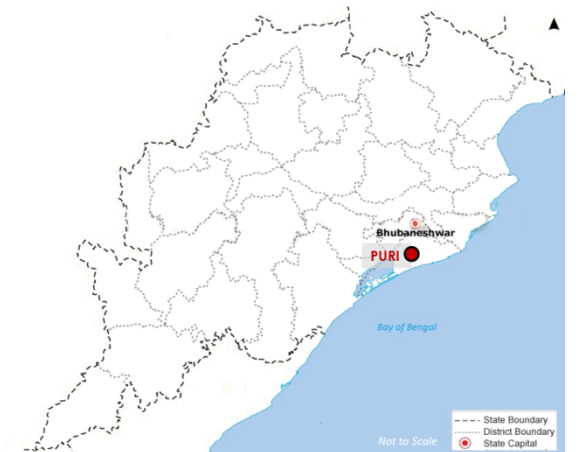
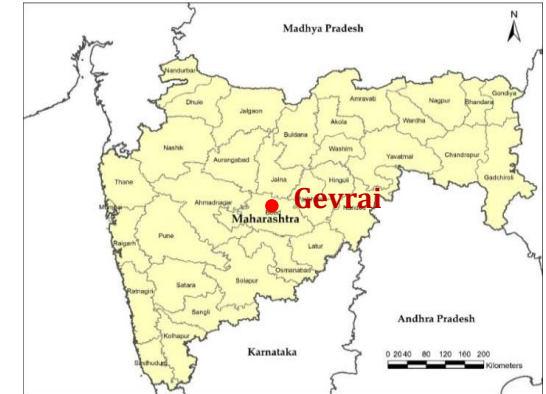
PSP

The private operator enters into service contract with ULB trucks and performance based contract with the local government



# Gevrai, Maharashtra and Puri, Odisha- Planning PSP model for scheduled desludging

- Both the cities are planning for scheduled desludging options for conveyance.
- Trucks will be provided by government and private sector will be contracted for operations of scheduled desludging model
- FSSM taxes (as part of property tax) will be collected by local government from households.
- Local government will monitor private sector activities and oversee to disposed collected sludge at treatment plant only.
- Payment to private sector will be on performance or number of septic tanks emptied.
- Payments to private operators will be made through an escrow account by the Government.



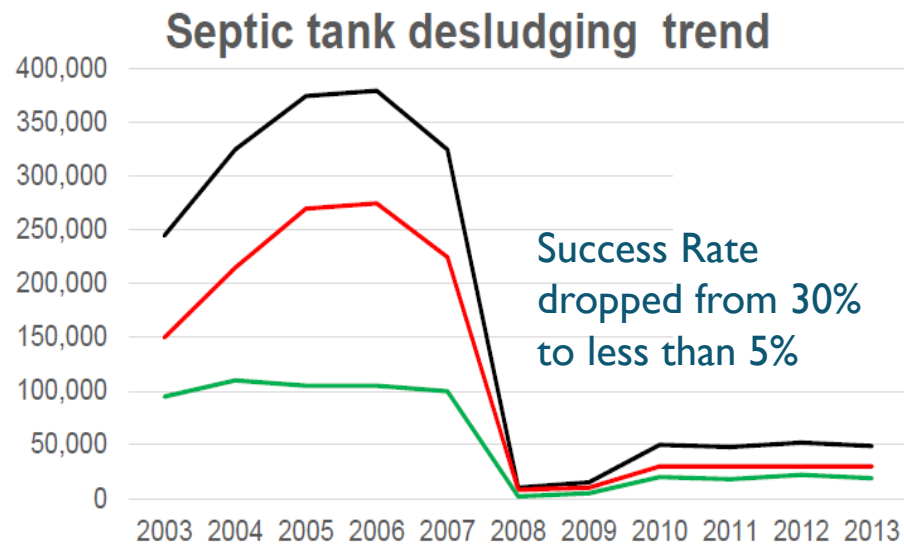
# Vietnam- Scheduled desludging in Hai Phong with surcharge on water bill

- Hai Phong Sewerage and Drainage a state Company limited (Hai Phong SADCO) is responsible for provision of sanitation services
- Its GIS database has 86,501 septic tanks under scheduled desludging across 4 urban districts.
- Desludging interval for household septic tanks is once in 5 - 6 years, and for communal apartments once in 1 - 2 years
- Scheduled emptying is covered by the city's budget and waste water fee of 15% surcharge on water bill
- In the city of Hai Phong, scheduled faecal sludge emptying service for the communities is only through the surcharge.



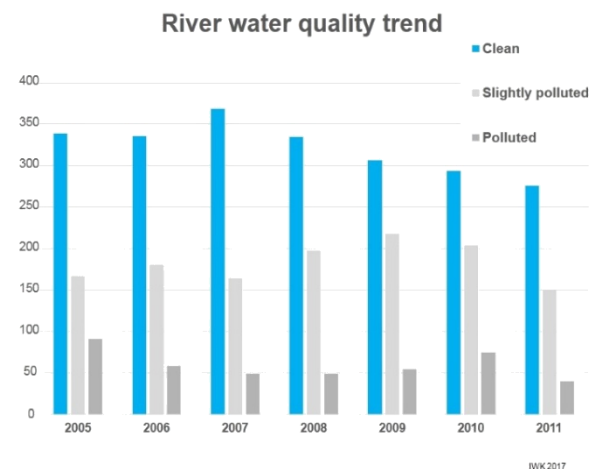
# Malaysia- Difficulties in setting incentives for HHs to adopt scheduled desludging

Indah Water Konsortium (IWK) provided scheduled desludging of septic tanks with good uptake from 2005-2007. However, from 2008, with liberalization, services were to be provided by private licensed trucks and tariffs were charged from first service onwards. Awareness generation was not used. Often, households were hesitant to pay for services, Also, there wasn't adequate efforts made for awareness generation. This led to a huge drop in desludging and a significant decrease in river water quality.



IWK plans to now outsource emptying / transport to permit holders from 2019 onwards. Their strategy involves:-

- Neighbourhood Consultation – for awareness on scheduled desludging and discussion on tariff - setting
- Tariff proposed to be spread over a 3 year period (monthly billing) and linked to water tariff to improve collection efficiency.

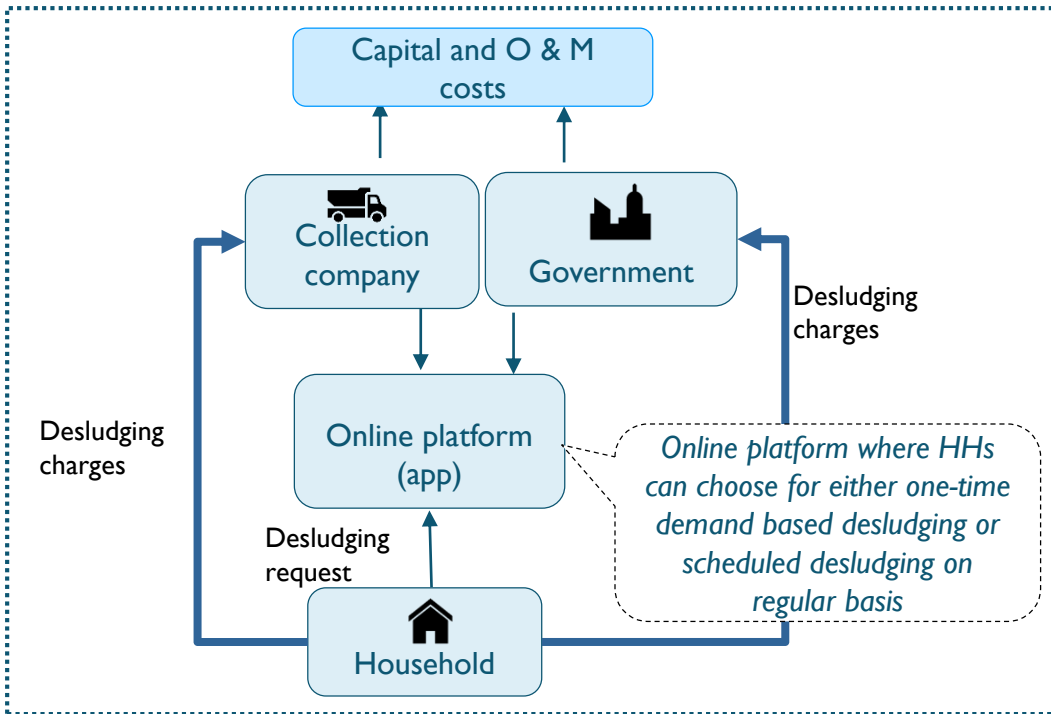


# Business model prototypes for scheduled desludging

## Scheduled desludging prototypes

- 5 PPP Annuity model for Scheduled desludging (e.g.: Wai and Sinnar, Maharashtra)**  
*Truck capex and Operations by private with performance based annuity contract with local government*
- 6 PSP Annuity model (e.g.: Leh, J&K, Gevrai, Maharashtra)**  
*Truck capex by government and Operations by private operator with performance based annuity contract with local government*
- 7 Scheduled desludging on requisition (e.g.: Indonesia)**  
*Online platform for Desludging requisition created by local government and services provided by either government or private operators*

# Conveyance prototype 7: Scheduled desludging on requisition



## Model description

In this model, scheduled desludging service is provided to only those households that request regular desludging. An online platform is created by local government, where HHs can register for desludging request and can choose from options of either one-time demand based desludging or scheduled desludging on regular basis. The service are either provided by government or by private provider registered on online platform. The desludging rates are fixed by the government on basis on demand desludging requisition or scheduled desludging requisition, with incentives to those preferring scheduled desludging models.

## Benefits

- Can be explored as a potential model for transition from on-demand to scheduled desludging

## Challenges

- Focus on IEC to generate buy-in by household /property owner

## Applicability

- Applicable in areas where there is considerable variations across properties in containment sizes in a given city

### Primary capex financier

Government / Private

This is a dual model where services are either provided by government or private. Hence, Capex financier will be both government and private.

### Operating agency

Government / Private

The operations are provided by both government and private as per preference of customers.

### Opex funding

User charges

Cleaning charges are market-based and factor in distance traveled and difficulty of access of tanks

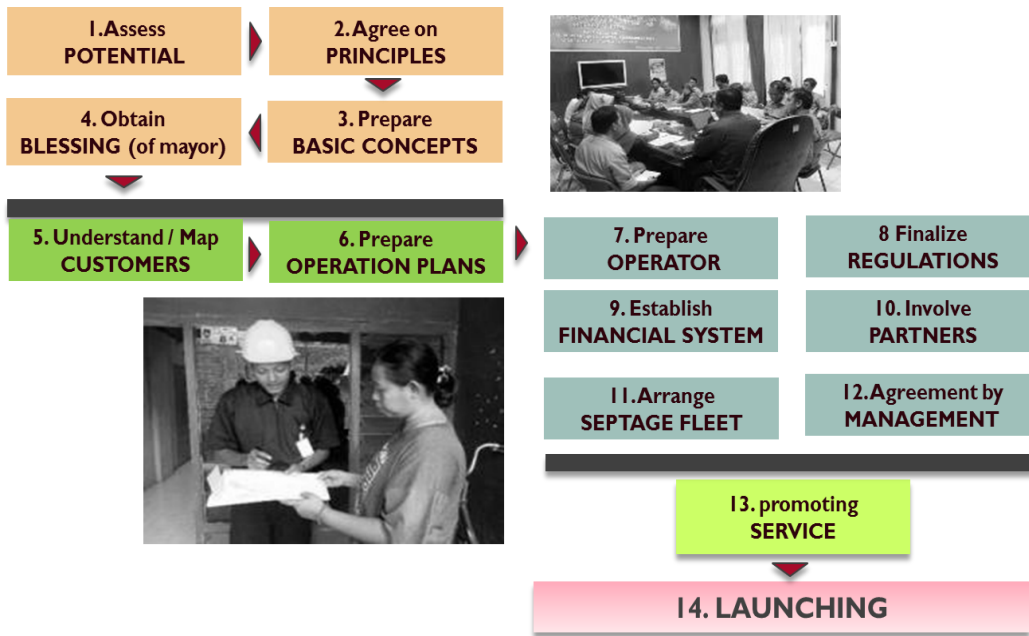
### Contract structure

Service contract

The private operator enters into service contract with ULB .Private sector players needs to register for provision of services on the online platform

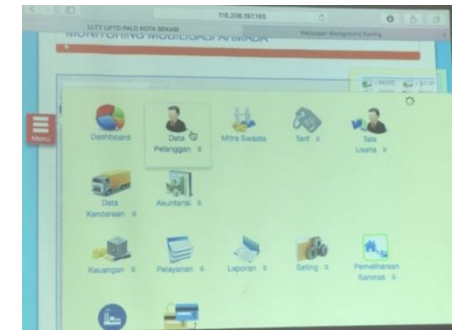
# Indonesia- Regular desludging on requisition

## Steps followed in scheduled desludging process....



## Mobile based app and Dashboard for desludging requisition and monitoring- Bekasi City

- Android Based App for households to request desludging services.
- A single app provides access to the LG trucks and private trucks
- HH register on the on-line platform, HHs inform their regular desludging period and based on their request service is provided
- A dashboard is prepared to monitor the activities of the desludging vehicles.
- The LG monitors the LG trucks as well as the private trucks
- Access to the dashboard is given according to the stakeholder.
- Bar-code is placed at every registered HH.



# Comparing prototype business models for conveyance

Prototype	ULB financial capacity needed	ULB implementation and monitoring capacity needed	Need for private participation	Payment burden on HHs
<b>1. Full Private model for demand desludging</b>	<b>Nil</b>	<b>Medium</b> provide designated deposit sites, monitor and license private players	<b>High</b> Capex and operations by private	<b>High</b> User charges can be high based on distress prices
<b>2. Full government model for demand desludging</b>	<b>High-</b> require capex for trucks procurement and operations by ULB	<b>High</b> Operations by ULB	<b>Nil</b>	<b>Low</b> User charges can be regulated
<b>3. Government-owned vehicles and leased to private players for operations for demand desludging</b>	<b>Medium</b> require capex for trucks procurement	<b>High</b> provide designated deposit sites, monitor players, lease trucks to private players	<b>Medium</b> Operations by private	<b>Medium</b> User charges will be regulated by govt with upper cap
<b>4. Call Centre with price negotiation model for demand desludging</b>	<b>Medium</b> ULB to set up online platform	<b>High</b> For co-ordination and monitoring activities	<b>High</b> Capex and operations by private	<b>Medium</b> Prices will be lower as private players will bid for services
<b>5. PPP Annuity model for Scheduled desludging</b>	<b>Medium</b> Trucks capex and operations by private, opex payments by ULB	<b>High</b> capacity needed to design and implement scheduled desludging	<b>High</b> Capex and operations by private	<b>Low</b> if FSSM taxes are levied instead of user fees
<b>6. PSP Annuity model for Scheduled desludging</b>	<b>Medium</b> Trucks capex and opex payments by ULB operations by private	<b>High</b> capacity needed to design and implement scheduled desludging	<b>Medium</b> Operations by private	<b>Low</b> if FSSM taxes are levied instead of user fees
<b>7. Scheduled desludging on requisition</b>	<b>Medium</b> Trucks capex by govt and private	<b>Medium</b> provide designated deposit sites, monitor and license private players	<b>Medium</b> Capex and operations by private	<b>Medium</b> User charges will be regulated by govt

# Conveyance business models and prototypes

Business model prototypes	Examples	Benefits	Challenges	Applicability
<b>Demand based desludging</b>				
<b>1. Full Private model</b>	Andhra Pradesh, Tamil Nadu	Low ULB financial and implementation capacity needs	User charges are higher than needed due to profit margins May not be equitable for low income customers	Applicable in cities where ULB financial and operational capacity is less and presence of private sector desludging operator is available.
<b>2. Full government model</b>	Small cities in Maharashtra	No contracting and monitoring arrangements needed	High implementation capacity required from the ULB Capex and opex burden is on the ULB	Applicable in cities where ULB financial and operational capacity is more and presence of private sector desludging operator is not available.
<b>3. Government-owned vehicles and leased to private players for operations</b>	Odisha	Low ULB implementation capacity needs Higher performance levels due to the private sector operations	Capex burden is on the ULB Requires high contract monitoring capacity within ULBs	Applicable in cities where ULB financial is more but operational capacity is less and presence of private sector desludging operator is available.
<b>4. Call Centre with price negotiation model</b>	Dakar	Easy access to emptying services; Service at reasonable cost	Requires high level of monitoring and implementation capacity	Maybe applicable in cities where there are multiple private players already present.
<b>Scheduled based desludging</b>				
<b>5. PPP Annuity model</b>	Wai and Sinnar, Maharashtra	Reduces the capex burden for local governments; result in higher service levels; Guaranteed fees result in competitive bid prices	Significant IEC needed to convince households for desludging ; Good monitoring of private sector activities	Presence and willingness of private sector to invest in trucks capex and take on contracts. Local government has capacity to monitor operations.
<b>6. PSP Annuity model</b>	Leh, J&K, Gevrai, Maharashtra	Government capex may incentivize more and smaller private providers to participate	Good monitoring of private sector activities. Possible lack of maintenance of trucks by private operator	Private sector presence, but low capacity to invest, while local /state government has financial and monitoring capacity.Government capex may incentivize private players to participate.
<b>7. Scheduled desludging on requisition</b>	Indonesia	Can be explored as a potential model for transition from on-demand to scheduled desludging	Focus on IEC to generate buy-in by household /property owner	Applicable in areas where there is considerable variations across properties in containment sizes in a given city

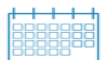


# Conveyance business models: Key observations 1/2



## Cities need to move more towards scheduled desludging due to its many advantages

Current practice of on-demand desludging through private operators or ULBs is the most prevalent model across cities and states in India. However, scheduled desludging is needed to ensure regular and timely desludging as per norms due to its many advantages: a) achieves inclusive and equitable services covering all residential and non-residential properties, including the poor; b) can help reduce costs due to efficiency gains; c) can lead to positive environmental impact; d) removes the need for manual labour; and e) can help to build a good database on real situation of onsite facilities. In scheduled desludging, it is easier to collect revenues through specific sanitation taxes rather than user charges, as users may not be willing to pay at the time of collection when there is no urgent need.



## Limited need for government investment, but CSR and impact investment can help demonstrate scheduled emptying models that are taken up for the first time in India

In conveyance, capex funding can be typically provided by private players in both demand and scheduled desludging practices. Cost recovery is typically from specific taxes, tariffs or user charges, with rare instances of government grants or philanthropic funds. Business models in conveyance can therefore be viable (and profitable for private players), with limited requirement for non-commercial assistance.

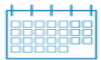


# Conveyance business models: Key observations 2/2



## Precautions while using these conveyance business model prototypes

For scheduled desludging, it is essential a) to avoid user charges at the time of desludging, b) to have at least a property tax database for the city, and c) have a good risk management plan while developing PPP/PSP contracts. For demand based desludging, need to license private providers. In both models, it is necessary to ensure safe disposal of collected FS at a designated treatment facility and ensuring use of PPE by private and ULB staff.



## Use of zonal contracts for large metropolitan areas

For **large cities and for metropolitan areas** where partial sewerage network is present, **zonal scheduled desludging models** can be explored with multiple private operators. For each zone ULB may provide service contract to selected private operators. Cities such as Pune, Mumbai metropolitan areas, Hyderabad can use such an approach.





# Contents

## Executive Summary

### 1. Introduction

- Emerging Emphasis on FSSM
- Approach for this project

### 2. Approach to the development of prototypes for business models

### 3. Business models prototypes

- Conveyance business models
- Treatment business models
- Integrated business models

### 4. Private sector providers landscape

- Overview of private sector presence across the 4 States
- Key findings and challenges

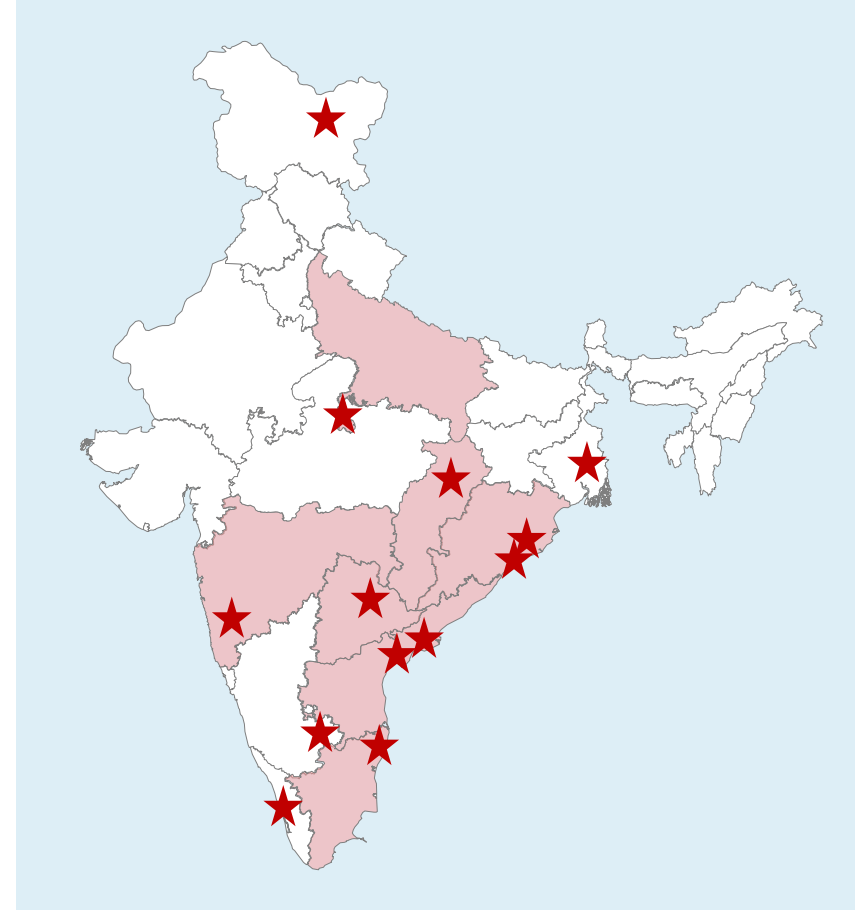
### 5. Applicability of business models

- Applicability of business models in four states
- Recommendations for business models

## Annexes

# Many states in India are taking up Faecal Sludge Treatment Plants (FSTPs)... The need is to scale and sustain the momentum

- **Several Faecal Sludge Treatment Plants (FSTPs) are already functional in different states in India.** *300 FSTPs at planning or implementation phase*
- Many states are progressing with state-wide roll-out for FSTPs – large number are being planned:
  - Andhra Pradesh-76 and Telangana-72 ,
  - Tamil Nadu-48 and Odisha-17,
  - Maharashtra-100 (potentially)
  - Uttar Pradesh-52 and Chhattisgarh- 8
  - Karnataka- 55
- Nearly 4,000 FSTPs are required to address country's need for faecal sludge management.
- Service delivery has to be strengthened concurrently.



# Philanthropic/non-profit funded models played a catalytic role for pilots and demonstration projects

**Philanthropic funders or CSR funds support capex requirements, typically for pilots of treatment technologies or models.**

- **Faecal Sludge Treatment Plants (FSTP)** are operational in Coimbatore, Devenahalli, Wai, Dhenkanal, Narsapur and Warangal through philanthropic / non-profit funds for capex and initial operating costs
- **Operations** are typically run by **private players**
- **Philanthropic / non-profit support is best suited for the nascent phase** of piloting technologies.
- Eventually sustainable models involving just the public and private sectors will take over

# However, there are other promising models that are scalable...

## **Funding through public finance seems to be the most scalable model.**

- Maharashtra plans to use public funds (e.g. 14th FC, Incentive funds, State schemes such as Nagarothan and Vasisthpurna schemes) for FSTPs. The GoM has issued a Government Resolution (GR) to ask cities to use 50% of 14th FC funds and ODF Incentive Funds for FSSM. It also has written to the Government of India to use 'left over funds' from the SBM for statewide implementation of FSSM across all cities.
- Andhra Pradesh has issued RFPs to leverage partial private funding for FSTPs through a Hybrid Annuity Model (HAM) with provision made in the 2018-19 State budget (made for the Swachha Andhra Corporation.) The role of local government is limited to allocation of land for FSTPs.
- Odisha has used AMRUT funding (National government program) for capex and Opex of FSTPs in Nine towns. The role of local government is limited to allocation of land for FSTPs.
- Tamil Nadu is exploring unutilized public (SBM) funds and own funding through state budget using a cluster based approach for setting up FSTPs across all cities.

# Business model prototypes for treatment

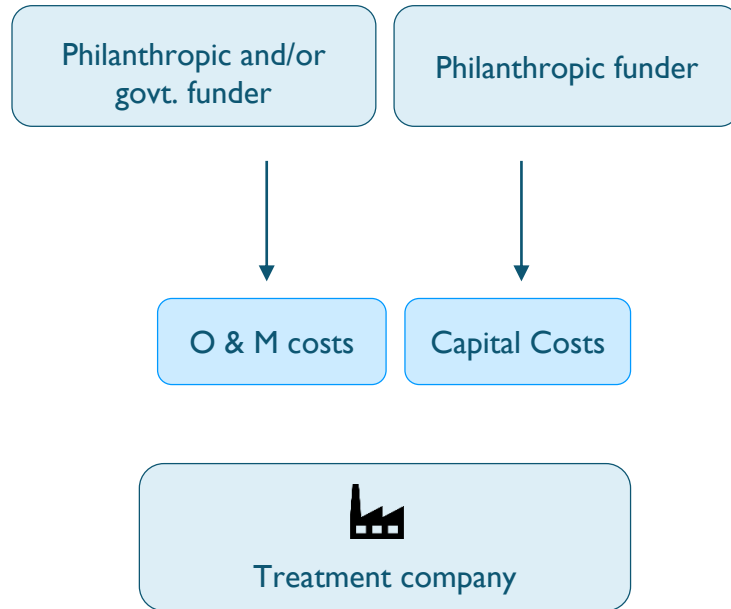
- 1 Philanthropic funded treatment facility (e.g. Wai, Narsapur, Warangal)**  
*Treatment plant capex and initial Opex by philanthropic and Operations by private*
- 2 State government funded through national/ state programs for capex and opex (eg: Odisha, Chhattisgarh, UP)**  
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*Treatment plant capex by private and state government; and Opex by state government and Operations by private*

# Different business model prototypes for treatment

- 1 Philanthropic funded treatment facility (e.g. Wai, Narsapur, Warangal)**  
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*Treatment plant capex by private and state government; and Opex by state government and Operations by private*



# Treatment prototype I: Philanthropic/ Non-profit funded treatment business models



Primary capex financier	Operating agency	Opex funding	Contract structure
Philanthropic funder	Private player	Govt. budget and Philanthropy	-
Philanthropic funders support capex requirements, typically for pilots of treatment technologies or models.	The plant is operated by a private player, working with the philanthropic funder to develop and test treatment technologies or models	Opex recovery from sources such as the government or philanthropic funders. Later reuse revenue and tipping fees can also be consider for Opex funding.	There is no contract of local government with phil or private operator but formal MoU is preferred mode.

## Model description

Philanthropic funders or CSR support capex requirements, typically for pilots of treatment technologies or models. The plant is operated by a private player, working with the philanthropic funder to develop and test treatment technologies or models. Opex recovery from sources such as the government or philanthropic funders. The plant is handed to city government after successful pilot of project (after 2-3 years as per MoU with government)

## Benefits

- **Plugs the funding gap for new treatment technologies and models**, which are still being tested and for which alternate sources of funds may not exist
- **No financial or implementation burden on governments**, since the philanthropic and private players are responsible

## Challenges

- Philanthropic funds are not a sustainable source of funds for the long term or for established technologies/models

## Applicability

Philanthropic funding typically drives capex investment, and supports opex recovery in the short / medium term, driven by the recognition that reuse / tipping fees are unlikely to fund all or a significant proportion of opex. Opex funding is short / medium term, local governments may need to take over thereafter

# Case example- Philanthropic funded treatment plant

## Coimbatore (2towns)

- Plant capex is funded by BMGF but constructed by a private player.
- Plant will initially be operated by a private player, then handed over to ULBs. Operating costs initially funded by BMGF, and later guaranteed funding by the ULB
- Cluster approach i.e. common FSTP for two towns

## Wai

- Plant capex funded by BMGF. A private player will design, build and operate the plant (DBOT).
- Tide Technocrats has a 2 year O&M contract, funded by BMGF.
- Plant O&M is planned to be funded through sanitation / property tax in the future.

## Narsapur

- BMGF has provided a grant to Tide Technocrats for the FSTP.
- One year O&M (funded by BMGF) is built into the contract with Tide Technocrats. The FSTP will be manned by five staff members, hired by Tide.
- Only licensed operators are allowed to deposit the faecal sludge at the FSTP.

## Warangal

- FSTP using pyrolysis technology is being funded by BMGF, under a DBOT model.
- The plant will be operated by a private player. BMGF will provide opex for the FSTP for the initial year.

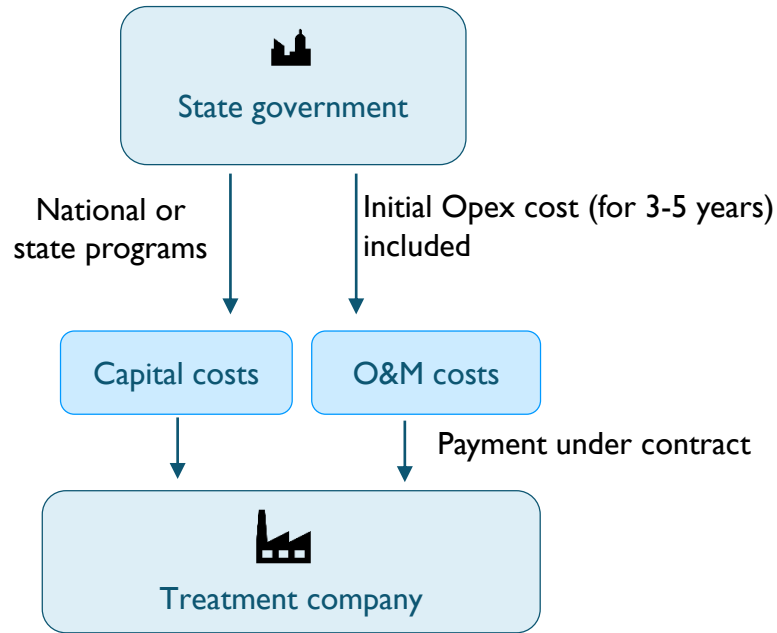
## Other

- **Devenahalli** uses a mix of funds, including capex funding and one year opex from CDD and BMGF. *The model is described earlier.*
- **Dhenkanal** uses BMGF funds capex and 1-2 years of opex. Revenue generation options for the long term are being explored e.g. reuse revenues.

# Different business models prototypes for treatment

- 1 Philanthropic funded treatment facility (e.g. Wai, Narsapur, Warangal)**  
*Treatment plant capex and initial Opex by philanthropic and Operations by private*
- 2 State government funded through national/ state programs for capex and opex (eg: Odisha, Chhattisgarh, UP)**  
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*Treatment plant capex by private and state government; and Opex by state government and Operations by private*

# Treatment prototype 2: State government funded through national/ state programs for capex and opex



## Primary capex financier

State government

State government fund plant capex and initial opex through either National or State level programs.

## Operating agency

Private player

A private player operates the plant, working under an O&M contract with the State government

## Opex funding

State or local government

Opex recovery from sources such as the state government or local government

## Contract structure

Service contract

The private operator enters into service contract with state government to construct and operate the treatment plant

## Model description

State government fund plant capex and initial opex through either National or State level programs (like AMRUT). The plant is constructed and operated by a private player. Opex recovery from the government in initial period and thereafter by local government.

## Benefits

- **Govt. participation in capex funding incentivizes private participation**, with lower financial burden and project risks for the private player
- **Sustainable plant operations** since implementation responsibility is with the private operator

## Challenges

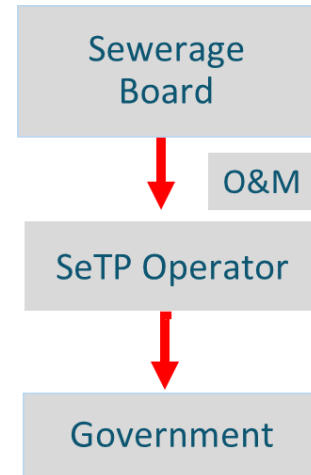
- **Requires allocation of public funds for FSSM capex** which requires advocacy
- **Long term sustainability may be a challenge**, if there is dependency on O&M financial support from state government
- The **limited role of ULB** in implementation and monitoring may challenge sustainability.
- Need to assess **ULB financial capacity** to finance Opex of treatment plants.

## Applicability

Relevant where Government has some funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective.

# Odisha- State government funded treatment plant

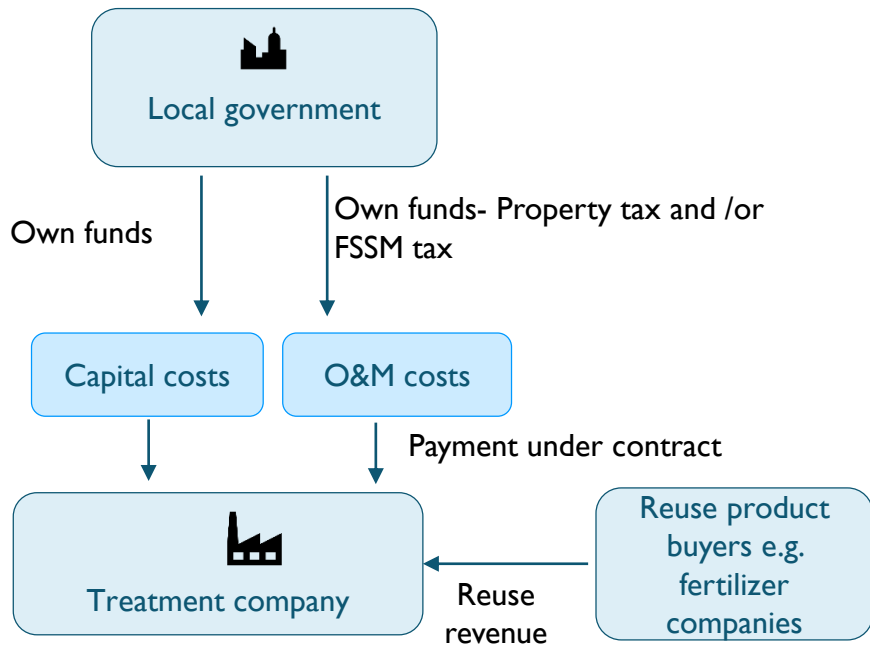
- In Odisha, AMRUT program (National government program) funding was used to build FSTPs (septage management) in 9 cities.
- Odisha Water Supply and Sewerage Board (OWSSB) (State level agency) carried out design, manage construction and O&M contracts for FSTPs. The Role of ULB is limited to allocation of land for FSTPs.
- O&M cost for 5 years through AMRUT program.
- Odisha Water Supply and Sewerage Board (OWSSB) floated tender on lump-sum contract basis to invite private sector to build and Operate treatment plants.



# Different business model prototypes for treatment

- 1 Philanthropic funded treatment facility (e.g. Wai, Narsapur, Warangal)**  
*Treatment plant capex and initial Opex by philanthropic and Operations by private*
- 2 State government funded through national/ state programs for capex and opex (eg: Odisha, Chhattisgarh, UP)**  
*Treatment plant capex by state government, Opex by State or local government and Operations by private*
- 3 Local Government funded for capex and opex (eg: Sinnar and Umred in Maharashtra)**  
*Treatment plant capex and Opex by local government and Operations by private*
- 4 Partially funded by private sector and state government and operated by private (similar to HAM) (Eg: Andhra Pradesh and Telangana)**  
*Treatment plant capex by private and state government; and Opex by state government and Operations by private*

# Treatment prototype 3: Local Government funded for capex and opex



## Primary capex financier

Local government

Local government fund treatment plant capex and opex through own funds.

## Operating agency

Private player

A private player operates the plant, working under an O&M contract with the local government

## Opex funding

Local government

Opex recovery from sources such as local government and reuse revenue

## Contract structure

Service contract

The private operator enters into service contract with local government to construct and operate the treatment plant

## Model description

Local government through its own funds finance the treatment plant capex and opex cost. The local government tender out the construction and O&M to private player. Opex recovery is from the local government own funds. The other sources of Opex recovery also includes reuse revenue, though its contribution is very less, given the low development of reuse market.

## Benefits

- **Govt. participation in capex funding incentivizes private participation**, with lower financial burden and project risks for the private player
- **Sustainable plant operations** since implementation responsibility is with the private operator
- **Low implementation burden on governments**, since the private player is responsible for operations

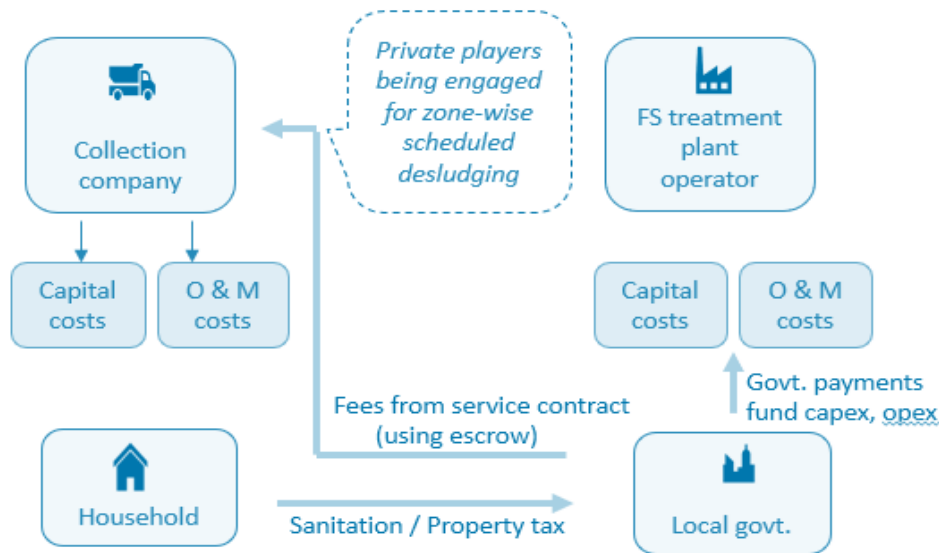
## Challenges

- **Requires allocation of public funds for FSSM capex**
- Need to assess **ULB financial capacity** to finance Opex of treatment plants.
- **Reuse markets are nascent**, market creation and linkages needed

## Applicability

Relevant where Government has funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective.

# Sinnar, Maharashtra- Local government funded treatment plant



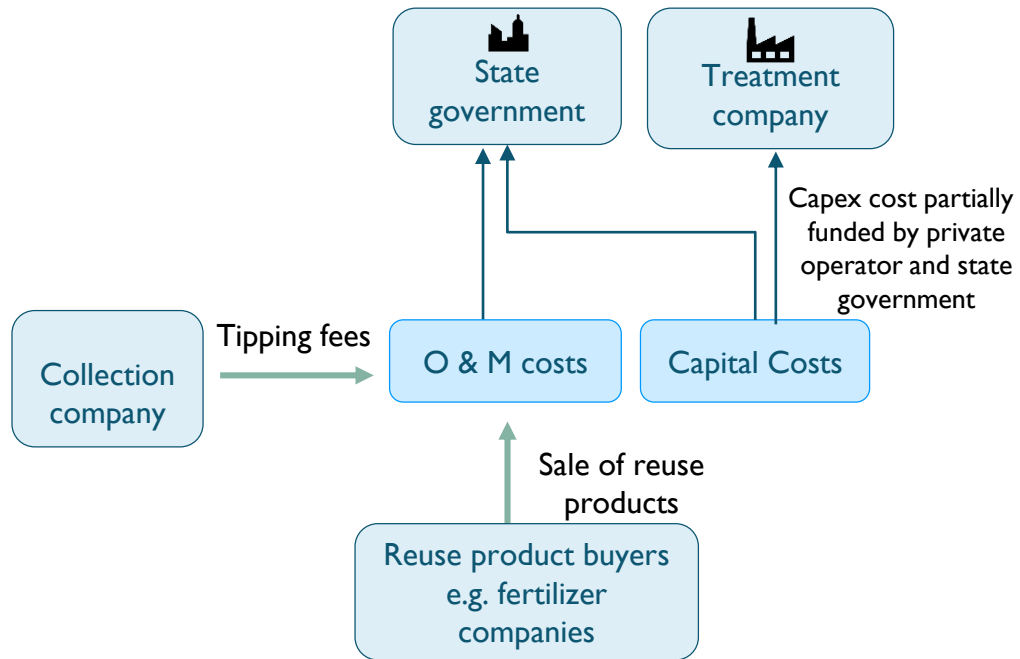
- Sinnar is the first city in India to fund an FSTP through ULB own funds (14<sup>th</sup> FC funds).
- Key success factor is relatively strong ULB finances, to support this model
- Private operator is selected through DBOT tender.
- Private operator is responsible for construction and/or operation of treatment plant
- Plant O&M to be funded by ULB through sanitation tax and property tax.
- Model can be easily implemented in most of small-medium cities in Maharashtra



# Different business model prototypes for treatment

- 1 Philanthropic funded treatment facility (e.g. Wai, Narsapur, Warangal)**  
*Treatment plant capex and initial Opex by philanthropic and Operations by private*
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*Treatment plant capex by private and state government; and Opex by state government and Operations by private*

# Treatment prototype 4: Partially funded by private sector and state government and operated by private



## Model description

The private enterprise funds plant capex fully or partially with the rest borne by the government. Private enterprise also undertakes construction, operation and maintenance of a treatment plant. The private sector capex cost will be repaid by the government in the form of annuity payment over the O&M period.

## Benefits

- **Reduces the capex burden** for governments, since the operator bears upfront costs with subsequent recovery from the government
- **Sustainable plant operations and maintenance** since implementation responsibility is with the private operator and part capex cost will be returned over the O&M period
- Funding by **State government** alleviates concerns around individual ULB financial capacity and payment risks

## Challenges

- **Difficulty in finding medium-large players** with the financial and technical capacity
- This will **discouraged small players** since their financial capacity will not be enough to finance the part capex cost

## Applicability

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

### Primary capex financier

Private player and State government

The private operator funds plant capex, partially with the rest borne by the government.

### Operating agency

Private player

The plant is operated by a private player, working under an PPP contract with the state government.

### Opex funding

State government

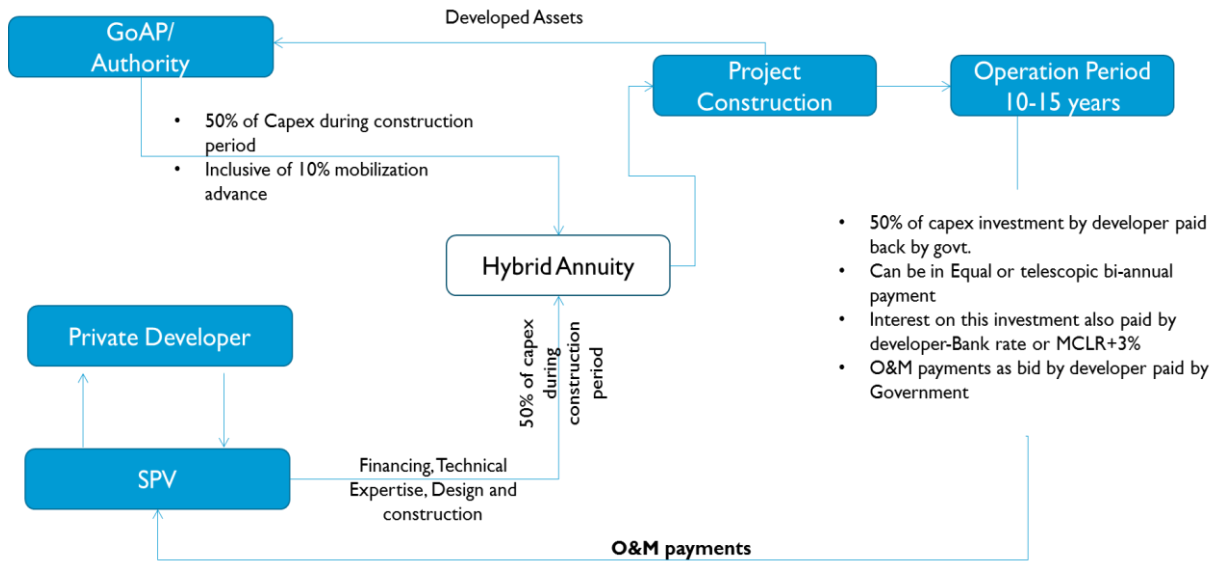
Opex recovery from state government. Annuities payments covering part capex cost and Opex cost to private operator.

### Contract structure

PPP contract

The private operator enters into performance based finance contract with the state government

# Andhra Pradesh and Telangana- Hybrid Annuity Model for treatment



HAM model proposed through city clusters for

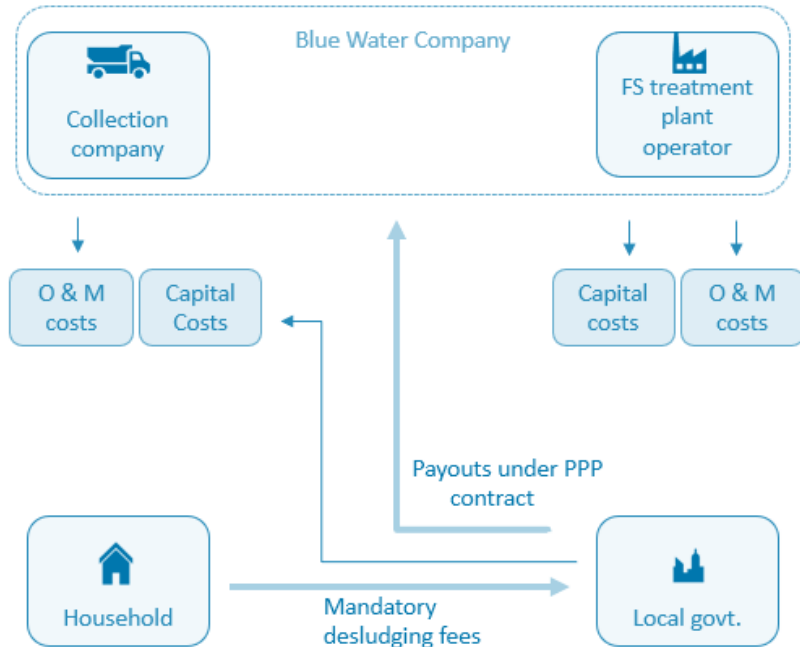
**76 ULBs in AP**

**72 ULBs in Telangana**

- 50% of capex investment by developer paid back by govt.
- Can be in Equal or telescopic bi-annual payment
- Interest on this investment also paid by developer-Bank rate or MCLR+3%
- O&M payments as bid by developer paid by Government

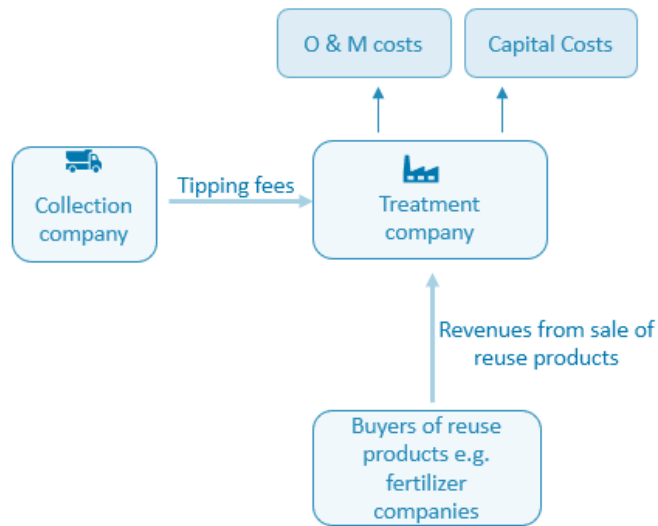
- Private companies - undertake construction, operation and maintenance on a DBOT basis. Cost determined by bidding
- CapEx – 50% by government , 50% by private company
- Annuity payments cover a) CapEx repaid through annuity payments over contract period, b) and OpEx
- Funding by Funding by Swachh Andhra Corporation supported through the state budget alleviates concerns around individual ULB financial capacity and payment risks
- Private player clustering approach (multiple ULBs per partner) to achieve scale economies and a large contract
- Private player responsible for selling soil conditioner/bio-fertilizer/biogas and recycled wastewater. In the long term, part opex recovery planned through user charges

# Leh- Privately funded treatment plant



- Blue Water Company (BWC) has design, finance, build and operate the FSTP on the land provided by the Leh Development Authority.
- Five year contract (cleaning and treatment).
- User charges (hotels at INR 3500 and HHs at INR 1000 per year) are collected by Blue water company and gives 10% of fees to Leh local government.
- Treated water to be used for children's park on next plot.
- Inclusive Services: Cross-subsidize cost of FSM services to poorer households through higher fees from hotels and guesthouses.

# Vietnam- Privately funded treatment plant



- Treatment plant is owned and run by the Hoa Binh fertilizer company.
- The company has built its own FS treatment plant.
- FS is separated from wastewater, and then dried into biosolids and dried sludge. The dried sludge is sold for fertilizing crops, while the biological sludge is sold to the wastewater treatment company.
- Desludging operators (both government and private) pay the fertilizer company for depositing FS, at the rate of approx. USD 1.46 for each truck depositing FS.
- Current revenue is limited due to illegal dumping of sludge by private operators.
- Relevant model to consider going forward in our focus states, especially where reuse markets are better developed.

# Assessing treatment business models across various factors

Prototype	State financial and implementation capacity needed	ULB financial capacity needed	ULB implementation and monitoring capacity needed	Need for private participation	Payment burden on HHs
<b>1. Philanthropic funded treatment facility</b>	<b>Nil</b> Only permission is required from state/ local government	<b>Medium</b> Nil at initial stage but high post handover as they require to provide opex funding	<b>Nil</b> at inception stage but may increase over the long term post handover of treatment plant	<ul style="list-style-type: none"> <li>• <b>Medium</b> if pvt. player only does O&amp;M</li> <li>• <b>High</b> if pvt. player also undertakes design/construction , or opex</li> </ul>	<b>Nil</b>
<b>2. State government funded through national/ state programs for capex and opex</b>	<b>High</b> Require capex for treatment and initial period (3-5 years) opex	<b>Medium</b> Only partial funding will be required from ULB however later full opex funding will be required from ULB	<b>Medium</b> Monitoring by ULB	<b>High</b> Construction and operations of treatment plant	<ul style="list-style-type: none"> <li>• <b>High</b> – if FSSM taxes or user charges are opex recovery sources</li> <li>• <b>Nil</b> in other situations</li> </ul>
<b>3. Local Government funded for capex and opex</b>	<b>Low</b> Allocation of adequate funds under state or national programs to local government	<b>High</b> Require funding for capex and Opex for treatment	<b>High</b> Funding, monitoring and opex recovery by ULB	<b>High</b> Construction and operations of treatment plant	<b>Medium-Low</b> If FSSM taxes or user charges are opex recovery sources
<b>4. Partially funded by private sector and state government and operated by private</b>	<b>Medium-</b> if partial capex funding and opex through state government Nil- else	<b>Medium-</b> if partial capex funding and opex through local government Nil- else	<b>High</b> Funding, monitoring and opex recovery by ULB	<b>High</b> Finance, Construction and operations of treatment plant	<b>Medium- Low</b> If FSSM taxes or user charges are opex recovery sources

# Treatment business model prototypes

Business model prototypes	Examples	Benefits	Challenges	Applicability
<b>1. Philanthropic funded treatment facility</b>	Wai, Narsapur, Warangal	Plugs the funding gap for new treatment technologies and models,; No financial or implementation burden on governments	Philanthropic funds are 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, driven by the recognition that reuse / tipping fees are unlikely to fund all or a significant proportion of opex. Opex funding is short / medium term, local governments may need to take over thereafter
<b>2. State government funded through national/ state programs for capex and opex</b>	Odisha, Chhattisgarh, UP	Govt. participation in capex funding incentivizes private participation; Sustainable plant operations	Requires allocation of public funds for FSSM capex; Long term sustainability may be a challenge; limited role of ULB	Relevant where Government has some funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective
<b>3. Local Government funded for capex and opex</b>	Sinnar and Umred in Maharashtra	Govt. participation in capex funding incentivizes private participation; Sustainable plant operations; Low implementation burden on governments	Requires allocation of public funds for FSSM capex; Need to assess ULB financial capacity to finance Opex of treatment plants.	Relevant where Government has funding capacity but limited operating capacity and where private sector participation is considered important from a operations perspective
<b>4. Partially funded by private sector and state government and operated by private (similar to HAM)</b>	Andhra Pradesh and Telangana	Reduces the capex burden for governments; Funding by State government alleviates concerns around individual ULB financial capacity and payment risks	Difficulty in finding medium-large players with the financial and technical 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

# Treatment business models: Key observations 1/2



**Government funding is important, but philanthropic funding can be useful in initial stages**



- Since there is limited commercial return potential, government funding would remain the dominant source of funding for treatment facilities.



- Since many technologies are in an early stage and inadequate experience exists, philanthropic or CSR funding can support pilots and demonstration projects. It can also help enhance project quality through quality monitoring and zero energy systems as well as to develop these as resource centres.



- Hybrid annuity model may have the potential for bringing in private sector investment ...however it is still in early/ exploring stage for sanitation treatment.



# Treatment business models: Key observations 2/2



**Opex funding for treatment is critical for sustainability and will need careful attention, as well attention on resource recovery for the future**

- Philanthropic organizations do provide opex support, but usually for a limited time while demonstrating the viability of pilots.



- Reuse revenues require developed markets and market linkages. As these are at relatively nascent stage, more advocacy and innovation will be needed to develop these markets. Innovative efforts developed with SWM composts ('Harit compost') will need to be assessed. Successful PPP projects for wastewater reuse such as in Nagpur for power plants, will also need to be assessed for applicability. The Government of Maharashtra's Wastewater Reuse policy requires electricity distribution centres and MIDCs falling within 50k to use the treated water from urban areas.



- The option of tipping fees is also difficult in most cases, due to negative incentives to private operators to dump outside.



- Thus, the opex costs will need to be mainly funded from local government sources. Plant selection (through tendering) can also emphasize low opex expenditure to the extent possible. Measures such as



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- Overview of private sector presence across the 4 States
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### 5. Applicability of business models

- Applicability of business models in four states
- Recommendations for business models

## Annexes

# Integrated business models for conveyance and treatment



- Integrated models offer efficiencies, convenience and easier contracting with the same player responsible for operations across the value chain
- An integrated contract offers interesting options for opex funding of conveyance and treatment from households – as a bundled price can be implemented efficiently
- However, dependency on a single player (1) compounds risk of non-performance, and (2) crowds out existing smaller players, which can impact implementation as existing markets are disrupted and players displaced
- Scheduled desludging may be more conducive for integrated players given that it offers predictability of operations in conveyance. This also means that opex recovery is typically from taxes and tariffs.
- Market information and subtle nudges along with technical assistance might be required to increase the number of players in the market who are willing and able to actively participate in both stages. Platforms to actively cultivate partnerships should be encouraged.

# Integrated business model prototypes for conveyance and treatment

- 1 Integrated model for scheduled desludging and treatment (e.g. Leh, J&K)**  
*Same private firm operates both desludging and treatment service for one city*
- 2 Integrated model with a cluster based approach (e.g. Thongthawil Service Co. Ltd, Thailand)**  
*Same private firm operates both desludging and treatment service for a group of nearby cities*

# Integrated business model prototypes for conveyance and treatment

1

## **Integrated model for scheduled desludging and treatment (e.g. Leh, J&K)**

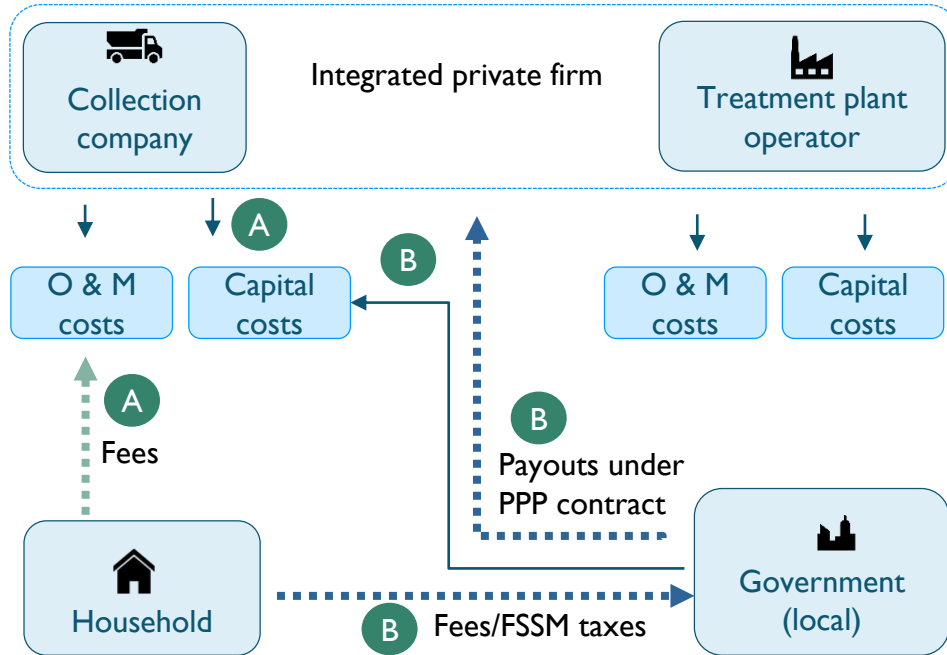
*Same private firm operates both desludging and treatment service for one city*

2

## **Integrated model with a cluster based approach (e.g. Thongthawil Service Co. Ltd, Thailand)**

*Same private firm operates both desludging and treatment service for a group of nearby cities*

# Prototype I: Integrated model for scheduled desludging and treatment



## Primary capex financier

Private player/  
government

The private operator funds treatment plant and truck capex, partially with the rest borne by the government.

## Operating agency

Private player

Both desludging operations and plant is operated by a private player, working under an PPP contract with the state government.

## Opex funding

Government

Opex recovery from local government and through user charges.

## Contract structure

PPP contract

The private operator enters into performance based finance contract with the state government

## Model description

The same private firm operates both desludging and treatment service in the city. The treatment facility and trucks may be funded by the government or by private sector fully or partially. Recovery could be from the government (PPP contract) or from desludging charges. Desludging charges from HHs are the source of opex funding for conveyance and Treatment. Charges are collected directly by the operator (user charges) or indirectly through the government (FSSM taxes) which then pays the operator.

## Benefits

- **Integrated models** offer efficiencies, convenience, and easier contracting, with the same private provider.
- In an integrated approach, there is incentive for the operator to bring all collected FS to the plant for treatment.

## Challenges

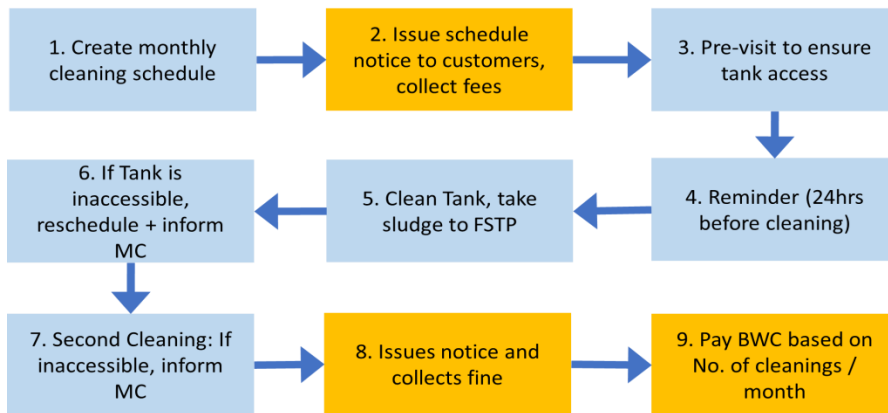
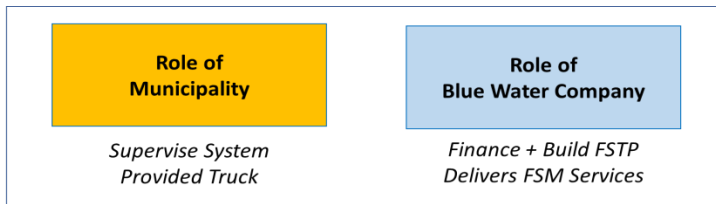
- Dependency on a single player (1) compounds risk of non-performance, and (2) crowds out existing smaller players

## Applicability

Relevant in areas where there are private players with capacity to manage both treatment and desludging operations.

# Leh, J&K- Integrated model for scheduled desludging and treatment 1/2

LDA and Blue water Company have entered in 5 year Public Private partnership contract for scheduled desludging and treatment of faecal sludge in Leh with a population of 45,000. High presence of hotels and tourists



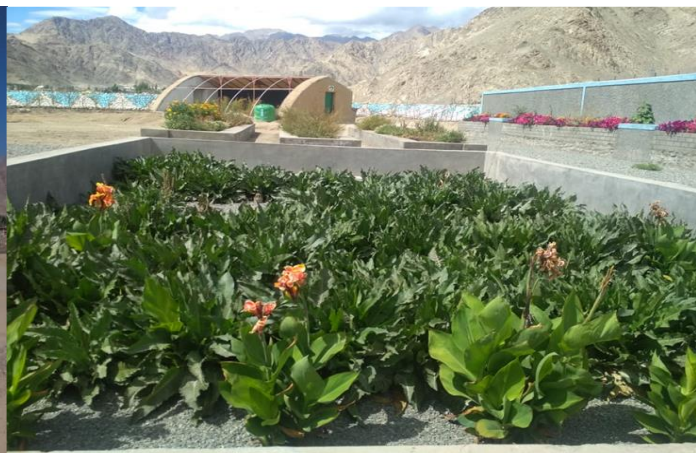
## Integrated PPP contract for scheduled emptying and treatment

- Blue Water Company (BWC) will design, finance, build and operate the FSTP on the land provided by the LDA
- Municipality will give its suction truck which will be operated by BWC at its own costs
- Five year contract (cleaning and treatment)
- Municipality will collect user fees, with help from BWC
- 90% of fees paid to BWC after service is delivered
- Treated water to be used for children's park on next plot
- Inclusive Services: Cross-subsidize cost of FSM services to poorer households through higher fees from hotels and guesthouses



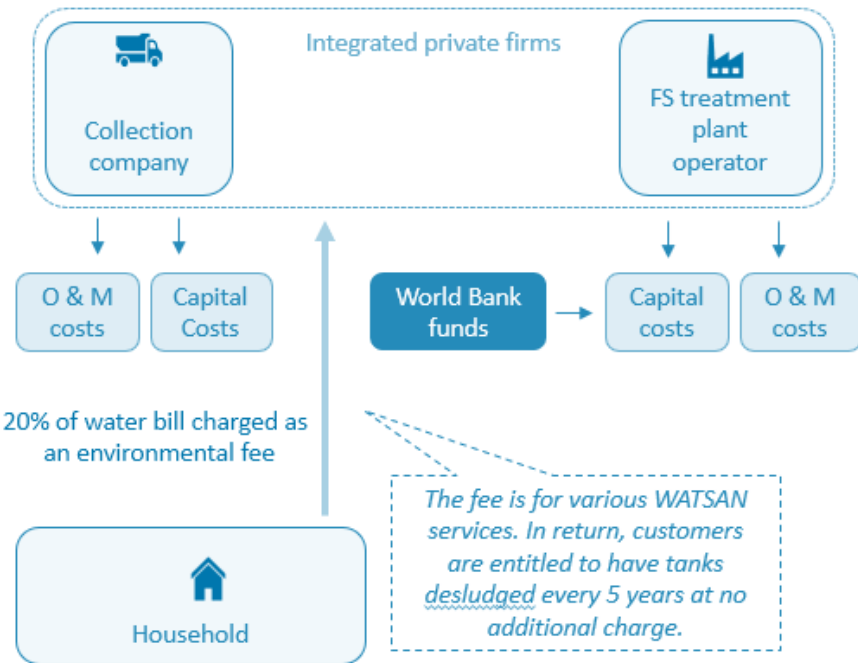
# Leh, J&K- Integrated model for scheduled desludging and treatment 2/2

- Over 2.6 Million liters of Faecal Sludge collected and treated
- Trips increased from 6-8 trips/month to about 80-100 trips /month
- Only 25% of septic tanks are easily accessible—extra time is planned to access narrow streets and open tanks, also an off-board pump near septic tank and can push septage from 100m distance
- Cold in nights—pipes break, septic tanks freeze – adjusted work duration
- Had to replace the LDA truck which broke down often, also added a smaller 2000 liter truck





# Manila, Philippines- Integrated model for scheduled desludging and treatment



- Conveyance and treatment are handled by two private entities who operates in different city zones.
- Integrated model with treatment plants also handled by the same players
- Both companies operate under a concession agreement with the Metropolitan Waterworks and Sewerage System (MWSS), which was formed as a governmental organization in 1971, and privatized in 1997
- They achieve the desludging mandate using a combined fleet of almost 200 desludging trucks and five mechanized faecal sludge treatment plants.
- Plants operated by private players. Three plants funded with World Bank loans, fourth by one of the private entities. Funds for treatment capex and opex are covered through tariffs charged as 20% of the water bill
- Currently, scheduled desludging services are provided for some customers (MWSI estimate is 30 percent), while on demand services are available for all customers.
- Tariffs are set by law to allow these companies to cover capital and operating costs, with some built in profit

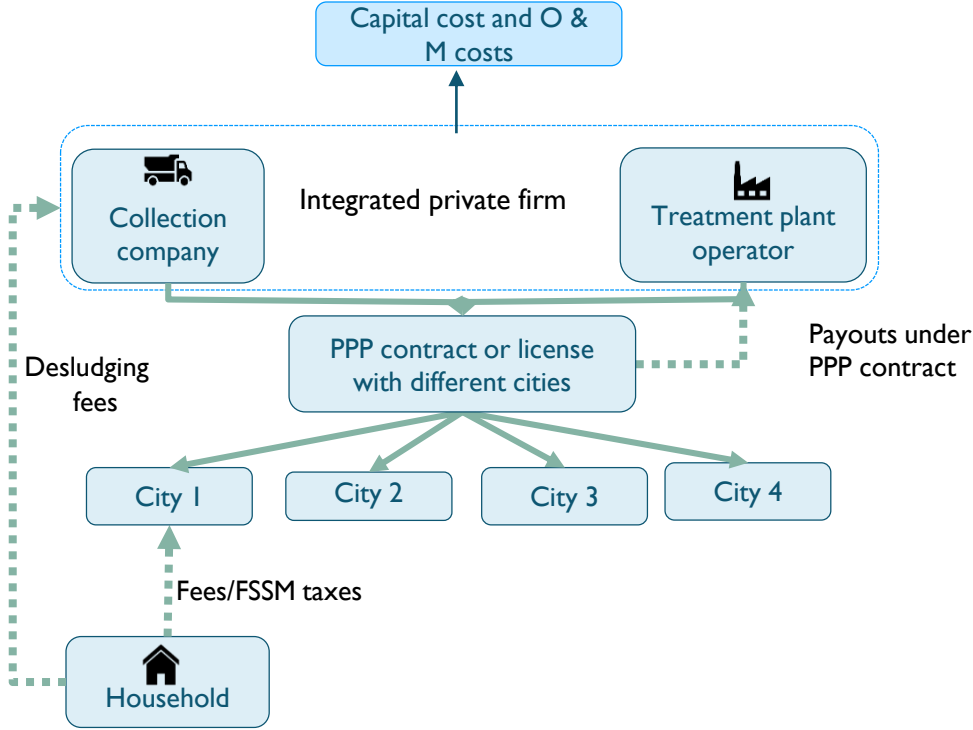
# SIBEAU, Cotonou, Benin - Integrated model for desludging and treatment

- The private truck operators formed an association called Union des Structures de Vidange, which was constituted in 1995 at the initiative of SIBEAU.
- (SIBEAU), a local private company, is involved in the collection, transport and treatment of septage.
- The treatment plant started operations in 1994, 13 km to the east of Cotonou, serves other places too.
- HHs pay operators between US\$ 55 to 75 for a truck of 6 m<sup>3</sup>; and from US\$ 120 to - 150 for a truck of 12 m<sup>3</sup>; average of US\$ 11 / m<sup>3</sup> FS.
- All vacuum truck operators are required to register with SIBEAU, but do not require a license from the City Council.
- Truck operators pay treatment plant US\$ 2.62 / m<sup>3</sup> FS + US\$ 1.67 per trip to SIBEAU + US\$ 2.25 to city authorities, next to insurance and car tax (no license fee).
- SIBEAU treatment plant designed to treat 180 m<sup>3</sup> of septage per day using waste stabilization ponds, no financial support from the government
- Sludge collected in the ponds are stored on-site and sold on request as a dry fertilizer to farmers.

# Integrated business model prototypes for conveyance and treatment

- 1 Integrated model for scheduled desludging and treatment (e.g. Leh, J&K)**  
*Same private firm operates both desludging and treatment service for one city*
- 2 Integrated model with a cluster based approach (e.g. Thongthawil Service Co. Ltd, Thailand)**  
*Same private firm operates both desludging and treatment service for a group of nearby cities*

# Prototype 2: Integrated model with a cluster based approach



## Model description

The same private firm operates both desludging and treatment service for a group of nearby cities. The treatment facility and trucks are funded by the private sector fully or partially. Recovery is mainly from desludging charges and partial from the government (PPP contract). Charges are collected directly by the operator (user charges) or indirectly through the government (FSSM taxes) which then pays the operator.

## Benefits

- Cluster approach can provide efficiencies and cost recovery for treatment facilities

## Challenges

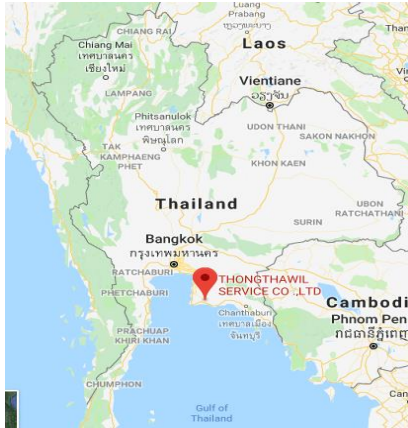
- Co-operation among cities, efficient road connections

## Applicability

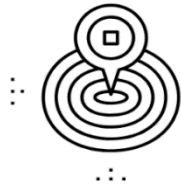
Relevant in areas where there are private players with capacity to manage both treatment and desludging operations. Also where the nearby cities are willing to come together for a cluster approach; or where a private provider has the capacity to work with several nearby cities.

Primary capex financier	Operating agency	Opex funding	Contract structure
Private player/ government	Private player	Government	PPP contract
The private operator funds treatment plant and truck capex, partially with the rest borne by the government.	Both desludging operations and plant is operated by a private player, working under an PPP contract with multiple local governments.	Opex recovery mainly through user charges and from local government	The private operator enters into integrated contract with the group of nearby cities.

# Thailand- Integrated model with a cluster based approach (Thongthawil Service Co. Ltd)



Population  
3,98,656

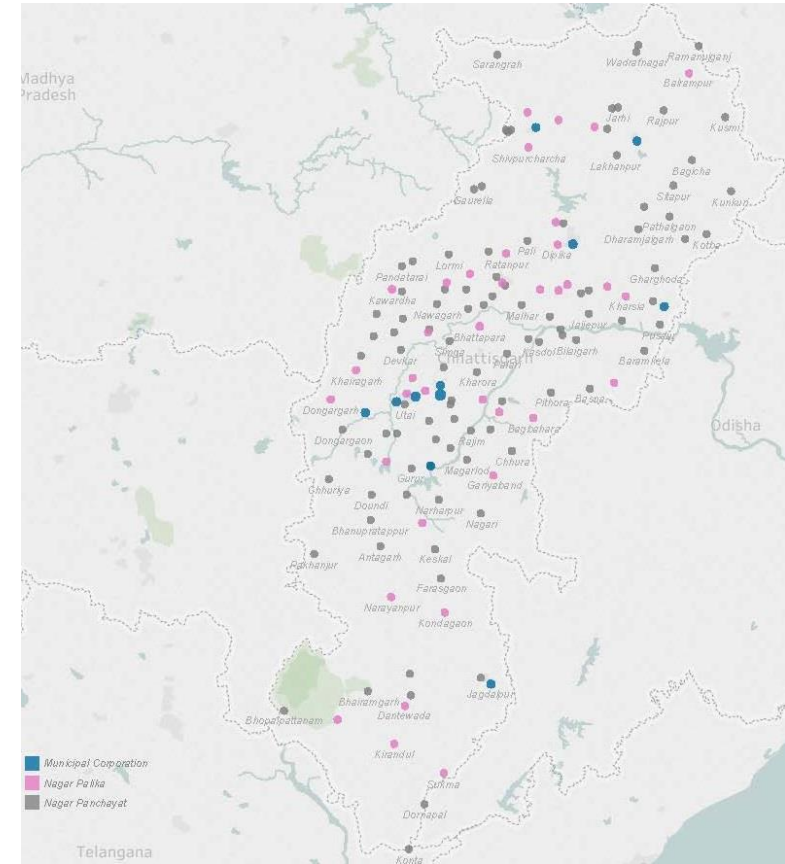


Service Area  
440 sq. km

- Thongthawil Service Co. Ltd (TSCL) located in Rayong province provides services for septage desludging and treatment in **two municipalities** and **8 sub-district organizations**
- Same private firm operates both desludging and treatment service for a group of nearby cities.
- **Desludging**
  - TSCL has a separate license for emptying and treatment in all these municipalities under the 1992 Public Health Act
  - It has 15 trucks and average 10-12 trucks serve daily, Services are provided for 365 days
  - Customers directly call TSCL for desludging services. They have a QR code on each truck where customer can directly send an online request for emptying services
- **Treatment**
  - Treatment plant is owned by the TSCL private agency
  - Each municipality provides an annual license to TSCL, and the company collects a license fee for providing treatment services
  - TSCL charge only industrial domestic waste for providing treatment services under Factory act. Around 40% customers are from industries.

# Chhattisgarh- Cluster based integrated approach treatment plant for small cities

- State has already started planning for cluster based faecal sludge treatment plant for non AMRUT ULBs.
- Initially, district wise clusters were formed but distance wise it's not feasible for all ULBs.
- Now they are preparing clusters in 15 – 20 kms distance and will also fix 3 – 4 non-mechanized treatment technology for non-AMRUT towns.
- State authority will rolled out tender to invite single private player for both desludging and treatment. The capex and 10 years Opex cost will be inbuilt in bid and will be funded by state government.
- In AMRUT towns, treatment plants are constructed through national program funding for both Capex and Opex.



# Assessing integrated business models across various factors

Prototype	State financial and implementation capacity needed	ULB financial capacity needed	ULB implementation and monitoring capacity needed	Need for private participation	Payment burden on HHs
<b>1. Integrated model for scheduled desludging and treatment</b>	<b>Nil</b>	<b>High</b> Full or Partial funding for capex and full funding for opex	<b>Medium</b> Monitoring and Opex cost recovery by ULB	<b>High</b> Private player undertakes design/construction, and operation and full or partial financing of treatment and trucks	<b>High</b> User charges or FSSM taxes for cost recovery
<b>2. Integrated model with a cluster based approach</b>	<b>Medium</b> Permission and/ or SPV arrangement is required involving state government	<b>Medium</b> Partial funding for capex and full funding for opex	<b>Medium</b> Monitoring by ULB	<b>High</b> Finance, Construction and operations of treatment plant and trucks	<b>High</b> User charges or FSSM taxes for cost recovery

# Integrated business models and prototypes

Business model prototypes	Examples	Benefits	Challenges	Applicability
<b>1. Integrated model for scheduled desludging and treatment</b>	Leh, J&K	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	Relevant in areas where there are private players with capacity to manage both treatment and desludging operations.
<b>2. Integrated model with a cluster based approach</b>	Thongthawil Service Co. Ltd, Thailand	Cluster approach can provide efficiencies and cost recovery for treatment facilities	Co-operation among cities, efficient road connections	Relevant in areas where there are private players with capacity to manage both treatment and desludging operations. Also where the nearby cities are willing to come together for a cluster approach; or where a private provider has the capacity to work with several nearby cities.



# Integrated business models: Key observations



## ***Preferable option from government perspective***

- From the ULB perspective a single operator for conveyance and treatment may imply ease and simplicity of reporting and monitoring,

## ***Limited number of private player for integrated options***

- Currently there are limited private players who have capacity to manage both conveyance and treatment operations. Integrated approach will require to cultivate partnerships among players in treatment and desludging to work together.

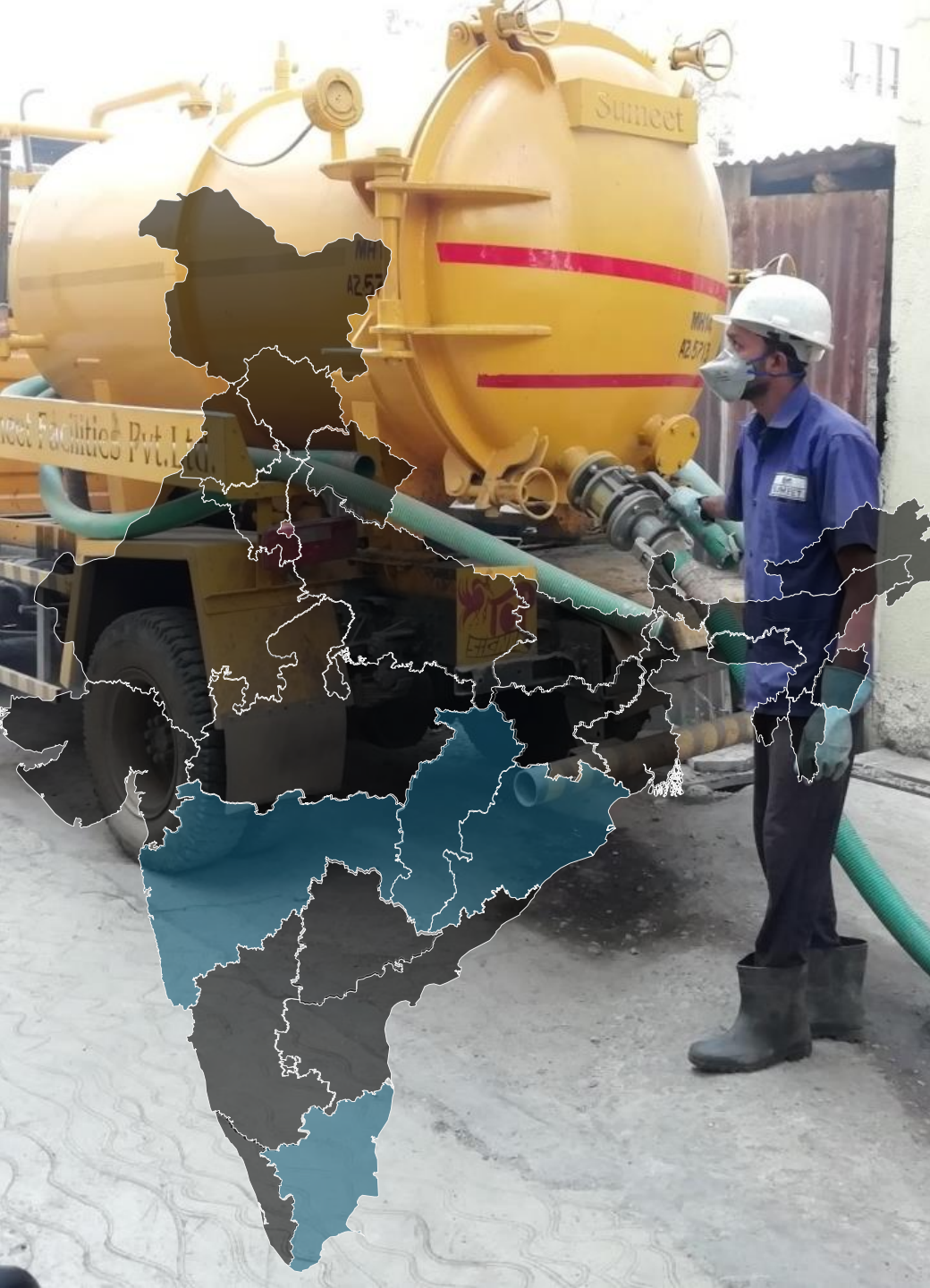


- Thus, from the perspective of private providers, integrated contracts maybe be difficult as very few private enterprises are in both areas of business, and thus they have to take on work which may not be their forte, or form consortia. In this process, it may lead to crowding out of expertise of smaller independent service providers.



## ***Opex funding could be explored***

- An integrated contract offers interesting options for opex funding of treatment from households – as a bundled price can be implemented



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- Overview of private sector presence across the 4 States
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### 5. Applicability of business models

- Applicability of business models in four states
- Recommendations for business models

## Annexes

# Need for landscape study of private sector service providers

- Given the **limited technical and financial capacity of ULBs**, the role of private sector will be crucial in implementation of citywide FSSM services. The **private sector can bring in benefits of operational efficiency and at times, even financial resources** that can complement local government efforts.
- Small and medium towns have a **sizable market potential** for private sector engagement in sanitation. Tapping into this opportunity will also help **ULBs address internal capacity constraints** and enhance sanitation services.
- For this, a **landscape study** of the private sector is important **to build mutually beneficial business models** for FSSM. Discussions with private service providers will also help to outline the measures needed to improve private sector participation and service delivery.

# Interviews with private sector service providers were done to assess their potential role in FSSM and in different business models

The study focused at three aspects for exploring private sector participation in different business models for conveyance and treatment



## Landscape of operators

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- Who are the private operators in FSSM and parallel sectors such as SWM?
- Specifically, what are the roles, activities, enterprise sizes, and scale of operations of players for conveyance and for treatment - along the FSSM value chain?



## Plans and interests

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- Are private operators interested in expanding their roles, scale, or geographies of operation in FSSM?
- What are their specific preferences and underlying reasons?



## Inducements and constraints

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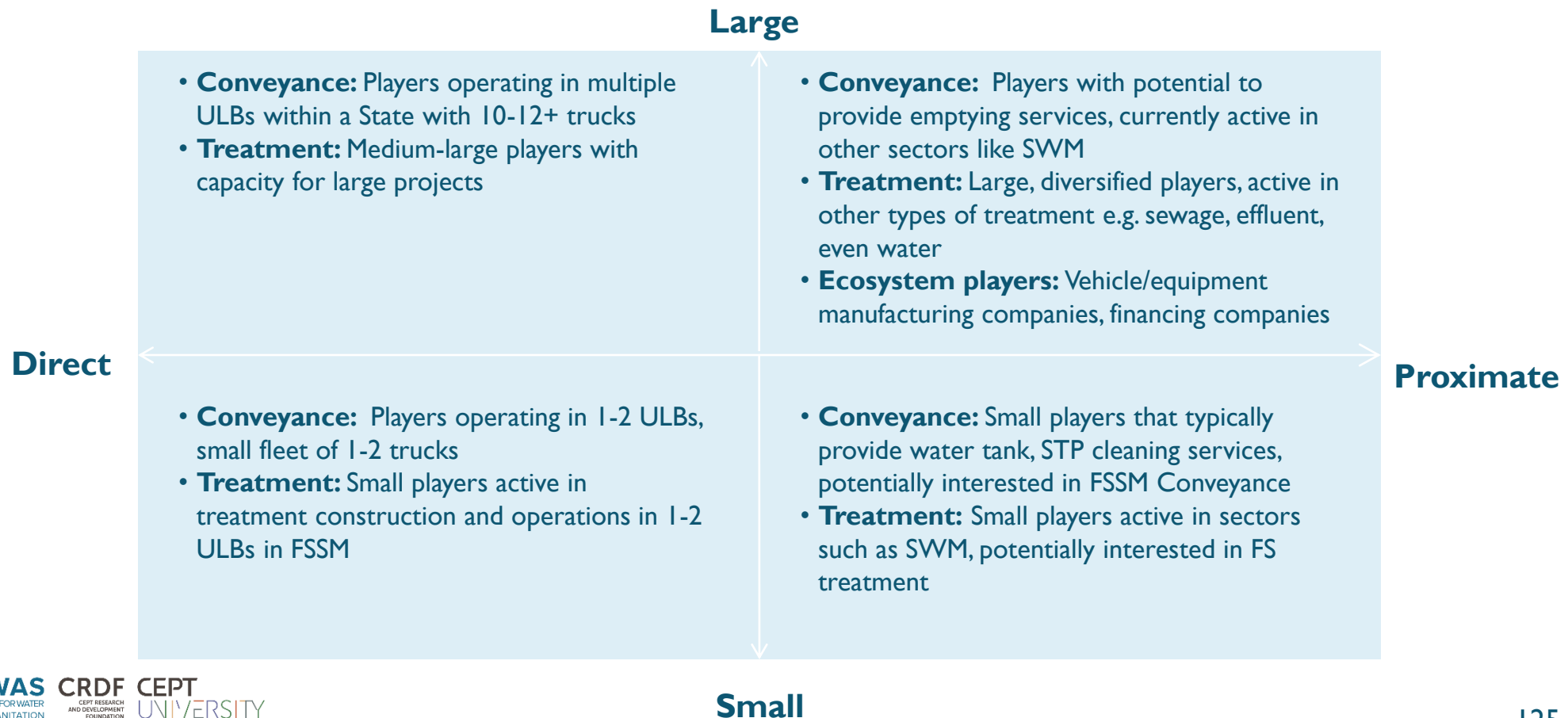
- What are the constraints faced or anticipated in achieving these plans?
- What inducements are needed to unlock value for private operators and enable participation at scale?

# Players in the sample across states can be classified according to size and segment of focus

**1 Size** refers to current status in terms of infrastructure availability, financial capacity, and employee strength, geographical reach and capability to expand

**2 Segment of focus** refers to the services that the player offers, essentially whether it is a direct or proximate player

## Prototypes and typical types of players found in each prototype



# List of private players interviewed across four states

## - a mix of conveyance players and treatment players

State	Large/medium-direct	Large-proximate	Small-direct
<b>Maharashtra</b>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• 3S/Saraplast</li> <li>• Sumeet Group</li> <li>• KK All Services</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• Panse Consultants</li> <li>• Tide Technocrats</li> <li>• Shivam Water Treaters</li> <li>• Blue water company (integrated player)</li> </ul>	<ul style="list-style-type: none"> <li>• Urja Biosystems</li> <li>• Kam Avida</li> </ul>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Govind Cleaning Services</li> <li>• Kadam Enterprises</li> </ul>
<b>Tamil Nadu</b>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Moorthy Septic Tank Cleaning</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• AIGA Engineers</li> <li>• Shivam Water Treaters</li> <li>• RTI</li> </ul>	<b>Treatment</b> <ul style="list-style-type: none"> <li>• Kings Industries</li> <li>• AP Engineers</li> </ul>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Individual with own business in Coimbatore</li> </ul>
<b>Odisha</b>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Om Construction</li> <li>• Two individuals businesses – one with 10 trucks and capacity to expand to other ULBs; other with 4 trucks but multiple businesses e.g. SWM in Odisha and elsewhere</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• Mother Blessing Construction</li> </ul>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Vedika Resources</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• Bhawani Enterprises</li> <li>• Health and Care Enterprises</li> </ul>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Himalaya Clean and Care</li> </ul>
<b>Andhra Pradesh</b>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Shiva Sai Septic Tank Cleaners</li> </ul> <b>Treatment</b> <ul style="list-style-type: none"> <li>• Tide Technocrats</li> </ul>	<b>Treatment</b> <ul style="list-style-type: none"> <li>• Ecoicons</li> <li>• Mahindra &amp; Mahindra</li> <li>• Ramky</li> </ul>	<b>Conveyance</b> <ul style="list-style-type: none"> <li>• Mudavat Srinu Septic Tank Cleaner</li> <li>• One individual with own business in Vijayawada</li> </ul>

# Maharashtra findings: Widespread presence of private providers along with ULB own systems for conveyance (1/2)



Target	Landscape/Context	Gap / Requirement
Scheduled desludging across the state using a PPP (or PSP) model with private sector	<ul style="list-style-type: none"> <li>Mix of public and private desludging trucks, with ~56% ULBs owning trucks, and rest with private operator trucks</li> <li>Emerging class of large private players e.g. 3S Shramik operates across the value chain, Sumeet Group, a diversified conglomerate also operates in the desludging space</li> <li>Many cities now show active interest of private players for conveyance</li> <li>For Wai and Sinnar, a private player has been contracted for citywide scheduled desludging based on an open bidding process</li> </ul>	<p>Approx. 600 private trucks are needed by 2022, a large increase beyond current scale.<sup>1</sup></p> <p>Increased private participation is particularly needed in cities which do not have their own trucks – selection between PPP/PSP models</p>

Operator plans / Scalability	Challenges
<ul style="list-style-type: none"> <li>Small and medium players are more willing to expand the business and do scheduled emptying compared to big players</li> <li>Many showed willingness in taking up FS treatment locally.</li> <li>Many private providers indicated willingness to travel up to 50 km for emptying</li> </ul>	<ul style="list-style-type: none"> <li>Small players would required financial assistance to take up citywide contracts</li> <li>In general, more awareness among private providers is needed about potential opportunities through scheduled emptying, and build their capacities for this</li> <li>Availability of human resources for driver and helper positions</li> </ul>

## Name: Kadam Enterprise

**Geographic focus:** 150 km radius in the Pune, Satara districts

**Business Scale:** Operates one truck of 3.5 kl capacity, that cleans ~60-70 tanks per month

- Customers:** Industrial estates and households in nearby villages
- Payment structure:** ~INR 1700 per trip; **Expected return:** ~ INR 50,000 – 75,000 in operating profit per truck per month

### Interest in business opportunity:

*“At present I am providing desludging service in the entire Satara district. Yes, I can procure a truck and operate it on the regulated schedule. Also I would like to get involved in treatment business if government pays some % of construction and O&M cost.”*

For Maharashtra, initially 8 private players were interviewed.....  
Later for understanding their interest in scheduled emptying, telephonic interviews of 41 private players were conducted

1. Based on estimate of 1445 trucks needed by 2022 for full coverage, of which 40% will be private trucks. Current estimate of 59 licensed private operators across ULBs.

Source: Analysis by CEPT based on Dalberg interviews

# Maharashtra findings: Treatment will require many proximate players coming forward (2/2)



Target	Landscape/Context	Gap / Requirement
<p>Faecal sludge treatment plant or co-treatment with existing /planned STP/FSTPs across all cities in Maharashtra</p>	<ul style="list-style-type: none"> <li>Private players will be sought for upcoming FSTPs in more cities in Maharashtra going forward to construct and to operate.</li> <li>Proximate players (STP, SWM) Panse Consultants, Urja Biosystems – have technical capacity but will need to be supported and induced.</li> </ul>	<p><b>Over 200 additional FSTPs are needed to provide coverage for all ULBs in the state. Increased private participation is needed to build and operate plants, and for capex and opex funding</b></p>

Operator plans / Scalability
<ul style="list-style-type: none"> <li>Direct operators are interested in expanding to other locations, but may start to face capacity constraints</li> <li>Proximate players, particularly STP operators, are also interested in FSTPs e.g. Shivam Water Treaters, Panse Consultants.</li> <li>Large EPC players active in wastewater and solid waste can be specifically directed towards to the emerging FS treatment opportunities eg: Urja biosystems private limited</li> </ul>

Challenges
<ul style="list-style-type: none"> <li>Medium sized players may face capacity constraints to expand without financial support</li> <li>Lack of detailed understanding of FSSM among proximate players, including some large players.</li> <li>Large proximate players are likely to be interested only in taking up projects at scale e.g. multiple treatment plants at a time</li> </ul>

## Name: Panse consultants

**Geographic focus:** Across India

**Business Scale:** Involved in STP construction, FSTP construction of Sinnar and Umred (planned)

### Interest in business opportunity:

*“I am interested in expanding FSTP practice business across India. I was interested in AP FSTP project, but bundling of FSTPs in packages appears more favourable to large enterprises. The small enterprises like us may not have adequate financial capacity for it. My only concern is late payment of O&M from ULB. I am also interested in expanding my business in conveyance of FS.”*



# Tamil Nadu findings: Conveyance operations can be scaled through the existing operators (1/2)



Target	Landscape/Context	Gap / Requirement
State strategy for scheduled or demand based emptying	<ul style="list-style-type: none"> <li>Private players' presence is common in many ULBs of Tamil Nadu.</li> <li>Most trucks are operated by small scale private players who previously engaged in non-mechanized desludging but have now upgraded to mechanized vehicles.</li> <li>Actual statewide numbers of trucks with ULBs or private sector, or the number of operators are not available.</li> </ul>	<p><b>Approx. 1200 private trucks are needed by 2022 substantially more than current coverage.<sup>1</sup></b></p>

Operator plans / Scalability	Challenges
<ul style="list-style-type: none"> <li>Some small players do not want to expand geographically, but are interested in treatment since they are familiar with STP cleaning</li> <li>Proximate players that do want to expand in conveyance seek financial assistance and credit</li> </ul>	<ul style="list-style-type: none"> <li>Large players such as Ramky (SWM) may not have sufficient knowledge of FSSM requirements to engage in a structured manner</li> </ul>

## Name: Moorthy Septic Tank Cleaning

**Geographic focus:** Pondicherry, Chennai, and Cuddalore

### Business Scale:

- Operates 3 trucks of 5.5 kl capacity, that cleans ~15 tanks per day
- Customers:** Households septic tanks and nala cleaning
- Payment structure:** ~INR 1500-3000 per trip depending upon the distance travelled

### Interest in business opportunity:

“At present we do not have any concrete plans to increase the fleet size and do not plan to serve other locations. We are interested in treatment but are concerned about the land issues that come along with it.”

For Tamil Nadu, 5 private players were interviewed and 9 interviews were conducted with state TSU members, government officials, etc.....

1. Based on estimate of 1290 trucks needed by 2022 for full coverage, of which 95% will be private trucks.  
Source: Analysis by CEPT based on Dalberg interviews

# Tamil Nadu findings: Treatment will require a focused inducement plan (2/2)



Target	Landscape/Context	Gap / Requirement
FSTPs in all cities along with co-treatment at existing STP	<ul style="list-style-type: none"> <li>Many direct and proximate operators. Direct players include Shivam Water Treaters, AIGA Engineers</li> <li>Some proximate players operate nationally but are headquartered in the state e.g. Kings Engineers and AP Engineers</li> </ul>	<p><b>Approx. 284 FSTPs are needed to provide coverage, 2 are coming up.</b></p> <p><b>Increased private participation is needed to build, operate and support funding</b></p>

Operator plans / Scalability	Challenges
<ul style="list-style-type: none"> <li>Existing FSTP operators are interested in more FSTP construction contracts</li> <li>Proximate players have also exhibited interest in FSTP construction</li> </ul>	<ul style="list-style-type: none"> <li>Small direct players will need significant capacity augmentation to scale up operations quickly</li> <li>Proximate players will require nudging and facilitation to ease entry into the treatment stage. Large contracts covering several plants are likely to induce interest.</li> <li>Late payment by government has been raised as an issue by private operators</li> </ul>

## Name: Shivam Water treaters

**Geographic focus:** Tamil Nadu, Gujarat, Maharashtra

**Business Scale:** Involved in STP construction, grey water, FSTP construction of Tamil Nadu

### Interest in business opportunity:

“I am interested in expanding our STP/ FSTP construction business. Geographic location is not a issue. However, there are sometimes delay of payment from the client, which causes cash flow issues. We are not interested in expanding in conveyance as local players are strongly present in it”.

## Name: AP Engineers

**Geographic focus:** Tamil Nadu,

**Business Scale:** Involved in wastewater and effluent treatment, water treatment

### Interest in business opportunity:

“I am interested in FSTP construction. We are not interested in becoming an integrated player because we feel we may face capital constraints. We believe we can sell reuse outputs eventually, but will need to create a market for them.”

# Odisha findings: Underdeveloped ecosystem that will need catalysis to scale. Access to finance and appropriate tender design at scale are key (1/2)



Target	Landscape/Context	Gap / Requirement
Increased participation of private players with appropriate PSP type business model for scheduled emptying	<ul style="list-style-type: none"> <li>Limited private participation observed in Odisha.</li> <li>ULBs across the state own 209 trucks. Recently, the State government offered incentives by buying and leasing trucks (~86 trucks) for 57 ULBs.</li> <li>Presence of private players is found only in 6-7 Municipal Corporations (Bhubaneswar shows maximum presence of private operators with 40 trucks).</li> </ul>	<b>Approx. 40 private trucks are needed by 2022, a large increase beyond current levels.<sup>1</sup></b>

Operator plans / Scalability
<ul style="list-style-type: none"> <li>Some small players do not want to expand, comfortable with location-specific operations</li> <li>Players that do want to expand seek financial assistance, including for tender deposits (~INR 3 lakhs).</li> <li>A few players have shown interest in building and operating treatment plants</li> <li>Proximate players e.g. water tank cleaners, have opportunities to expand, as their clients often also seek septic tank cleaning services</li> </ul>

Challenges
<ul style="list-style-type: none"> <li>Direct players that have leased trucks from ULBs, seek financial assistance to expand. They face challenges since financing companies do not finance deposits (to be provided to the ULB) as the private sector players do not own the trucks and hence there is no collateral</li> </ul>

A private operator in Odisha  
**Geographic focus:** Bhubaneswar  
**Business Scale:** Operates 10 trucks and cleans ~45 tanks per day  
**Payment structure:** ~INR 900 per trip  
**Interest in business opportunity:**  
 “Do not want to expand to places where we do not have personal presence. There is more competition in Bhubaneswar than before. There are small private operators in small towns and it is difficult to compete with small operators because they clean at a cheaper rate.”

For Odisha, 8 private players were interviewed and 5 interviews were conducted with state TSU members, government officials, etc.....

# Odisha findings: Underdeveloped ecosystem that will need catalysis to scale. Access to finance and appropriate tender design at scale are key (2/2)



Target	Landscape/Context	Gap / Requirement
FSTPs in AMRUT cities	<ul style="list-style-type: none"> <li>FSTPs design, finance and O&amp;M carried by state level agency (OWSSB)</li> <li>There are a few direct and proximate players operating in Odisha. Players are relatively smaller compared to other states. Six private operators are involved in FSTP construction in AMRUT cities</li> <li>Proximate players are involved in effluent, sewage, and water treatment, and do not understand FSSM well</li> </ul>	<p>Approx. 96 FSTPs are needed to provide coverage, 9 are coming up. Increased private participation as treatment plants beyond AMRUT cities are planned</p>

## Operator plans / Scalability

- Ongoing private participation in upcoming FSTPs. The direct player in our sample is building an FSTP in Sambhalpur and has constructed one STP previously

## Challenges

- Lack of detailed understanding of FSSM among proximate players, including some large players.

### Name: Mother Blessing Construction

**Geographic focus:** Only Odisha

**Business Scale:** 30 KLD FSTP in Sambhalpur, water treatment plant

**Interest in business opportunity:**

“Only work in Odisha, and do not have plans of expanding geographically. Not interested in cleaning and transport, or in operations for the FSTP. We are civil contractors and do not want to operate treatment plant”.

### Name: Bhawani Enterprises and Health N care enterprise

**Geographic focus:** Odisha

**Business Scale:** Effluent treatment – sewage

**Interest in business opportunity:**

“We are interested in FSTP business but are unfamiliar with FSSM. The company sees enough work for itself in Odisha and is not interested in expanding beyond the state”.

# Andhra Pradesh findings: Private participation in conveyance need to expand going forward and the state is seeking large players for treatment (1/2)



Target	Landscape/Context	Gap / Requirement
<p>Focus on demand-driven private sector run desludging in the medium term; plans to explore scheduled desludging in a few cities</p>	<ul style="list-style-type: none"> <li>• Predominance of private players across most ULBs in the state, most are small and unorganized. Size ranges from small (2-3 trucks) to larger players (~12 trucks)</li> <li>• Highly competitive market but players often self-regulate by allotting areas between themselves</li> <li>• Players use own funds or loan from financing companies to buy trucks.</li> <li>• However actual numbers of operators and trucks available with the ULBs is not known.</li> </ul>	<p><b>Approx. 800 private trucks are needed by 2022.<sup>1</sup></b></p> <p><b>Funding support needed for players wanting to scale in Conveyance or expand into treatment</b></p>

### Operator plans / Scalability

- Direct players often also undertake STP cleaning and are interested in building and operating treatment plants. Some are interested in geographical expansion for desludging operations.

### Challenges

- Ecosystem of entrenched players in a competitive market. Most are satisfied with the current on-demand model.

**Name:** Shiva Sai Septic tank cleaners  
**Geographic focus:** Throughout Telangana  
**Business Scale:**

- Operates 12 trucks with capacity between 5-11 kl that clean ~200-300 tanks per month
- **Customers:** Households septic tanks

**Interest in business opportunity:**  
 “Each new truck costs 25 lakhs and 10-12 lakh for used trucks. Received half of the funds for these trucks via bank/personal finance. We are interested to build treatment plant anywhere in Andhra and Telangana.”

For Andhra Pradesh, 6 private players were interviewed and 6 interviews were conducted with state TSU members, government officials, etc.....

# Andhra Pradesh findings: Private participation in conveyance need to expand going forward and the state is seeking large players for treatment (2/2)



Target	Landscape/Context	Gap / Requirement
FSTPs for 78 ULBs, co-treatment for 28 ULBs	<ul style="list-style-type: none"> <li>There are nationally present direct players in Andhra Pradesh, like Tide Technocrats.</li> <li>Proximate players are active in SWM e.g. Mahindra &amp; Mahindra, Cube Bioenergy, Jindal and can be induced to participate in large FSSM projects</li> </ul>	78 FSTPs need to be built as planned, an additional 4 to be planned. <sup>2</sup> Large players needed to build, operate, and support funding for 78 FSTPs

Operator plans / Scalability
<ul style="list-style-type: none"> <li>Large tenders and contracts issued by the State could induce large STP players</li> <li>Medium-small direct players may need financial support for capex and Opex to expand their business</li> <li>Large proximate players are not interested in entering waste treatment business eg: Mahindra and Mahindra</li> </ul>

Challenges
<ul style="list-style-type: none"> <li>Small players expressed their concerns about the Hybrid Annuity Model (HAM) and emphasized its biasness towards large enterprises as small enterprises may not have the capacity and finance to participate in the bids.</li> </ul>

**Name: TIDE technocrats**  
**Geographic focus:** Across India  
**Business Scale:** FSTP at Narsapur, Warangal, and Wai  
**Interest in business opportunity:**  
 “We are in thermal based faecal sludge treatment plant. The technology is in the testing phase. Capex and opex will have to get paid by government. The revenue is not enough to cover even the 100% opex cost.”

**Name: Ecoicons**  
**Geographic focus:** Andhra Pradesh  
**Business Scale:** industrial effluent treatment plant  
**Interest in business opportunity:**  
 “We are interested in a government contract for STPs/FSTPs. We can construct plants at city scale as well, but will need financing for projects above INR 1 cr in size.”

# Reflection on private sector in the FSSM value chain by State TSUs

“Mix of public and private desludging services are observed in Maharashtra. An estimated 200+ private service providers”

“ULBs do not usually give trucks to the private sector to operate, they operate trucks themselves. There is demand to engage the private sector in some cities. For Two cities of Wai and Sinnar, a private service provider has been contracted for citywide scheduled desludging based on an open bidding process.”

**-Maharashtra**

“Other than Chennai (Chennai Metro Water has their own trucks) and very few corporations, mostly private operators run trucks. Most trucks are operated by small scale private providers who previously engaged in non-mechanized desludging but have now upgraded to mechanized vehicles.”

“In these cities there isn't much variation on workings of financial and operations ops – all private, demand driven, one time fee collected, cost depends on distance. Requirements are truck licensing, equipment for private operators.”

**-Tamil Nadu**

“Presence of private service providers is found only in 6-7 Municipal Corporations (Bhubaneswar shows maximum presence of private operators with about 40 trucks), Other cities only have public services”

“There are monitoring issues when it comes to private operators, so GPS monitoring is needed. ULBs have had to fund this from their own money, but cities without smart cities grant are reluctant to do so.”

**-Odisha**

“Purely demand based service provided by private operators. The private sector needs effective business models to participate in treatment services.”

“Operators are empaneled according to the GO 134 guidelines. The operator has to apply to the ULB and is only allowed to operate within the ULB.”

**-Andhra Pradesh**



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# Conveyance: Active private participation due to strong business economics with increasing but cautious interest among proximate players (1/4)

## Landscape / Context

- There is a large spectrum of participation across the four States ranging from a large number of private operators in AP, strong private ecosystems in Maharashtra and Tamil Nadu. Though there is limited private sector participation in Odisha, the Government is making efforts to resolve this. In most cases private providers use their own funds, but a few have borrowed from financing companies e.g. Shriram Finance loans to finance trucks.
- **Direct – large and small players:** Small players typically operate in 1-2 ULBs with 2-4 trucks. Medium to large players operate in multiple ULBs with 10-12+ trucks. Predominance of small players noticed but also some emerging examples of medium-large players e.g. 3S Shramik (Maharashtra), Om Construction (Odisha), Shiva Sai Septic Tank Cleaners (Andhra Pradesh).
- **Proximate – large and small players:** Not much representation of proximate players for conveyance. Players often do not have adequate awareness of potential market scale and business opportunities of FSSM. Large players expected in SWM due to larger volumes and capacity needs e.g. truck/equipment manufacturing providers. (e.g. Kam Avida)

# Conveyance: Active private participation due to strong business economics with increasing but cautious interest among proximate players (2/4)

## Operator plans / Scalability

### Direct players

- Some players ready/plan to expand their conveyance operations in other cities, many want to build and run treatment plants.
- Existing informal players are ready to entered into formal contract with local government.

### Proximate players

- Proximate players in SWM, water tank cleaning are interested in FSSM. Large players (e.g. Ramky) have the capacity to enter and expand in the FSSM conveyance space.

## Challenges

### Direct players

- The most likely cost implication in emptying business is the varying fuel pricing and late payment by local governments (if contracted).
- Some smaller players have expressed concerns with access to finance as a hindrance to expansion.
- Lack of treatment facilities and disposal sites for collected faecal sludge
- Lack of availability of human resources for driver and helper positions for emptying service
- Technical capacity to manage adjacent businesses viz. treatment / reuse business is limited - would need to be developed to encourage across value chain expansion.

### Proximate players

- Limited understanding of available solutions, and market landscape, given the relatively low profile for FSSM, even among large proximate players like Ramky.
- Perceived to be a high risk business given significant government linkages and limited proof of concept.

# Conveyance: FSSM awareness generation, financing and citywide contract opportunities can catalyze greater participation by proximate players (3/4)

## Inducements needed / way forward

### Improved access to financing (across direct and proximate players)

- Increased linkages between small conveyance operators and SME and vehicle financing companies
- Potential for the establishment of government supported financing mechanisms to catalyze support for the sector

### Technical assistance

- Technical assistance and capacity development in relation to FSSM market opportunities and business economics among proximate players
- Technical support also needed by direct players to expand across value chain (e.g. in treatment, equipment manufacture etc)

### Contract structures

- For proximate players, the development of customized contracting structures which result in risk mitigation while they gain an understanding of the sector could enhance interest
- Bundled contracts across ULBs to attract large players for scheduled desludging – such players may be staying away due to the low size of investments currently

# Conveyance: FSSM awareness generation, financing and citywide contract opportunities can catalyze greater participation by proximate players (4/4)

## Inducements needed / way forward

### Monitoring Systems

- Call centers to streamline services for customers and organize private players. Proximate players entering the sector will need support with integration into existing markets

### Business models

- Regulatory push mandating regular desludging (whether through on-demand or scheduled desludging) will further increase demand, which will in turn support/incentivize existing or new players
- Contracting private players for scheduled desludging is easier to introduce in ULBs given the scale of business
- Leasing of vehicles from ULBs is relevant for smaller direct/proximate players without financial capacity

Treatment: Only a few existing players with a strong interest in expanding; proximate players have exhibited cautious optimism (1/4)

## Landscape / Context

- **Overall:** FS treatment is nascent, with some technologies being piloted by a few direct players. Many small-medium proximate players (eg: engaged in STP business) are interested in FS treatment.
- **Direct players:** Players have strong technical capacity. Many large players with financial capacity for large projects e.g. Ion Exchange, Panse Consultants, Shivam Water Treaters, AIGA Engineers.
- **Small-medium proximate players:** Includes STP, ETP and SWM plant operators active within states (e.g. Health & Care Enterprises - Odisha) or nationally (e.g. Kings Industries). Limited visibility of, and focus on the FSM space currently, though they do offer technical capacity.
- **Large proximate players:** Includes large established companies such as L&T, Gammon undertaking large infrastructure projects. Some are active in wastewater, sewage and effluent treatment e.g. L&T, but FS treatment does not seem to be on their radar.

# Treatment: Only a few existing players with a strong interest in expanding; proximate players have exhibited cautious optimism (2/4)

## Operator plans / Scalability

- **Direct players:** Enthusiastic to work on more FSTPs. All but one (Mother Blessing) in our sample are interested in working in any location nationally. Growth drivers include mandates of funders (e.g. Blue Water is funded by BORDA, who has a social mandate).
- **Small proximate players:** Most proximate players are prima facie interested in FSTP contracts, and have technical capacity but do not have any concrete plans to expand in the space, and have limited visibility on opportunity.
- **Large proximate players:** Likely to be interested in FS treatment projects – especially if scale can be determined through state level partnerships. The vast ramp up in investments in SWM serve as a proof of concept of future potential.

## Challenges

- **Direct players:** Dependent on creation of opportunities for FS treatment by States/ULBs – have limited ability to scale without state / non-profit support given the lack of commercial economics in the space.
- **Small proximate players:** In addition to the above, in certain cases (a) a lack of detailed understanding of FSSM (e.g. of SWM players) and (b) financial capacity for projects at scale, seem to be hindrances to participation e.g. Some smaller players may have difficulties with projects >INR 1 cr or so.
- **Large proximate players:** Participation needs availability of FS treatment opportunities at scale. Low awareness and understanding of markets is also a challenge.

Treatment: Clear planning along with stakeholder interaction and awareness generation, may result in catalysis of additional funds (3/4)

## Inducements needed / way forward

### Establishment of FSSM policy laying out clear plans, models and guidelines for contracts

- A clear FSSM plan laying out the state policy, plans for expansion, and contract structures would provide strong visibility and certainty to the private sector.
- Creation of a plan through extensive stakeholder interaction to ensure that the concerns of all stakeholders, including the private sector (e.g. concerns around economics, subsidies / financial support, land availability etc) are addressed.
- Critical to define clear guidelines for contracting structures. Creative structures that lead to scalable solutions (e.g. clustering of ULBs), and attract large players should be encouraged.

### Technical assistance and information

- Most proximate players lack awareness about the FSSM sector and would need to get significantly more understanding to begin participating in the sector at a large scale.
- Increased awareness of FSSM market opportunities and business economics among proximate players could be achieved through seminars, marketing events, workshops, etc.

Treatment: Clear planning along with stakeholder interaction and awareness generation, may result in catalysis of additional funds (4/4)

## Inducements needed / way forward

### Development of reuse markets

- The lack of financial returns and reliance on public support may be dampeners for some private players – however, the development of reuse markets through market development activities, and policy inducements can help reduce this reliance.

### Financing support

- Access to SME capital for Treatment would crowd-in several operators.
- Potential for the establishment of government supported financing mechanisms to catalyze support for the sector.



Overall recommendations: Local players can be supported and encouraged in conveyance while treatment requires increased awareness about opportunities among private players (1/2)

## Conveyance

- **Increasing awareness of the business opportunity:** The conveyance stage is quite profitable however it is treated as largely informal and the size of the opportunity is not fully understood by both local and non-local medium and large players. Dissemination and awareness activities are required for private enterprises in view of the nascent stage of the FSSM sector.
- **Call-center for conveyance services:** For the demand based desludging model, digitizing the process and making it as simple as ordering an Uber taxi will lead to a more demand responsive approach. However, the experience of a few models such as in Indonesia, Dakar, Kampala et need to be reviewed further.
- **Appropriate regulatory and policy guidelines at the state level to minimize risks:** In order to mitigate payment risks, there is a need for regulatory measures and formulation of guidelines at the state level for engagement of private sector. To better manage **risk of delayed payments**, more options need to be explored. Besides an 'escrow account with a contract fee reserve fund', there should be mechanisms for joint quarterly reviews of late payments, with a district or state level person of eminence identified jointly at the outset. Possibility of guarantee fund also need to be explored.
- **Bundled contracts:** ULBs can cluster together to offer larger conveyance contracts to induce larger operators with greater capacity for whom the volume of work in 1-2 ULBs may not justify the focus.
- **Scheduled emptying models for zones in large cities:** While many large cities have sewerage, there are always periphery areas or zones that depend on FSSM. For these, it would be useful to explore PPP contracts with performance linked annuity payments for 3-year zonal contracts.

Overall recommendations: Local players can be supported and encouraged in conveyance while treatment requires increased awareness about opportunities among private players (2/2)

## Treatment

- **A state level strategy for FSSM treatment at scale:** A clear sanitation strategy by States outlining how many FSTPs are being planned, clear guidance on technology and funding will greatly induce private operators to bid for such contracts.
- **Catalyzing reuse markets:** The operational cost for treatment is often difficult to recover through reuse revenue or user charges through tipping fees. This has to be mainly funded by local government. Reuse of treated sludge and water also requires developed markets, in view of the prevailing subsidies for chemical fertilizers. More advocacy and innovation is needed to develop these markets. Reuse needs to be planned from the outset.
- **Single city versus large multi-city tenders:** The average FSTP capex cost is too small to induce medium and large players who are used to significantly larger MSW / STP contracts. Governments should create bundled contracts with multiple cities to make this a viable opportunity for larger players. On the other hand, if the state / region has good small contractors to build and manage operations and maintenance, single city contracts with greater ULB ownership would be preferred.
- **Awareness and capacity building of private players:** FS technology is not that different and difficult but there are limited private enterprises available for this market. Capacity building for creating an awareness and demand for FSSM solutions is required at all levels
- **“Planning and data collection”** followed by scientific assessment, are important and necessary tasks. Lack of information is also major constraint for the private enterprises entering into this market. They would require further support and guidance.



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# Maharashtra: Scheduled desludging with PPP annuity model for conveyance and local government funded treatment model emerge as the strongest recommended prototype



## State level strategy/policy

- State government is in the process of developing a statewide FSSM strategy. For treatment, full capex support is expected from the state government and/or local government. Land for treatment is provided by ULBs.
- Local government is responsible for managing, monitoring and O&M funding of FSSM services
- There is recognition and policy recommendation for scheduled desludging
- Opex recovery is typically expected from local governments through sanitation and property tax
- Reuse options are being explored for treated wastewater and treated sludge.

## Local govt financial and managerial capacity

- ULBs in Maharashtra are relatively strong, both financially and in terms of ULB capability
- Local governments have strong property tax collection efficiency compared to other states, Cities can also introduce Sanitation Tax if FSSM services are provided, as has been done in the cities of Wai and Sinnar
- Thus, it will be easier for ULBs in Maharashtra to meet the opex requirements of FSSM, from their own sources.

## Presence of private sector service providers

- Private player capacity exists to cater to demand using their own vehicles
- Many ULBs also own trucks and can do PSP contracts for services
- A few medium players involved in desludging services showed willingness to also take up FS treatment
- Implementation of PPP performance linked annuity model for scheduled desludging in Wai and Sinnar- local govt funded and private operated treatment plant in Sinnar, and philanthropic funded plant operated by private operator in Wai.

# Tamil Nadu: Full private sector led desludging model for conveyance and state government funded clustered model for treatment emerge as the strongest prototypes



## State level strategy/policy

- State led approach.
- Conveyance for septage is expected to continue for demand-based desludging by private sector players.
- Treatment plants are to be established based on cluster based approach (covering nearby cities)
- Co-treatment method in place where STPs already exist
- The funding for these FSTPs is planned to be given by the state government, using funds from SBM, IUDM, etc. Opex costs will be borne by the ULBs.

## Local govt. financial and managerial capacity

- ULBs in Tamil Nadu have significant dependence on State Transfers; but the transfers are timely with regular devolutions from SFC. This has also made it possible to have the well functioning Tamil Nadu urban Development Fund.
- Property Tax Collections Efficiency is ~56%, situation worse in Municipal Corporations as compared to Municipalities
- Overall good capacity of local governments

## Presence of private sector service providers

- Private players' presence for desludging service is common in many ULBs of Tamil Nadu. The sector is totally demand based
- Private players have to register with the government every year and pay an annual fee of Rs. 2,000. Interviews suggest, however, that all operators are not registered.
- Opex is recovered through user charges by the private operators themselves. The user charges range from 1500 INR to 2500 INR per trip.
- Small private operators do want to expand operations geographically to other cities and financing doesn't seem to be a major concern.

# Odisha: Govt. owned vehicles leased to private player model for conveyance and state government funded treatment model emerge as the strongest prototypes



## State level strategy/policy

- Odisha follows a state led approach and a state agency (OWSSB) carries out all activities for design, implementation and monitoring of projects
- State allocated CaPex funds for trucks procurement; Treatment plants are funded through AMRUT Program grants (50% Centre and 50% State)
- OWSSB, a State agency, monitors construction, O&M and performance of FSTPs.
- The role of ULB is to provide land for FSTP. Majority of the functions are state led and ULBs seem to play a very small role in the overall process.

## Local govt. financial and managerial capacity

- Low capacity of ULBs with significant dependence on State Transfers
- Property tax collections efficiency is low as compared to other states
- State level agencies fund major projects in sanitation along with O&M management and also often provide opex funding.

## Presence of private sector service providers

- Limited private participation observed in Odisha.
- Government has issued tender for inviting private operators to operate the vehicles bought by the state government for the ULBs.
- User charges (Rs. 900 per trip) are collected from households to finance desludging opex
- Private operators are often not ready to do business in small cities and financing for one time earnest money deposit was a key constraint in applying for tenders.

# Andhra Pradesh: Full private sector led desludging model for conveyance and Hybrid Annuity Model (partial funding by private and partial by government) for treatment are the main prototypes being followed



## State level strategy/policy

- Conveyance for septage is being carried out by private sector players through on-demand desludging. This is expected to continue in the near future.
- GoAP has set-up Swachh Andhra Corporation(SAC), which is expected to also undertake FSSM planning.
- SAC has issued tenders to set up FSTPs under a Hybrid Annuity Model (50% capex through private and 50% capex through government).
- Swachh Andhra Corporation will monitor construction, O&M and performance of FSTPs
- The role of ULB is to provide land for FSTP. ULB will play a small role in the overall process. Majority of the functions are likely to be state led.

## Local govt. financial and managerial capacity

- In AP, cities are able to generate about 50% of the revenue through own sources.
- Public funds are not planned to be utilized for desludging. The state to ensure availability of funds and de-risk perceptions around ULB financial capacity, ULB revenues are not identified as a funding source for ongoing implementations.
- Property Tax Collections Efficiency is ~63%, however per capita property tax is very less in AP as compared to other states.

## Presence of private sector service providers

- Predominance of private players for desludging services across most ULBs in the state. Most players are small and unorganized.
- Players use own funds or loan from financing companies to buy trucks.
- Opex is recovered through user charges (Rs. 1000-2500 per trip)

# Applicability of conveyance models

Business model prototypes	Maharashtra	Tamil Nadu	Odisha	Andhra Pradesh
<b>Demand based desludging</b>				
1. Full Private model		●		●
2. Full government model		●		●
3. Government-owned vehicles leased to private players for operations	● Private player capacity exists using own vehicles. Low need for vehicles leased from ULBs		● Ongoing initiative to support private participation by leasing of State-owned trucks.... Preferred model for the long term	
<b>Scheduled based desludging</b>				
4. PPP Annuity model	●	●	●	
5. PSP Annuity model		●		●
6. Scheduled desludging on requisition	●		●	

Existing recognition in Wai and Sinnar and policy push for scheduled desludging makes this model most scalable

Currently prevailing model.... Seems to continue in near future. Strong presence of private operators makes this model most feasible

Though interest is low, TN ULBs can move to scheduled desludging with opex recovery from taxes

Relatively low levels of private participation, small players may not have adequate financial capacity for truck capex....Low tax collection efficiency

Strong ecosystem of private players in conveyance, competitive market Preference for continuing with the on-demand model



# Applicability of treatment and integrated models

Conveyance prototypes	Maharashtra	Tamil Nadu	Odisha	Andhra Pradesh
<b>Treatment Business models</b>				
1. Philanthropic funded treatment facility	●	●		●
2. State government funded through national/ state programs for capex and opex	●	●	●	●
3. Local Government funded for capex and opex	●		●	
4. Partially funded by private sector and state government and operated by private (similar to HAM)				●
<b>Integrated Business models</b>				
1. Integrated model for scheduled desludging and treatment	●			
2. Integrated model with a cluster based approach		●		●

This model is implemented in Sinnar....sustainable model for the long term, capex funding from the local govt. or state govt. ULB strong financial capacity

State plans to fund FSTPs using funds from SBM, IUDM, etc. Opex costs will be borne by the ULBs...

State is planning FSTPs based on cluster approach (covering nearby cities)

This model is being implemented in the 9 AMRUT towns.... sustainable model; however state needs to think of O&M beyond 5 years

FSTPs planned under a Hybrid Annuity Model....SAC will monitor construction, O&M and performance of FSTPs



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### 5. Applicability of business models

- Applicability of business models in four states
- Recommendations for business models

## Annexes

# Recommendations on business models – Conveyance (1/2)

- The key recommendation for Conveyance part of the FSSM service chain is to move towards scheduled desludging as it helps achieve the recommended regular desludging of septic tanks every 2-3 years, along with ensuring equity and inclusive implementation across all properties, the rich and the poor, residential and non-residential, and it does it at affordable rates. It also helps deliver desludging as a public service to all, while roping in the private sector for efficiency and additional resources.
- From a business model perspective, this could happen through various models ranging from a PPP approach with performance linked annuity model (PLAM), or with a PSP approach applied to PLAM with capital investments by the State Government or ULBs. In some cases, ULBs with strong internal operational capacity may also use the approach as a fully funded and operated public model.
- The emerging experience of the cities of Wai and Sinnar in Maharashtra in providing citywide scheduled services using a PPP model with a performance linked annuity model will need to be reviewed and emerging lessons incorporated while scaling up. It would be also useful to review the on-ground experience in other countries such as Indonesia, Vietnam and Philippines where variants of scheduled desludging models are being implemented.

## Recommendations on business models – Conveyance (2/2)

- **Maharashtra:** Based on the emerging experience of Wai and Sinnar in Maharashtra in providing citywide scheduled services using a performance linked annuity model has been recognized by the state in its draft FSSM policy. Maharashtra is also better positioned to move to scheduled desludging with good opex recovery from taxes, relatively strong financial and implementation capacities of ULBs.
- **Tamil Nadu and Andhra Pradesh:** On-demand desludging, with heavy private participation and opex recovery from user charges will continue for the near term, given the ecosystem of private players in conveyance and a current government preference for on-demand desludging. However, both States are well positioned to move to scheduled desludging with opex recovery from taxes.
- **Odisha:** The current model of on-demand desludging with public funding of emptying trucks can be linked to citywide or zonal scheduled desludging contracts. The government leasing of trucks to private players to encourage private participation in conveyance remains relevant but with performance linked annuity payment based contracts. These can be supported through local sanitation taxes, fees or intercepts from state transfers.

# Recommendations on business models – Treatment

- **All states:** Government funded treatment plants with O&M through a private operator, remains the most relevant model. Non-profit funding models remains relevant when new treatment technologies are being explored, but government funding is crucial for long term sustainability, particularly since commercial recovery from sale of reuse products is not yet viable.
- **Innovative financing models** can be explored as tried in Andhra Pradesh. The Hybrid Annuity Model is the step in the direction to revive private sector investment in treatment plants. It will be useful to watch the AP experience to assess the appetite for private sector funding. An area of concern could be a State entity managing and monitoring local services. Impact investment can be explored for treatment through a DIB /SIB structure.
- The **operational cost for treatment is often difficult to recover** through reuse revenue or user charges through tipping fees. This has to be mainly funded by local government. Reuse of treated sludge and water also requires developed markets, in view of the prevailing subsidies for chemical fertilizers. **More advocacy and innovation are needed to develop these markets.**

# Recommendations to improve business model performance 1/3

- **Invest in centralized helpdesks and data platforms:** For well structured business model prototypes identified in this research, good data is critical and ranges from city level information on properties, finances, land availability and characteristics etc are essential. ULBs need to be supported to have this data updated regularly. At the state level information across cities in terms of emerging opportunities, key city characteristics and finance allocations need to be mapped and regularly updated. Such an approach will also help the State Government and ULBs to identify appropriate business models at state and city levels.
- **Improved contracts for PPP/ PSP contracts:** For prototypes that have some form of private sector participation, contracts to capture service level agreements (SLAs) with performance linked features are needed. The currently used contracts need to be reviewed based on the ongoing experience and developed into model contracts. Efforts are required to reduce the risk of late payments by local governments to private sector service providers in form of some payment guarantee with support provided from the state government. It is important to review this issue across different contracts by ULBs to develop measures.
- **Encourage private sector participation through information, consultation and capacity building:** Engagement of the private sector in FSSM is still low, and participation is mostly observed in the emptying services as the ULBs fail to provide this key public service. For encouraging entrepreneurs/ private sector to enter this market, better information about emerging opportunities need to be made available. At the same time, capacity building support for private sector will also be needed.

# Recommendations to improve business model performance 2/3

- **Encourage social entrepreneurs in the conveyance stage:** Current social entrepreneur activity is restricted to the treatment stage whereas, in the coming years, thousands of trucks are needed across the four states.
- **Impact investment for sanitation:** Impact investment model such as Development Impact Bonds (DIB) or Social Impact Bonds (SIB) can be explored for urban sanitation particularly FSSM. After the CSR law, a lot of money is flowing into the social sector. An impact bond model could be one potential way of attracting these funds into urban sanitation. An instrument like a DIB allows for organizations to invest in urban sanitation. Investors who want both impact and profits in this sector can participate through impact bonds. Through DIB it is possible to introduce a rigorous monitoring system which is easily possible but somehow missing in the sanitation sector.
- **Address difficulties in access to good repair services in small and medium towns:** It is observed that trucks and their pumps often breakdown during emptying operation especially when sludge is too thick and not emptied for several years. Such breakdown requires quick repair services, which are often not available in small and medium towns. This hampers the emptying services for many days. This requires use of good quality trucks and quick access to repair services.

# Recommendations to improve business model performance 3/3

- **Encourage use of PPEs:** Awareness about use of PPE and training in their use will help protect worker health and may also help increase prestige of sanitation work.
- **Role of Women in Sanitation businesses:** It is important during the implementation of FSM activities that participation of all stakeholders is encouraged across the sanitation value chain. One of the major stakeholders in a city are the women's SHG groups which are formalized under the NULM mission in all cities. These SHG groups could be involved for FSM at various stages by the ULB for employment generation. Local community groups, Self-help groups (SHGs), etc. can also be involved in monitoring activities.
- **Access to funds for private enterprises:** For scheduled emptying and PPP based business models private providers will need access to capital finance. As sanitation finance is under priority sector lending, potential bankers need to be sensitized. For smaller firms benefits under SME funding, and interest rate subvention as being used by Grameen Capital for a DIB to reduce EMIs can be pursued.
- **IT based monitoring systems to help improve operational performance:** Performance of both emptying treatment services can be improved significantly with well-designed As an indirect benefit, this will also help improve prestige of sanitation workers,.





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## Abbreviations (1/3)

AIIB	Asian Infrastructure Investment Bank
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BMGF	Bill and Melinda Gates Foundation
Capex	Capital Expenditure
CSR	Corporate Social Responsibility
C-WAS	Center for Water and Sanitation
DBOT	Design Build Operate Transfer
DMF	District Mineral Funds
EAP	Externally Aided Program
ETP	Effluent Treatment Plant
FFC	Fourteenth Finance Commission
FSS	Faecal Sludge and Septage
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
GoI	Government of India
GoAP	Government of Andhra Pradesh
GoM	Government of Maharashtra
GoO	Government of Odisha
GoT	Government of Tamil Nadu

## Abbreviations (2/3)

HAM	Hybrid Annuity Model
IEC	Information Education and Communication
IUDM	Integrated Urban Development Mission
IWK	Indah Water Konsortium
JMP	Joint Monitoring Program
KLD	Kilo Liters per Day
MAUD	Municipal Administration and Urban Development
MAWS	Municipal Administration and Water Supply
MoHUA	Ministry of Housing and Urban Affairs
MUINFRA	Maharashtra Urban Infrastructure Development Co. Ltd.
ODF	Open Defecation Free
Opex	Operation and Maintenance Expenditure
OUIDF	Odisha Urban Infrastructure Development Funds
OWSSB	Odisha Water Supply and Sanitation Board
PPP	Public Private Participation
PSP	Private Sector Partnership
PSMBV	Program for Market Structuring of Faecal Sludge Management
PLAM	Performance Linked Annuity Model
SAAP	State Annual Action Plan

## Abbreviations (3/3)

SAC	Swachh Andhra Corporation
SBM	Swachh Bharat Mission
SDG	Sustainable Development Goal
SeTP	Septage Treatment Plant
SLB	Service Level Benchmark
STP	Sewage Treatment Plant
SWM	Solid Waste Management
TSU	Technical Support Unit
UDD	Urban Development Department
ULB	Urban Local Body
UNICEF	The United Nations Children's Fund
VGF	Viability Gap Funding
WHO	World Health Organization
WSUP	Water and Sanitation for Urban Poor

# Anne- I: List of interviews: Experts, staff of technical support units, government, funders, civil society

#	Name	Organization
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## Maharashtra

1	Dinesh Mehta, Meera Mehta, Dhruv Bhavsar, Aasim Mansuri, Jigisha Jaiswal, Dhvani Shah, Utkarsha Kavadi	CWAS, CEPT University (TSU of Maharashtra)
2	Utkarsha Kavadi	Director - RCUES, AILSG
3	Mahesh Harhare	Chief Resilience Officer, Pune

## Tamil Nadu

4	Gayathri, Kavita Wankhade, Srinithi Moopnar, Niladri Chakraborti	IIHS (TSU of Tamil Nadu)
5	Suresh Kumar, Rajesh, Vinitha	Keystone Foundation
6	R Murugan	TUFIDCO
7	Executive Officer of PNP and implementation staff at NNP near Coimbatore	
8	Site visit to the FSTP near Coimbatore and discussion with the site engineer and his staff	
9	K. Santoshkumar	Coimbatore City Health Officer
10	D. Rajendiran	TNUIFSL Senior Assistant VP

#	Name	Organization
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## Odisha

11	Bhawna Prakash, Sarith Sasidharan, Pritesh Nanda, Amol Nawathale, Avik	EY (TSU of Odisha)
12	Labanya Sabar	CFO Bhubaneswar Municipal Corporation
13	R Manivannan	OUIDF
14	PK Mohapatra	OWSSB
15	Sangramjit Nayak	SBM(U) Mission Director

## Andhra Pradesh

16	Dr. Malini Reddy, Prof. S. Chary, Manoj Mavuduri	ASCI (TSU of Andhra Pradesh)
17	D. Muralidhar Reddy	Swachha Andhra Corporation
18	Kanna Babu	Director of Municipal Administration, MD of APUFIDC

## PMU/Government

20	Jyoti Dash, Depinder Kapur	NIUA
21	Saket Kumar	KPMG



# List of interviews: Experts, staff of technical support units, government, funders, civil society

#	Name	Organization
<b>DFIs, funders</b>		
22	Raghava Neti	World Bank
23	Dr. Christoph Kessler	KfW
24	Janavi Papriwal and Disha	Aavishkaar
25	Dominique Carrie	Social Finance
26	Jack Robinson	Sorenson Impact
<b>CSOs/NGOs</b>		
27	Sujatha Srinivasan	IFMR
28	A. Kalimuthu	WASH Institute
29	VK Madhavan	WaterAid India
30	Shubhagato Dasgupta	CPR

#	Name	Organization
31	Dr. Hrudanand Mohanty, Rafiul Islam	Practical Action (India and Bangladesh)
32	Sasanka Velidandla	CDD Society
33	Paul Gunstensen	Stone Family Foundation
34	Chaitanya Krishna Rao	IWMI
35	Tom Outlaw	Clearwater Strategy Consulting
36	Foort Bustraan	Development Alternatives Incorporated
37	Stanzin Tsephel	BORDA
38	Sanjay Singh	PSI

## Annex-2: List of private players interviewed across four states - a mix of conveyance players and treatment players

State	Large/medium-direct	Large-proximate	Small-direct
Maharashtra	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• 3S/Saraplast</li> <li>• Sumeet Group</li> <li>• KK All Services</li> <li>• Kam Avida</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Panse Consultants</li> <li>• Tide Technocrats</li> <li>• Shivam Water Treaters</li> </ul>		<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Govind Cleaning Services</li> <li>• Kadam Enterprises</li> </ul>
Tamil Nadu	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Moorthy Septic Tank Cleaning</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Shivam Water Treaters</li> <li>• AIGA Engineers</li> </ul>	<p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Kings Industries</li> </ul>	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Individual with own business in Coimbatore</li> </ul>
Odisha	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Om Construction</li> <li>• Two individuals businesses – one with 10 trucks and capacity to expand from to other ULBs; other with 4 trucks but multiple businesses e.g. SWM in Odisha and elsewhere</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Mother Blessing Construction</li> </ul>	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Vedika Resources</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Bhawani Enterprises</li> <li>• Health and Care Enterprises</li> </ul>	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Himalaya Clean and Care</li> </ul>
Andhra Pradesh	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Shiva Sai Septic Tank Cleaners</li> </ul> <p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Tide Technocrats</li> </ul>	<p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Ecoicons</li> <li>• Mahindra &amp; Mahindra</li> </ul>	<p><b>Conveyance</b></p> <ul style="list-style-type: none"> <li>• Mudavat Srinu Septic Tank Cleaner</li> <li>• One individual with own business in Vijayawada</li> </ul>

# Illustrative profiles of private operators

Company	Description
<b>Maharashtra Private Operators- Conveyance</b>	
<b>3S Saraplast</b>	<ul style="list-style-type: none"> <li>• 3S is a brand owned by Saraplast, and is focused on innovative models for sanitation and waste management</li> <li>• Operating desludging services across a large number of ULBs</li> <li>• Saraplast is developing an app through which people can ask for private trucks for services.</li> <li>• developing an Uber type app. There are some issues such as if an external player starts operating but this can be sorted through commercial arrangements e.g. revenue sharing with local players etc. We also do sub-contracting where others will contract with us (like in Uber).</li> </ul>
<b>Sumeet Enterprises</b>	<ul style="list-style-type: none"> <li>• Multi-industry conglomerate with a presence in septic tank de-sludging, facility management, security services, engineering services, electronic security services, manufacturing, trading etc</li> <li>• Operates 8 desludging trucks in Pune.</li> <li>• In Wai and Sinnar provides scheduled desludging services. Contract with ULB for performing scheduled emptying for 3 years. An escrow model is being followed which will have a 3 month balance in funds for our payments.</li> </ul>
<b>KK all services</b>	<ul style="list-style-type: none"> <li>• He has 4 trucks for cleaning septic tanks, and mostly cleans businesses and corporation office tanks in Aurangabad.</li> <li>• He does not want to expand to other geographical areas because he has concerns about receiving payment.</li> <li>• He has paid cash for his vehicles, and isn't thinking about buying more.</li> <li>• Currently does not have plans to expand to different businesses.</li> <li>• He is interested in running an FSTP, but not in putting up any upfront capital for its construction.</li> </ul>
<b>Kam Avida</b>	<ul style="list-style-type: none"> <li>• Manufactures vacuum trucks and equipment, and has a pan India presence</li> <li>• Customers include civic bodies and private operators</li> <li>• Also operates and maintains vehicles in some areas, where it is required to do the same due to contractual requirements</li> <li>• Kam Avida operates around 100 trucks. Kam Avida applies for tenders to operate trucks. So O&amp;M is a part of these tenders. Kanpur, Delhi, Odisha, Indore</li> <li>• Pan India presence. Partnered with CDD in Devenahalli</li> </ul>
<b>Kadam Enterprises</b>	<ul style="list-style-type: none"> <li>• The company has 2 trucks of 3.2 kl capacity. They own their own trucks, and have three employees per vehicle.</li> <li>• Currently working in Satara and Pune districts, and interested in expanding, though there are no immediate plans</li> <li>• Paid for most trucks through a mix of own and loan funds. Receive loans from a bank and Chalamandalam Finance</li> <li>• Interested in FSTP construction and solid waste management, but have no immediate plans</li> <li>• Lack of awareness about fund raising seems to be a major constraint</li> </ul>

# Illustrative profiles of private operators

Company	Description
<b>Govind Cleaning Services</b>	<ul style="list-style-type: none"> <li>• He uses waterproof machines to remove water from holding tanks, and then manually removes the hardened or more solid material from the bottom of the tank.</li> <li>• He has 12 machines, each of which costs 90K INR. He rents out the sludge transporting trucks on an event by event basis</li> <li>• He has plans to buy tankers (and take out loans to do so), but hasn't acted on them.</li> </ul>
<b>Maharashtra Private Operators- Treatment</b>	
<b>Panse Consultants</b>	<ul style="list-style-type: none"> <li>• He has been involved in water and sewage treatment projects since 2004, and has over 300 clients</li> <li>• He works all over India and outside as well.</li> <li>• He does turnkey projects, financed by the government. The payment structure is determined on a project by project basis, as stated in the tender.</li> <li>• He is constructing an FSTP in Nashik, funded by the central government, with a capacity of 102 KLD.</li> <li>• He is interested in expanding his FSTP practice, and is agnostic about location.</li> </ul>
<b>Tide Technocrats</b>	<ul style="list-style-type: none"> <li>• Tide Technocrats provides faecal sludge treatment technology with significant reuse potential</li> <li>• Offer FSTPs utilizing their pyrolysis technology - reportedly produces valuable biochar</li> <li>• Their projects include treatment plants in Wai, Narsapur, and Warangal</li> <li>• They have a thermal faecal sludge treatment plant. The tech is in the testing phase. They are doing the field testing at Narsapur (DBFOT), Warangal (DBFOT), and Wai (DBFOT).</li> </ul>
<b>Shivam Water Treaters</b>	<ul style="list-style-type: none"> <li>• Shivam Water Treaters has provided liquid waste and water treatment technology for over two decades</li> <li>• Solutions include sewage treatment, drinking water treatment.</li> <li>• Their projects include working on the FSTP near Coimbatore.</li> <li>• They are doing work for TNP, Tamil Nadu and did tenders for FSTP in MH (Sinnar)</li> <li>• They have been given contract for 2 years for operating the FSTP, however they want to work for longer.</li> </ul>
<b>Tamil Nadu Private Operators- Conveyance</b>	
<b>Moorthy Septic Tank Cleaning</b>	<ul style="list-style-type: none"> <li>• The company has self-owned three trucks of 5.5 kl capacity. Two employees operate each vehicle</li> <li>• Currently working in Pondicherry, Chennai, and Cuddalore</li> <li>• The company engages in septic tank, nala, and water tank cleaning using the same equipment</li> <li>• No plans to expand to solid waste, and while they have expressed interest in faecal sludge treatment, they do not seem to understand the business well</li> </ul>

# Illustrative profiles of private operators

Company	Description
<b>Private Operator - I</b>	<ul style="list-style-type: none"> <li>• He used to own 13 trucks but sold 7</li> <li>• He has done this for 25 years and is part of the caste that does this business.</li> <li>• When competition increased they lost half their customers</li> <li>• They find it easy to get bank loans</li> <li>• They would lower their rates if government guaranteed them steady business</li> </ul>
<b>Tamil Nadu Private Operators- Treatment</b>	
<b>AIGA Engineer Treatment</b>	<ul style="list-style-type: none"> <li>• Active in water and wastewater treatment in Tamil Nadu but are considering expanding to Delhi and Uttar Pradesh</li> <li>• They have previously constructed 4 STPs and 3 industrial effluent plants, and are have constructed the 25 KLD FSTP in Karunguzhi.</li> <li>• They have expressed an interest in being involved in more FSTP projects</li> </ul>
<b>Kings Industries</b>	<ul style="list-style-type: none"> <li>• They manufacture sewage treatment plants, They supply effluent and water treatment plants as well. Hey have done 30-40 sewage treatment plants, which constitutes 10% of their business.</li> <li>• They have Turnkey contracts, where they handle design to execution of the project.</li> <li>• They can construct an FSTP with a capital outlay of 1 lcr per KLD. They are not particularly interested in conveyance and treatment, but don't mind doing so if they receive a proper contract.</li> <li>• They do not want to work with governments, however, because they assume that they will have difficulty being paid and will have to hand out bribes. They may be interested if there escrow mechanism in place. They are interested in working with philanthropic organizations.</li> </ul>
<b>AP Engineers</b>	<ul style="list-style-type: none"> <li>• They engage in wastewater treatment, effluent treatment, and water treatment. Their sewage treatment technology is the usual bio aeration.</li> <li>• They sometimes do small septage treatment plants, with aerobic and anaerobic treatment.</li> <li>• They are interested in FSTP construction.</li> <li>• They are not interested in becoming an integrated player because they feel they may face capital constraints.</li> <li>• They believe they can sell reuse outputs eventually, but will need to create a market for them.</li> </ul>

## Odisha Private Operators- Conveyance

<b>Om Construction</b>	<ul style="list-style-type: none"> <li>• They have 10 trucks of 3Kl capacity, and 30 employees working in the septic tank business. They work in Puri, Bhadrak, Jajpur and nearby areas. He only has two trucks. The rest are provided by government. His own trucks are in Jajpur.</li> <li>• Looking for financial assistance for expansion. They have to deposit an amount for tender procedure and this amount is too high (3 lakh per vehicle).</li> <li>• They are interested in treatment plant construction and operation. If he operated the plant, would use it to create fertilizer. Everyone likes organic fertilizers now so this would be useful.</li> <li>• He purchased a piece of land in Jajpur and created a farm and use manure on this farm and harvests sugarcane etc.</li> <li>• He is interested in being an integrated player because he can ensure constant sludge quantities.</li> </ul>
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# Illustrative profiles of private operators

Company	Description
<b>Private Operator I</b>	<ul style="list-style-type: none"> <li>• He is operating in Bhubaneswar for the last 15 years.</li> <li>• They have 10 vehicles. 8 standard vacuum trucks with suction ability, and 2 with suction ability and jetting technology.</li> <li>• If the demand arises, he will go as far as Puri or Korda to desludge.</li> <li>• Has a contract with Rourkela. Doesn't want to expand to other places where he doesn't have a personal presence</li> <li>• He is going to construct a mini STP. He can break even with the construction costs if he completes 100 trips a day. He also plans to charge other operators a tipping fee if they dump in his STP. He is considering possibilities of reuse.</li> </ul>
<b>Shubasis Mohanty</b>	<ul style="list-style-type: none"> <li>• He works in both Odisha and outside the state. And his business includes SWM, liquid waste, STPs, and is now entering FSM</li> <li>• Has four trucks (which are provided by the government) of 3000 liters each</li> <li>• He entered into a 7 year contract with the ULB. He might enter into the co-compost business, but it requires a lot of manpower and technology.</li> </ul>
<b>Vedika Resources</b>	<ul style="list-style-type: none"> <li>• They are involved in the water tank cleaning business.</li> <li>• He works in Bhubaneswar, Cuttack, Anugul, Berhampur, Sambalpur, and nearby areas.</li> <li>• He is interested in septic tank and sewage blockage cleaning. His clients often ask him for that business</li> <li>• He is looking into purchasing a jetting machine to clean sewer line blockages, but they are having difficulty obtaining a bank loan. He has not looked at vehicle company loans.</li> </ul>
<b>Bhawani Enterprises</b>	<ul style="list-style-type: none"> <li>• They are into effluent treatment – sewage, distillation, rice mills (most of their business), hotels.</li> <li>• They have executed 40 treatment plants, mostly in Odisha, and mostly for private firms.</li> <li>• They do less work in STPs because clients tend to be very price sensitive when it comes to sewage treatment.</li> <li>• They are interested in other types of treatment plants, but are unfamiliar with FSSM.</li> </ul>
<b>Health and Care Enterprises</b>	<ul style="list-style-type: none"> <li>• The company has been in operation since 2003. It builds water treatment plants and is not yet involved with any STPs.</li> <li>• They work in four districts in Odisha - Sundargarh, Jajpur, Sambalpur, Mayurbhanj.</li> <li>• They are interested in STPs or FSTPs. Recently there were a lot of tenders issued in the state for STPs. L&amp;T was awarded the tender for Rourkela. Health and Care applied but was not awarded.</li> <li>• The company has the capacity to build plants of around 40 KLD capacity, and around INR 5-6 crore of funding.</li> </ul>
<b>Himalaya Clean and Care</b>	<ul style="list-style-type: none"> <li>• The company has three trucks, two from the ULB, and one of their own, with which they do 3-4 desludgings a day. The trucks from the ULB are given on a 7 year contract. They also do housekeeping and maintenance work.</li> <li>• Operates only in Berhampur.</li> <li>• Currently have no plans to buy additional trucks or expand to other businesses. In order to do either of those things, they would require additional financing.</li> <li>• Currently have no plans of expanding to treatment, and do not understand the business.</li> </ul>

# Illustrative profiles of private operators

Company	Description
<b>Odisha Private Operators- Treatment</b>	
<b>Mother Blessing Construction</b>	<ul style="list-style-type: none"> <li>• They are constructing a 30 KLD FSTP in Sambalpur (using biological treatment), and have previously constructed a water treatment plant.</li> <li>• The project cost is 2.7 cr, paid out on a Turnkey basis.</li> <li>• They only work in Odisha, and do not have plans of expanding geographically.</li> </ul>
<b>Andhra Pradesh Private Operators- Conveyance</b>	
<b>Shiva Sai Septic tank cleaners</b>	<ul style="list-style-type: none"> <li>• They work throughout Telengana, and have 12 trucks that complete 200-300 trips each in a month.</li> <li>• He also engages in STP cleaning and will do work anywhere that he finds it.</li> <li>• He is interested in treatment plant construction anywhere in AP or Telangana. He doesn't know much about the construction of FSTPs and STPs, but seems confident that he can undertake it</li> </ul>
<b>A private operator-I</b>	<ul style="list-style-type: none"> <li>• has been working in FS desludging for the last 10 years</li> <li>• He owns and operates 3 trucks</li> <li>• Outreach to HHs is through ads through justdial, internet, wall paint, door to door stickers.</li> <li>• He bought old trucks and modified them</li> <li>• Not interested in treatment since he doesn't have capacity or bandwidth to do it.</li> </ul>
<b>Mudavat Srinu Septic Tank Cleaner</b>	<ul style="list-style-type: none"> <li>• The company owns three trucks of 6-8 kl capacity, and has been in the business for ten years.</li> <li>• Paid half the cost of the trucks upfront, and took the other half as loan from Sriram Finance.</li> <li>• Also cleans STPs for corporations, and is willing to send trucks up to 700 km away for larger jobs.</li> <li>• Interested in FSTP construction in AP, but can only finance INR 10 lakh.</li> </ul>
<b>Andhra Pradesh Private Operators- Treatment</b>	
<b>Ecoicons</b>	<p>They do industrial effluent treatment plant design and construction as well as sewage treatment plant construction. They work largely near Hyderabad, but have done some work in Andhra, Kolkata, and the Northeast</p> <p>He is interested in a government contract for STPs/FSTPs.</p> <p>He can construct plants at city scale as well, but will need financing for projects above INR 1 cr in size</p>

# Illustrative profiles of private operators

## Mahindra & Mahindra

- Mahindra is active on the solid waste side in bio-CNG projects.
- These plants are in Chennai, near Bangalore (40 tons per day capacity) and coming up in Indore. In Andhra Pradesh, Mahindra plants to implement 7-8 projects.
- The company is not working on faecal sludge and has not made any decision around faecal sludge. FS does not give any gas. Also, households clean tanks very irregularly, only after 5-10 years, so the supply of FS will be limited.

## Others

## Blue water company

- Involved across the FSSM value chain. They operate desludging vehicles and construct and operate simple FSTPs that require low manpower and use biological treatment mechanisms.
- They are the implementing body for desludging and FSTP plant installation and operations in Leh
- Funded by BORDA



# Annex-3 : Discussion workshops and meetings

1

One workshop was held on 14<sup>th</sup> February 2018 in partnership with the Finance Task Force. Of the NFFSSM Preliminary findings from study of private providers and potential business models for FSSM services were shared with teams from the four State TSUs as well as other members of the Finance Taskforce.

[Link](#) to the detailed workshop report.



2

Maharashtra State level stakeholder workshops held for 130 cities– 8 divisional level stakeholder workshops were conducted

## Ideas accepted by cities for implementation

- Scheduled emptying 3 year cleaning cycle
- Some cities have shown interest for gradual approach of emptying (Strengthening with demand based and then going for Scheduled emptying)
- Idea of levying Sanitation tax



3

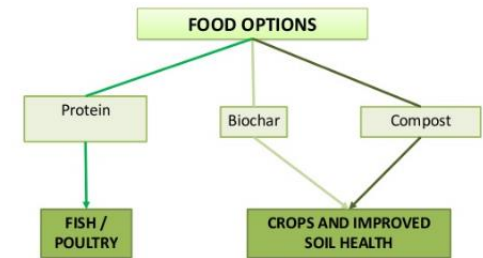
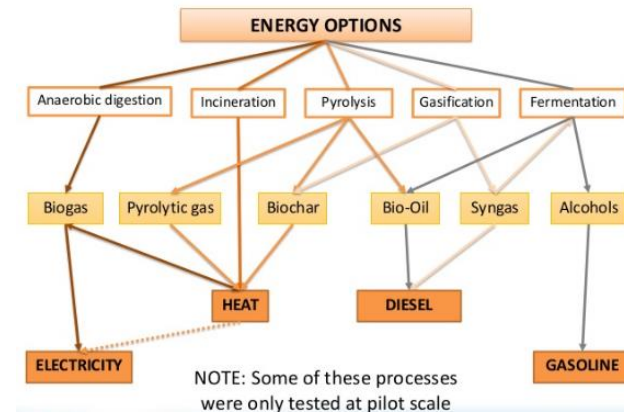
Workshop with private players involved in sanitation business in Pune on 22-23rd October, 2018. The main objectives of the workshop were to sensitize the private sector regarding the potential scale of FSSM market ; to understand their interest and readiness to take up opportunities; discuss FSSM business models and to understand their risk and challenges.

[Link](#) to the detailed workshop report.



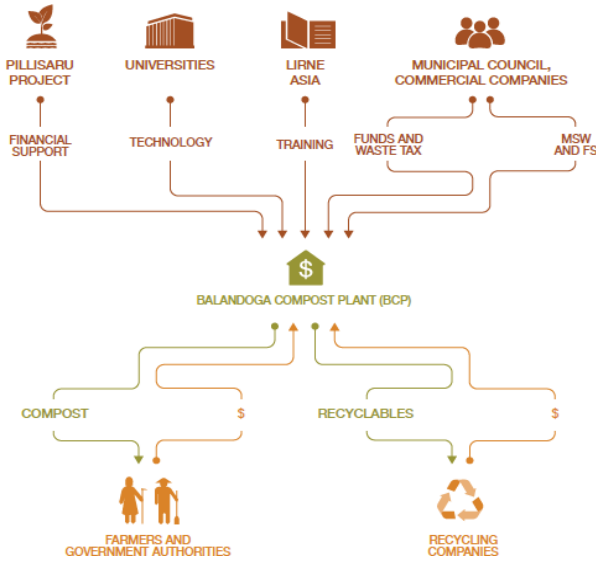
# Annex-4: Resource recovery in FSSM

- FS is rich in organic carbon and energy can be recovered in the form of heat and/or electricity. However, there is not much experience.
- Resource recovery and reuse is slowly gaining momentum in developing countries. It help to shift the focus away from waste that needs disposal toward creating a valuable resource that can benefit farmers, create jobs and generate energy and funds to improve the sanitation service chain (Rao, K.C.; Otoo, M.; Drechsel, P. and Hanjra, M.A. 2017.)
- However, there are not enough studies and market to tap this opportunity. There are limited mandates to reuse wastewater and sludge and hence less investments in RRR.
- In the last few years, the Government of India has taken many concrete steps to promote reuse of wastewater. It began with regulating industrial water consumption and enforcing mandatory water reuse targets for industries.
- The cities should promote reuse of treated sludge as fertilizer in farmlands, parks, gardens, backfilling material and other such avenues. The treated water can also be reused in landscaping, washing of emptying vehicles, cleaning of community/public toilets, agriculture, industries etc where feasible.
- **Omni-processor treatment plant converts FS waste into energy, fertilizer and water.** But no studies on how much O&M cost recovery could be achieved?



# Reuse initiatives in FSSM (1/2)

## Sri Lanka- Faecal Sludge and municipal solid waste composting for Cost recovery



- In Balangoda, Sri Lanka, population of about 35,000, a successful co-composting business model is run by the Balangoda compost plant, a public entity owned and managed by the local urban council.
- The council is responsible for delivering MSW and FS collected from the municipal region to the plant.
- The capital cost of the co-compost treatment plant was USD 352,000, with operation costs of USD 1,340 per month and production capacity of 14 tonnes of compost per day.
- Some compost is sold to small farmers (USD 77 to 120 per tonne) where soils are sandy and chemical fertilizer proved less effective.
- Most of the compost is sold in bulk at very low prices to tea plantations and government institutions, such as the Urban Development Authority.
- Recyclable material is sold to recyclable companies based on the prevailing market price, and it is the primary driver for achieving cost recovery and sometimes with marginal profits for the plant.

## Faecal sludge as fuel for industries in Kigali, Rwanda

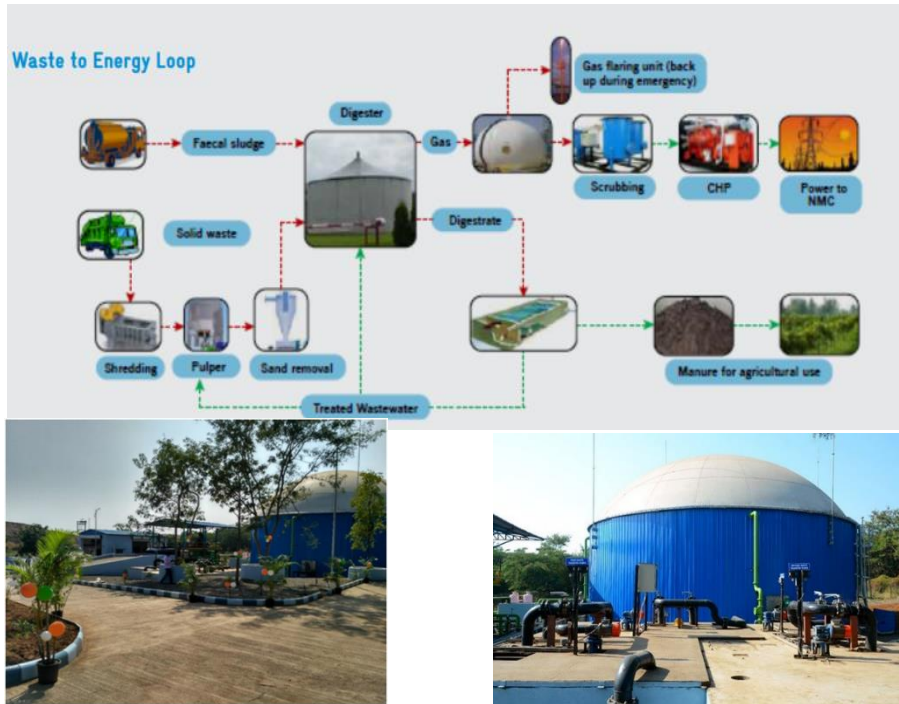


- Pivot has build a “factories” that use human waste as raw material for producing a renewable solid fuel for industries, instead of building treatment plants,
- Maximizing moisture removal from sludge that occurs in the greenhouses, and doing so at the lowest cost possible, is the key to making the overall process commercially viable.
- The team has built and commissioned a complete demonstration plant in Kigali, Rwanda, that processes 100 m<sup>3</sup> of faecal sludge per day. They are selling their fuel to several Rwandan industries, including cement, clay brick and textile factories.

Source: Otoo, M. and Drechsel, P. (2018) “Resource Recovery from Waste: Business Models for Energy, Nutrient and Water Reuse in Low and Middle income countries” London and New York, Routledge; Grand Challenges Canada, “Blue Fuel – Innovative faecal sludge treatment” accessed from: <https://www.grandchallenges.ca/grantee-stars/0403-01/>

# Reuse initiatives in FSSM (2/2)

## Nashik, Maharashtra- Resource recovery and reuse



**Processing Capacity:** 30 Tonne/day

**Capital Cost:** INR 8.02 Crore (INR 6.8 Cr from GIZ and 1.2 Cr from NMC)

**Operational since:** December, 2017

**O&M:** NMC will give INR 5 lakh per annum for management

**Power Generation:** 3300 kWh/day;

- Daily 10 to 15 tons of food and vegetable waste from approximately 500 restaurants and 10 to 20 tons of septage from 400 community toilets are collected by trucks and delivered to the plant.
- Approx. 2,500m<sup>3</sup> biogas and subsequently 3,300 kWh of electricity is produced per day. The generated power is fed into the power grid.
- The project in Nashik opens possibilities to develop and replicate sustainable Waste to Energy technology with the potential of reducing investment costs for the public sector and to achieve sustainability in operation.



## Janacki's omni processor in Dakar

- Janacki Bioenergy has constructed an omniprocessor that can process any sort of biosolids into ash, electric power, and distilled water.
- The omni-processor is currently being piloted in Dakar
- Due to the high upfront costs, the processor would ideally be used in larger cities with low levels of sewerage. While this combination is not very common, the processor may also be used to process solid waste.



## Resale of fodder grown on sludge drying beds in Cameroon

- A survey of three cities in Cameroon showed that fodder grown on sludge drying beds was used to feed horses, goats, sheep, cows, rabbits, cane rats, and guinea pigs.
- This fodder was sold at .1 - .3 USD / kg.

# Annex-5: Learnings from solid waste management sector for FSSM

## Egypt: Integrating formal sector firms with informal sector participants

- In Egypt, households would pay informal waste collectors to remove their solid waste
- The government contracted out waste collection to a few international firms
- One of these firms failed, partially due to the fact that it faced competition from informal collectors
- A different firm succeeded because it subcontracted waste collection out to these informal players, but enforced certain norms, such as the separation of waste

### Relevance to FSSM

- Much desludging activity is informal. Instead of competing with current players, the government may want to integrate them into the formal sector

## Andhra Pradesh: Solid waste treatment and reuse in partnership with the private sector

- Waste to Compost plant set up in Andhra Pradesh in four cities (operational)
- These are also suitable models for ULBs with smaller quantities of waste
- PPP model is adopted with Output based incentive from the government:
  - INR 1500 per ton of compost, from the central government
  - INR 200 per ton of compost, from the state government

### Relevance to FSSM

- This model could be considered for setting up and running FSTPs.
- Production of compost/ other reusable items must be marketed to approach and attract the private sector.

## Nagpur: Reusing treated sewage at power station

- Mahagenco – the electricity generation firm in Nagpur, purchases sewage from the Nagpur Municipal Council.
- The organization also paid 30% of the capital costs for an STP, while 70% came from JNNURM
- The utility then uses this treated wastewater for industrial uses, instead of other sources of water

### Relevance to FSSM

- While this model is specifically for sewage, it could be considered in the context of a co-treatment model for FS.
- The treated water and sludge at FSTPs can be reused at the relevant industries. Partnerships with industries can be a way forward.



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PAS project

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.