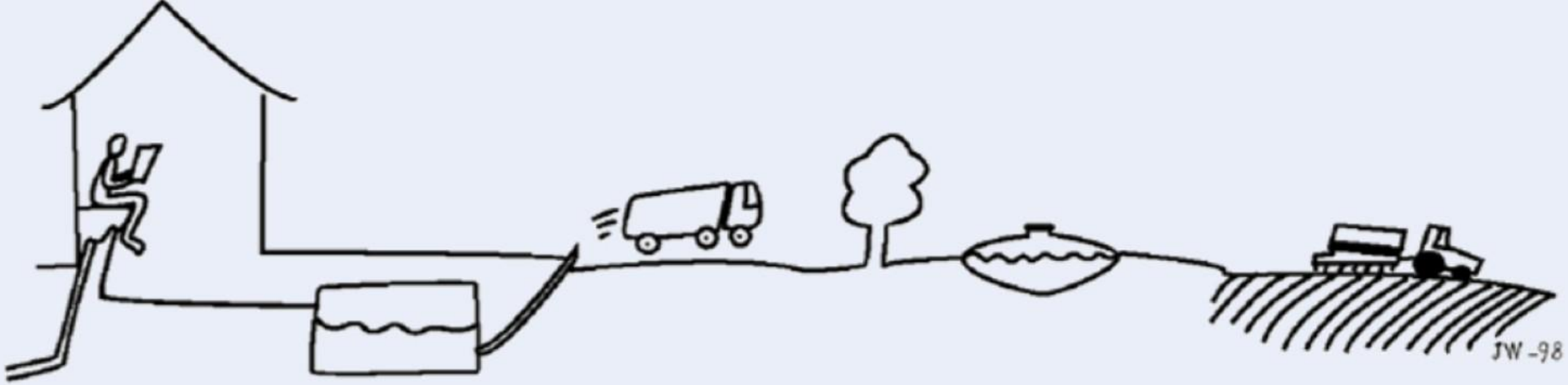

Financing FSM: Potential sources and approaches

September 30, 2017

CEPT UNIVERSITY

C-WAS

Acknowledgement

Swachh Bharat Mission –Urban (SBM-U), has fund allocated for toilet construction, and not for safe management of septage. This study provides a preliminary assessment of financing requirement for FSM services in India and identifies potential financing sources. It explores various mechanisms/approaches which can be adopted by government and private entrepreneurs for financing FSM services.

This study was conducted by Center for Water and Sanitation (C-WAS), CEPT University under the project "Supporting sustainable sanitation services at scale in India" funded by the Bill and Melinda Gates Foundation. Further work on this topic is being pursued at C-WAS.

The work on this study was carried out by a team led by Meera Mehta and Dinesh Mehta and included Dhruv Bhavsar, Aasim Mansuri, Upasana Yadav and Jigisha Jaiswal.

September 30, 2017

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Content

Content

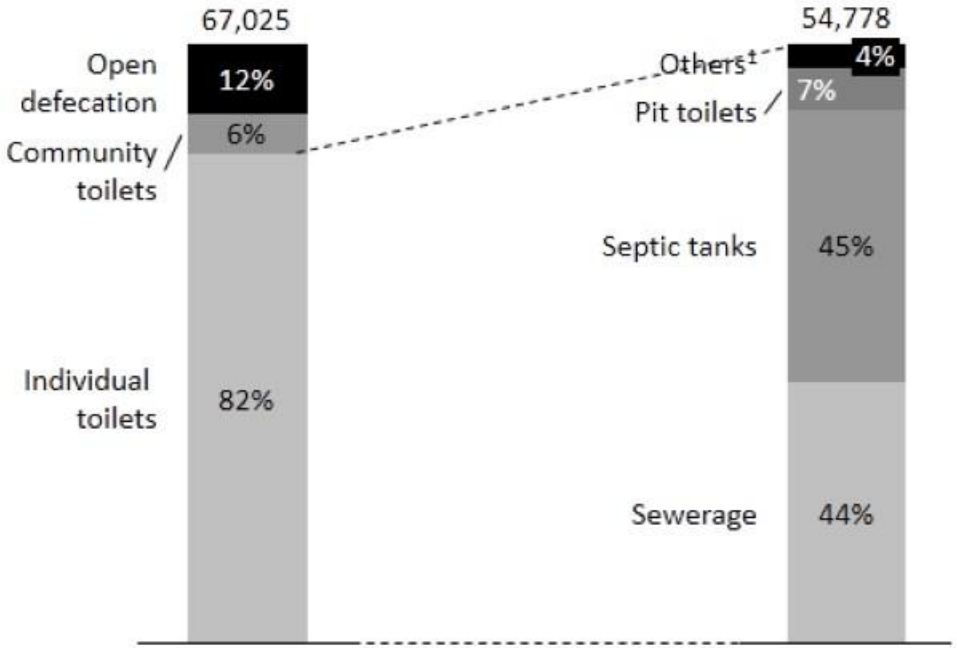
Objectives of this Study

- **An approach of thinking beyond making cities ODF.**
- **To sustain safe sanitation practices with improved onsite sanitation services together with faecal sludge and septage management.**
- **To assess the financial requirement for FSSM services.**
- **To identify potential sources of financing FSSM services.**
- **To explore various approaches available which can be adopted to achieve safe sanitation service chain.**

Content

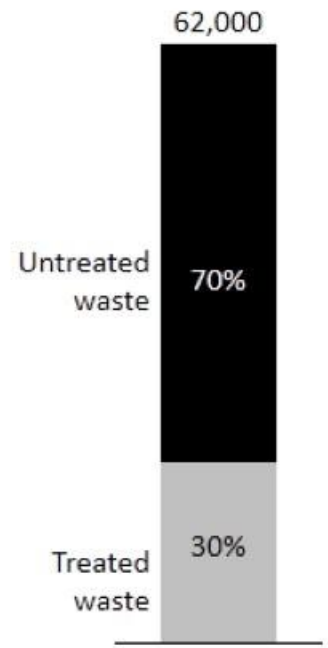
50% of HHs in India are dependent on onsite sanitation systems

Access | **Collection and Conveyance** | **Treatment**



Access to type of sanitation for HH in urban India
(in '000 HH)

Methods of disposal of waste by HH with personal toilets in urban India *(in '000 HH)*



Status of wastewater treatment in urban India[2] (MLD)

37 million people practice open defecation in urban India

28 million people with individual toilets use unsanitary methods of disposal of waste

43,117 MLD untreated wastewater is discharged in water bodies or on land

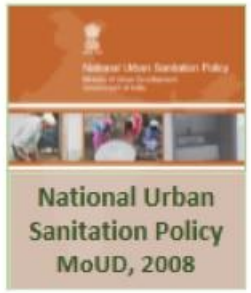
- ✓ Over 50% of the households are dependent on on-site sanitation.
- ✓ Only 30% of the WW being treated.

Note: (1) Others includes primitive methods of C&C such as pour flush toilets-other systems, night soil disposed intro open drain and latrines serviced by humans and animals, (2) "Inventorization of sewage treatment plants " report by Central Pollution Control Board of India (CPCB), 2015

Source: Based on Census of India 2011

Positive enabling environment is emerging at all tiers of government

Fecal Sludge and Septage Management (FSSM) is now an integral part of the national infrastructure programme - Atal Mission For Rejuvenation And Urban Transformation (AMRUT).Along with water supply and sewerage, it includes a component for Septage Management. Focus of AMRUT is on creating infrastructure such as water supply, sewage and septage management, etc. that have direct impact on well-being of urban residents. As a consequence, state governments are now required to prepare an FSSM policy and suggest activities related to FSSM plan under their AMRUT mission.



Importance of safe and hygienic facilities with proper disposal and proper disposal and treatment of sludge from on-site installations; Proper operations & maintenance (O&M) of all sanitary facilities

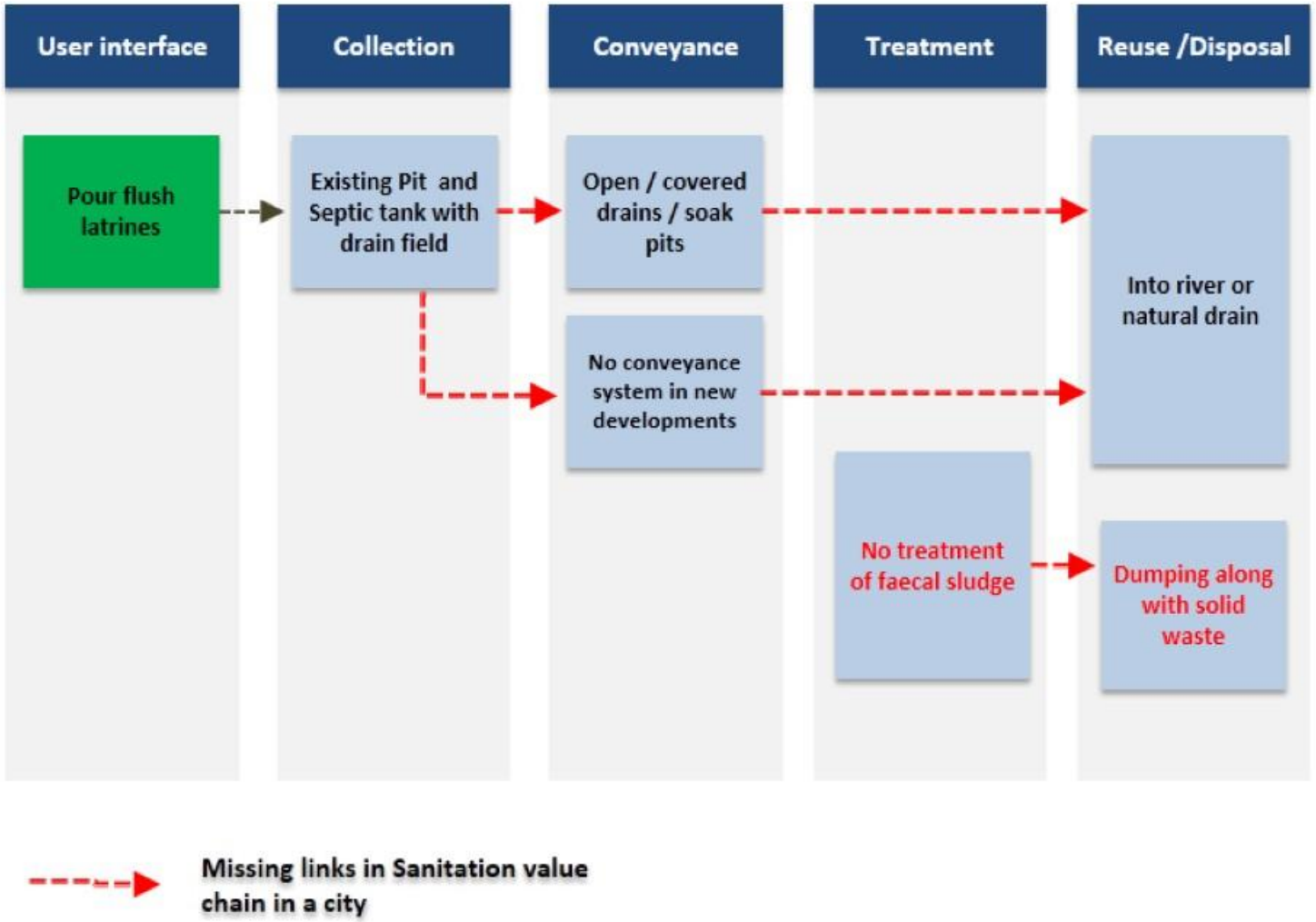
Under AMRUT incentives are present for achievement of reforms under state to prepare FSSM policy. Financial Allocation under AMRUT for FSSM related projects

The national FSSM policy has emphasized an approach of thinking beyond making cities ODF. The FSSM policy envisages that All Indian cities and towns become totally sanitized, healthy and livable and ensure sustenance of good sanitation practices with improved Onsite Sanitation Services together with faecal sludge and septage management to achieve optimum public health status and maintain clean environment with special focus on the poor.

SMM
ODF+
ODF++

Under Swachh Maharashtra Mission (Urban), Government of Maharashtra envisages "ODF Communities" moving towards "ODF+ and ODF++ Communities" by addressing entire service chain of sanitation and not focusing only on number of toilets constructed in the cities. Government of Maharashtra adopted a systematic approach by keeping in view city as a unit and encouraging city managers for moving towards improved sanitation by prioritizing access and use of own toilets and implementing plans for safe management of faecal waste.

In cities with onsite sanitation systems SBM India has pushed towards making cities ODF, but it lacks attention on wastewater and FSSM



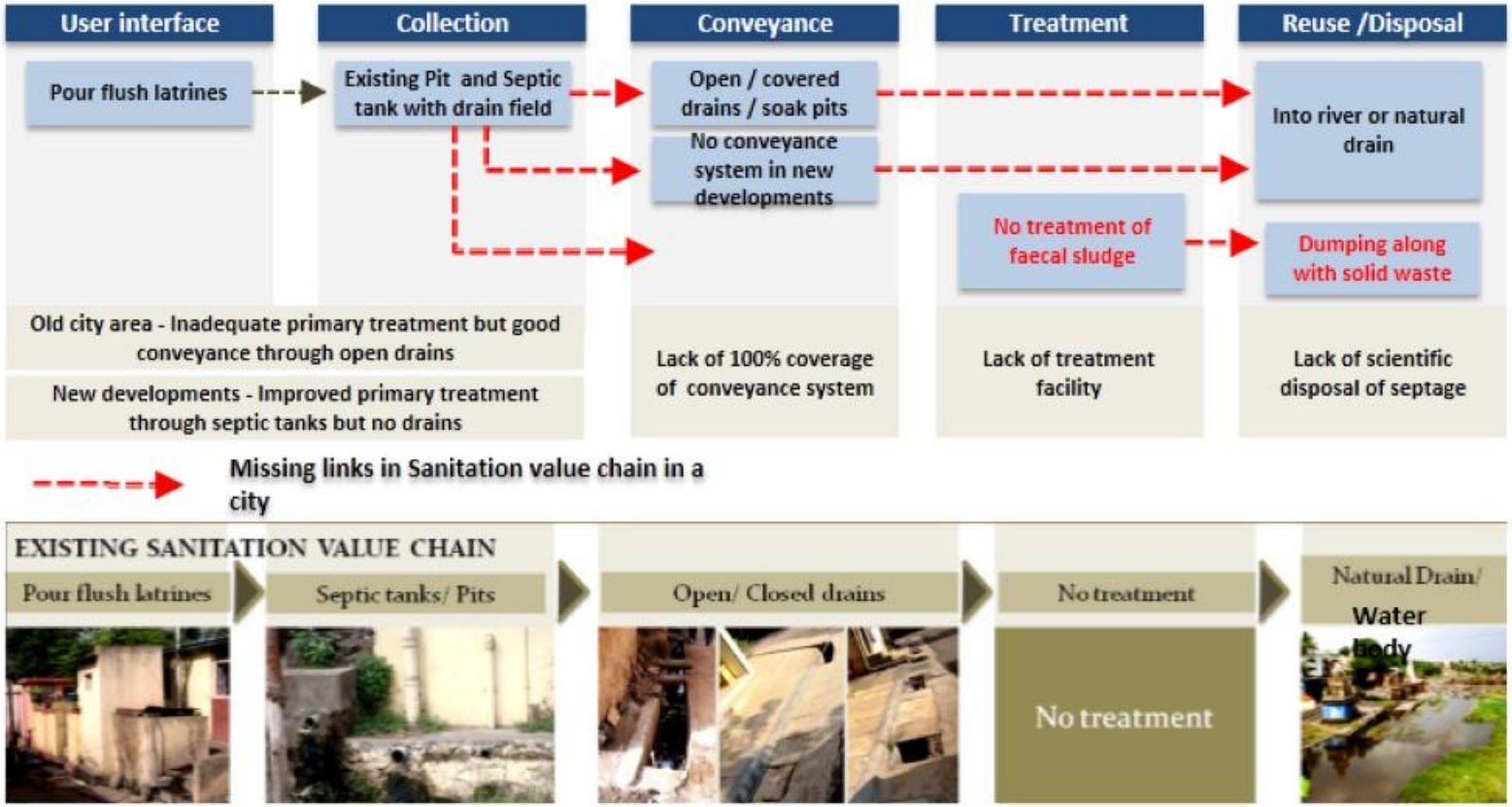
It is being increasingly recognized that making cities Open Defecation Free (ODF) is only a first step in achieving safe sanitation. It is equally important to ensure safe conveyance and disposal/reuse of wastewater as well as fecal sludge and septage.

Sanitation financing is needed across the whole service chain of access, collection and conveyance, and treatment. The Swachh Bharat Mission (SBM) already focuses on the first part of the chain by providing partial incentive subsidy for toilet construction.

While significant investments were made in the past on sewerage systems, the on-site sanitation system were not given adequate attention.

Amrut program provides funding for 500 cities, the rest of the 3500 small and medium towns do not have dedicated programs which would fund FSM services.

Existing Issues and challenges across the service chain



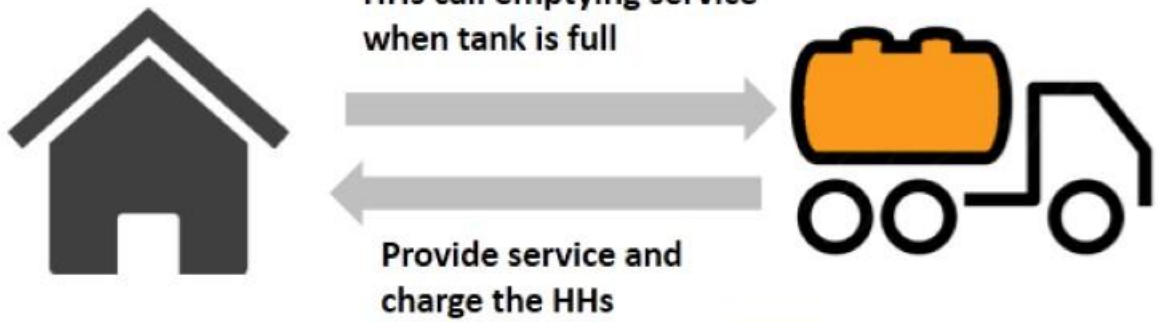
- Though a specific act has been passed against **Manual Scavenging,** social and cultural acceptance of such practices act against formal and systematic methods of cleaning tanks.
- In many instances faecal sludge and septage is **dumped in drains and open areas** posing considerable health and environmental risks.
- Sanitary workers also work in hazardous conditions to clean OSS pits and tanks sometime **without adequate protective gear and equipment**.
- In most Indian cities, there is **limited data** and information on the types and number of OSS toilets and septage disposal systems and practices.
- Widespread treatment technologies are available in developed countries while the developing countries are still struggling to find options for treatment technologies and its service providers.
- There are some emerging examples of the existing FSSM service plan being implemented at city level.

Major challenges in the present practices in FSM services- Complaint based desludging and Informal desludging is generally being practiced in India

Unsafe handling of septage

Informal Private sector

Emptying when the tank is full



Disposal of Septage on open land

Disposal of Septage at Dumpsite

- In most cities, desludging is done only when requested by households and is usually addressed when the tank runs full (in case of emergency). The cleaning services of the ULB are currently treated as a **complaint redressal** system for overflowing septic tanks rather than a regular cleaning and maintenance service.
- At places manual cleaning is also practiced to clean the septage full tanks, especially in the areas where they are inaccessible.
- During the emptying process, no safety precautions are taken by the workers.
- The collected septage is disposed on open lands or solid waste disposal sites without any treatment.

National Policies and guidelines advise to practice regular cleaning of septic tanks

Effluent discharged standards for Sewage Treatment Plant are mentioned below:

Sl. No.	Industry	Parameters	Standards for New STPs (Design after notification date)*
	Sewage Treatment Plant	pH	6.5-9.0
		BOD	10
		COD	50
		TSS	20
		NH_4-N	5
		N-total	10
		Fecal Coliform (MPN/100ml)	<100

Note:
(i) All values in mg/l except for pH and Coliform.
(ii) These standards will be applicable for discharge in water resources as well as for land disposal. The standards for Fecal Coliform may not be applied for use

While desludging frequencies vary, it is typically considered best practice to desludge tanks once every three to five years, or when the tank becomes onethird full. **National Policy on Faecal Sludge and Septage management** says Regular cleaning of septic tanks through a systematic extraction and collection procedure is essential to check environmental pollution. The frequency of cleaning is determined by the desired performance of the OSS system for the local conditions.

CPHEEO suggests that yearly desludging of septic tank is desirable, but if it is not feasible or economical, then septic tanks should be cleaned at least once in two - three years, provided the tank is not overloaded due to use by more than the number of persons for which it is designed.

As per **IS 2470,** Half yearly or yearly desludging of septic tank is desirable. Small domestic tanks, for economic reasons, may be emptied at least once in 2 years provided the tank is not overloaded due to use by more than the number for which it is designed.

Regular desludging can be achieved from different ways

Services		Opportunities	Challenges
Demand Based Regular Desludging	***Citywide regulation for mandating HHs to desludge septic tanks at regular interval and levy appropriate penalty on default*** Owner decides whether and when to empty. Only covers the people that call for the service.	• Often direct financial transaction between emptier and private owner. • Pricing of services	• Assumes that the owner knows when to empty • Difficult to monitor when private operators carry out the services. • Managing multiple requests from a same household would be difficult. • Mostly practiced for emergency cleaning. • The treatment plant does not receive required amount of sludge.
Scheduled (Supply) Based Regular Desludging	***Citywide regulation for rolling out scheduled desludging of septic tanks at regular interval and levy appropriate penalty on default; the local government decides desludging households.*** Authority sets up an emptying schedule to make sure that all households practice "timely emptying" as opposed to "emergency emptying".	• It can ensure citywide coverage. • Well monitored process. • Treatment plant receives septage according to its design. • Pricing of services	• Requires that local government capacity to set up an emptying schedule. • Willingness to pay before the service is being availed.
Scheduled (Demand) Based Regular Desludging	***Citywide regulation for rolling out scheduled desludging of septic tanks at regular interval and levy appropriate penalty on default; the owner takes the final call.*** Authority sets up an emptying schedule to make sure that all households practice "timely emptying" and alarms the household. The final call is taken by the households.	• Pricing of services.	• Mostly practiced for emergency cleaning. • The treatment plant does not receive required amount of sludge.

Case studies of Regular desludging across globe and in India

Demand Based Regular Desludging

Kampala, Uganda- The city is divided into several FS collection zones and are assigned to private operators selected by tender process. The selected private sector players work under service level agreements and in return pay a designated monthly fee to municipal council. The operators were paid user charges by the clients during desludging.

Warangal- Warangal Municipal Corporation addressed FSM by introducing demand based regular desludging. It has established a formal process of licencing desludging operators. The licence is valid for 5 years and needs to be renewed every year. The households are informed to engage the licensed operators for collection and transportation to desludge.

Scheduled (Supply) Based Regular Desludging

Dumaegete city, Philippines: The Water district conducts desludging practice in the city of Dumaegete. The service started out as a scheduled desludging program. First, the city was subdivided into zones and a schedule was developed. A promotions campaign was conducted that raised interest and awareness of the program. The coverage of the service is about 95%. 6 trucks were used for desludging practice. The emptying cycle is for an interval of 5 years.

Wai, Sinnar- Under the city's IFSM plan, it ensures that the emptying services are scheduled emptying at an interval of 3 years. The city is divided into 3 zones and yearly plan has been prepared to desludge each septic tank once in three years.

Scheduled (Demand) Based Regular Desludging

Malaysia- The desludging responsibility is of the owner rather than the service provider. Thus it does not ensure regular desludging of septic tanks.

Content

Infrastructure requirement for improved and safe FSM practice

Assessment of Financing requirement across FSM service chain

		Access	Collection	Conveyance	Treatment/ Disposal
Financial Requirements	Capex	New Toilets New septic tanks	Refurbishment of septic tanks	New Suction Emptier Trucks	Treatment Facility- Land cost, construction cost
	Opex			Operation of Emptier trucks– Fuel cost, salaries of truck driver, etc	Operation of Treatment Facility- staff salary, electricity bill, pumps replacement, etc

- The first step in Financial Assessment is to determine the financing requirements for proposals for the full service chain – starting with toilets in the user interface, to collection, conveyance and treatment or disposal.
- The finance requirements are essentially based on costs of achieving the various improvement activities planned.
- It is also important to ensure that both capital costs and O&M costs are assessed.

Annual financing need according to the requirement ranges from 1600-2400 Cr for next 5 years

Need for FSSM capital financing is **not very high**!!

- At the national level, we estimate that a total capital investment of around Rs 8000 crores would be required for FSSM (septic tank emptying trucks and septage treatment facilities).

Preliminary National estimates (Rs in Cr)

	AMRUT	Non-AMRUT	Urban India
Number of cities	499	3,542	4,041
Capital investments for FSTP	3,000 – 5,000	2,500 -4,500	5,500 - 9,500
Capital investments for trucks	1,200	1,300	2,500
Total capital investment for FSM	4,200 - 6,200	3,800 - 5,800	8,000 –12,000

Annual FSM investment requirement for next **5 years is ~ INR 1600 - 2400 Cr.**

	Total ULBs	Funds required for FSTP	%
AMRUT	499	3000-5000	8-12% of AMRUT
14th FC for Non-AMRUT	3542	2500-4500	10-20% of FC

10-20% of funds are required from AMRUT and 14th FC to provide FSTP for all cities.

Content

We identify potential sources of funds for FSM financing

	Access	Conveyance	Treatment/ Disposal
CAPEX	**New toilets and Refurbishment of septic tanks**	**Suction Emptier Trucks**	**Treatment Facility-** Land and construction cost
	Households	Central/State Grants	Central/State Grants, VGF
	Government Subsidy	Local Govt. funds	Local Govt. funds
	CSR fund, Crowdfunding, Credit	Private Sector/PPP	Municipal Bonds/Public Finance
			CSR, Crowdfunding
			Private Sector/PPP
OPEX	**Repair of toilets and septic tanks**	**Operation of Emptier trucks–** Fuel cost, salaries of truck driver,etc	**Operation of Treatment Facility-** Salary, electricity , pumps replacement, etc
	Households, Housing society fees	Sanitation Tax/Other Taxes	Sanitation Tax/Other Taxes
		User Charges (Emptying fees)	Sale of Compost

- For the conveyance component, funds for septic tank emptying can come from private sector participation as there are clear business models for such investments. However, capital investments for faecal sludge and septage treatment will have to be made mainly from public funds.
- There may be opportunities to leverage private investments using Viability Gap Funding (VGF) type mechanisms and to explore other innovative sources of funds such as from CSR and impact investing.
- It is important to ensure adequate operating expenditure to sustain these services, which will need to be made from local sources such as user charges or local government taxes. Appropriate use of sanitation tax and property taxes where needed will be critical for ensuring adequate funding of O&M expenditure.

We identify potential sources for Capex funds for FSSM financing

Public Finance

Sources

Central/State Schemes/ Grants

Central and state government programs/schemes funds can be utilized for FSSM related projects. Eg. AMRUT, SBM, etc.

14th FC grant

The 14th FC has recommended assured transfers to the local bodies for planning and delivering basic services including water supply, sanitation including septage management, sewage and SWM amongst others.

State Budget

Under the water supply and sanitation head of the state budget, allocations can be made for providing FSSM services across the state. Funds for emptier trucks or FSTP can be allocated under it.

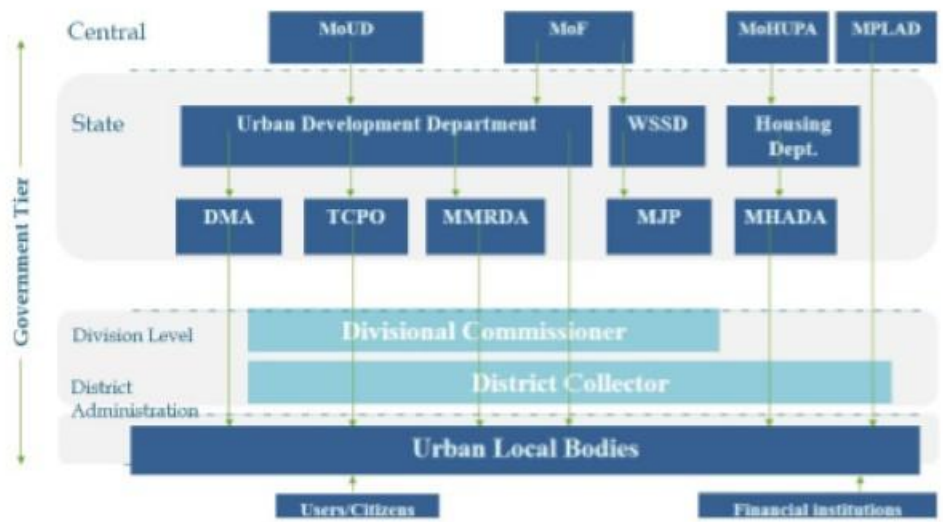
ULBs own Budget

ULBs can allocate funds from their own budgets for provision of FSSM service across the city.

Mechanism/ Instrument

Transfers

Funds are transferred from the higher tier of the government to the lower tiers. The national and state grants are transferred to the ULBs.



Fund flows in Maharashtra for UWSS

Source: Revised report on Financing Urban Water Supply and Sanitation in Maharashtra, PAS project, CEPT University (in progress)

We identify potential sources for Capex funds for FSSM financing

	Sources	Mechanism/ Instrument
Commercial Finance	**Private Sector** Private sector can be involved for funding of emptier trucks and/or FSTPs. Their interest in the treatment and reuse component can be explored by adopting various mechanisms. Private sector involvement is present in the emptying services. Private operators own the emptier trucks and perform the services. **Banks** PSL can be the instrument for the banks to provide loans for sanitation services.	**Public Private Partnership** PPP model can be adopted for building FSSM infrastructure. DBO, DBOT, BOT, BTO etc. are the models available that can be adopted to make the financing viable. **Viability Gap Funding (VGF)** The VGF scheme of the Government of India acts as an institutional mechanism for providing financial support to public-private partnerships in infrastructure. A grant, one-time or deferred, is provided under this scheme with the objective of making projects commercially viable. **Hybrid annuity model (HAM)** The Hybrid annuity model, the government pitches in to finance 40 percent of the project cost. It ensures access to sufficient private capital and high quality service and maintenance. For the private sector it asks for reduced funding commitment while offering assured returns over project life cycle. **Pooled financing** The mechanism of PF is for creating local infrastructure funds, where municipalities create an external investment body to manage local infrastructure. It helps small urban local bodies finance their services by raising capital market resources on a pooled basis. It enhances the credit worthiness assessment of the ULBs.

We identify potential sources for Capex funds for FSSM financing

Grants from companies (philanthropy)/ organizations / institutes

Sources	Mechanism/ Instrument
CSR Funds The CSR act makes new models of social engagement possible and is expected to improve the pool of funding. Many companies in India have extended their CSR support for WASH sector. These are mainly found in funding for construction of toilets and in capacity building and behavior change.	**Crowdfunding** Crowdfunding is soliciting small amounts of fund from various investors through a web-based platform or social networking sites for a specific project, business, or social cause.

Potential sources and approach for Capex of Emptying & Conveyance

Potential sources of finance for Capital Expenditure

Suction Emptier Trucks	Demand based FSM Services	Scheduled FSM Services
Central/state Grants/ Local Government Funds	Several states have earmarked funds/ grants for procurement of vacuum trucks for urban local governments.	
Private sector	Private sector is already investing as per demand	Private sector is generally willing to bring investment for vacuum trucks

For procurement of vacuum trucks for urban local governments several state governments do also provide grants to local governments. Also the use of 14th Finance Commission grants that available for local governments can be explored for this. For eg. Government of Maharashtra has already asked urban local governments to use at least 50% of these funds for sanitation activities. It also provides special incentive grants to all cities that become ODF. These funds can be used for purchasing vacuum trucks.

Complaint based FSM services already exists in several cities which is addressed by local government and/or private operators. This shows the interest of private sector in this business model. On the other side private providers seem willing to fund trucks and an attractive business model around emptying services is possible.

Further, scheduled emptying services can help to develop an attractive business model with a known number of tanks to be cleaned and return to be achieved. There is a lack of experience for scheduled emptying in India.

Possible matrix for conveyance service..(1/2)

Based on the different aspects of providing agencies, funding options and the approach for deslugding service is selected, possible matrix is developed.

	Providing Agency	Funding Options		Examples
		Capex	Opex	
Demand Based services	Public agencies ULBs/ Utilities	Public funds	User charges/ Taxes	Maharashtra Tamilnadu
	Private large firms formal	Private investment	User charges	Many likely in large cities
	Private informal small firms	Private investment	User charges	AP, TN, Bangalore
	Private Centralized by state or ULB	Public investment (Public trucks used)	User charges	Odisha
	Private small firm licensed	Private investment	User charges	Warangal, Narsapur

Possible matrix for conveyance service..(2/2)

	Providing Agency	Funding Options		Examples
		Capex	Opex	
Scheduled Services	Private Contracted	Private investment	Contract fees from taxes	Wai, Sinnar
	Private Contracted	Private investment	User fees	Malaysia
	Public agencies ULBs/ Utilities?			

	Providing Agency	**Funding Options**		**Examples**
		Capex	Opex	
Integrated Contract (Conveyance + Treatment)	Private Contracted	Conveyance- Private Treatment- Grants/ Private	User fees/ Taxes To pay contracted fees	

Case studies of existing conveyance models..

Providing Agency: Private small firm licensed
Funding Options: Private investment

Maputo Mozambique:

In Maputo, small-scale solid waste collection enterprises have successfully moved into the FSM business, where they have become economically viable.

The conveyance was divided into two parts: primary operators who use handcart to dispose to transfer station; secondary operators who use trucks to dispose it to the treatment plant. The primary operators essentially covered their full costs over the first 24 months, and are now operating at a profit after refining their business model.

Prices charged are negotiated with clients, taking into account both the costs of the job (for example,
distance to the treatment plant, or the amount of compacted sludge to be dug out) and the perceived ability of the client to pay. The average price per emptying is USD 58.00. this is
too much for some poor households, even with the option of paying in two or three instalments, which some of the operators are offering.

Source: Hawkins, P. and Muximpua, O. (2015)"Developing Business Models for Faecal Sludge management in Maputo, Wolrd Bank and WSP

Potential sources and approach of funds for Capex of Treatment system

Potential sources of finance for Capital Expenditure

FSSTP	Demand based FSM Services	Scheduled FSM Services
Central/state Grants	Size of treatment units is relatively small. Large cities may mobilize from own funds. Small cities may mobilize from 14th FC funds/ AMRUT.	-Large cities may use ongoing national level programmes - Small cities may require small size of grant from state programme or mobilize from 14th FC funds.
Local governments		
Private /VGF	Private sector is willing with VGF	
Innovative Finance	CSR, Social Impact Investor, Donor funding etc	

Sources from Public Finance: At the national level, there is no separate allocation of funds for septage management in Swachh Bharat Mission (urban), unlike the SBM (Gramin) that has specific allocation for solid and liquid waste management (SLWM). While it is expected that funds for FSSM in urban areas will be largely met from state and local budgets, these funds needs to be explored. Possible public funds can be:

- Current Government Programmes and funds availability: AMRUT
- State's annual budget allocation for urban water and sanitation
- To explore the use of 14th Finance Commission grants that available for local governments.
- Own funds of Urban Local Body for capital financing

Modes of financing and requirement will also depend upon the approach selected for treatment

Various approaches which can be adopted for treating faecal sludge are:

Co-treatment with STP

Co-treatment with SWM Treatment Plant

Cluster Based FSTP

Individual FSTP

If an existing STP is near-by, treatment can be adopted with Co-treatment mechanism..(1/2)

Co-treatment with STP

When ULB has STP in the city or nearby location, the collected septage can be treated at the STP along with sewage. Co-treatment of septage along with domestic sewage at a sewage treatment plant (STP) is a feasible and acceptable alternative for septage treatment.

- ULB should first assess the possibility of septage treatment at existing STP in the city or STP of nearby city through appropriate agreements with STP operators and receiving ULBs.
- Septage can be added at various stages:
  - Septage addition to nearest sewer manholes.
  - Septage addition to STP
  - Septage additions to sludge digesters/ sludge drying bed
- The nearby local bodies situated approximately 10-20 kms of radius can be prioritized for co-treatment of septage at nearby STP.

Land:

No requirement of land for building new FSTP.

Technical aspects:

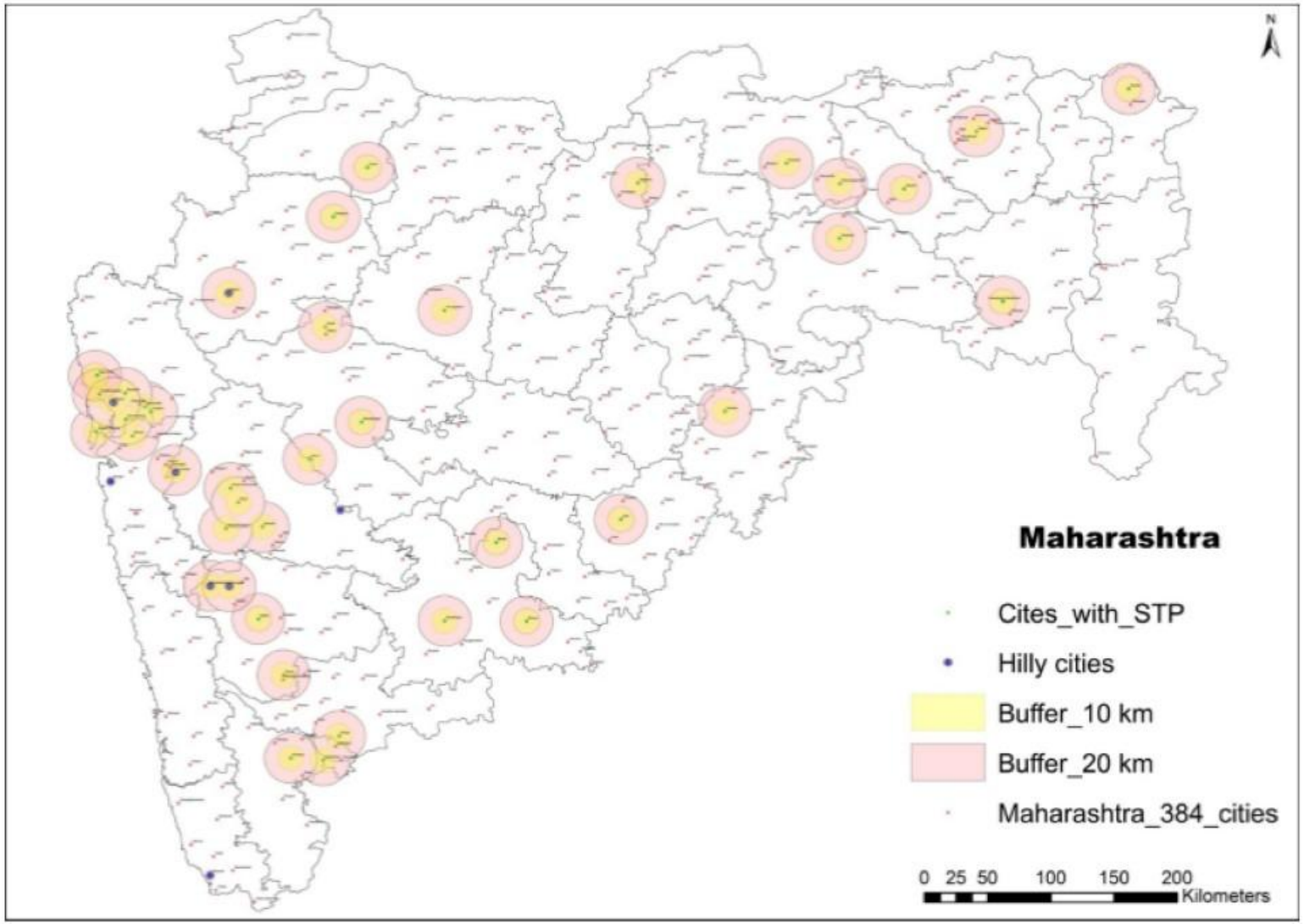
- Additional component needs to be added to support septage treatment at STP.
- Sewage treatment plant should have an adequate capacity in order to accept the septage without hampering the normal functioning of other processes.

Financing aspects:

- Capital cost investment requirement decreases majorly. The only capital investment required would be an initial component for introduction of Faecal sludge into the treatment plant according to the treatment technology at STP.
- Operations cost will be for transportation of septage to the STP. (depends on the distance of STP from the city).
- Tipping fees if STP is on PPP basis.

If an existing STP is near-by, treatment can be adopted with Co-treatment mechanism..(2/2)

Co-treatment with STP- The case of Maharashtra



Maharashtra Government resolution

जोडपत्र-१

शासन परिपत्रक, क्रमांकःस्वगप्र-२०१७/प्र.क्र.२६३/नवि-३४ दिनांक ३० डिसेंबर, २०१७ चे जोडपत्र

अ.क्र.	STP ची सुविधा उपलब्ध असलेली नागरी स्थानिक स्वराज्य संस्था	सुविधा उपलब्ध करून द्यावयाची नागरी स्थानिक स्वराज्य संस्था
१	२	३
१	वसई-विरार	तहाणू, पालघर
२	अंबरनाथ	मांडेराल
३	पनवेल	अलिबाग, खोपोली, कर्जत, रोहा, पेण
४	पिंपरी-चिंचवड	तळेगाव, लोणावळा, आळंदी
५	कोल्हापूर	वडगाव, पन्हाळा, गडहिंग्लज, आष्टा, मडगाव
६	पंढरपूर	सांगोला, करमाळा, माळशिरस, अक्कलकोट
७	इचलकरंजी	कुरुंदवाड, जयसिंगपूर
८	कराड	विटा, इस्लामपूर, तासगाव
९	सोलापूर	दुधणी, मैंदर्गी
१०	नाशिक	सिन्नर, दिंगतपुरी, त्र्यंबक, सटाणा, मनमाड, येवला
११	शिरपूर	दोंडाईचा-वरवाडे, शिंदखेडा, शिंदे, नंदुरबार, अमळनेर, धरणगाव
१२	शिर्डी	कोपरगाव, राहता, राहुरी, संगमनेर, श्रीरामपूर
१३	नागपूर	मौदा, रामटेक, महादुला, सावनेर, खापा, काटोल, पवनी, तुमसर, कळमेश्वर, उमरेड, देवळी, सिंदी, नरखेड
१४	चंद्रपूर	बाळापूर, वरोरा, भद्रावती, राजुरी, मूल, गडहिंग्लज, गडचांदूर
१५	नांदेड	हिंगोली, परळी, कळमनुरी, उमरी
१६	औरंगाबाद	पैठण, वैजापूर, सिल्लोड, गंगापूर, भोकरदान
१७	अमरावती	दर्यापूर, अंजनगाव सुर्जी, चिखलदरा, अचलपूर, चांदूर रेल्वे,धामणगाव रेल्वे, शेंदुरजना घाट
१८	यावतमाल	उमरखेड
१९	शेगाव	जळगाव जामोद, बुलढाणा, अकोला

Treatment can be done at SWM treatment plant of the city..(1/2)

Co-treatment with SWM treatment plant

When ULB has solid waste treatment facility in the city, the collected septage can be treated at the SWM treatment plant. The strategy which can be adopted is opting for co-treatment of FS along with existing SWM treatment plant in the city.

- Sometimes only addition of dewatering unit at existing SWM treatment facility may suffice co-treatment of septage.
- The most common method of **co-composting** Septage with organic waste is through windrow composting. Septage and other organic material are placed in piles or rows. Various parameters need to be controlled to ensure an optimal composting process, including temperature, moisture, carbon–nitrogen ratio and oxygen concentration. Co-composting takes several months and needs low amount of energy.
- Co-treatment of septage is also possible in **waste to energy** solid waste treatment plant.

Land:

No requirement of land for building new FSTP.

Technical aspects:

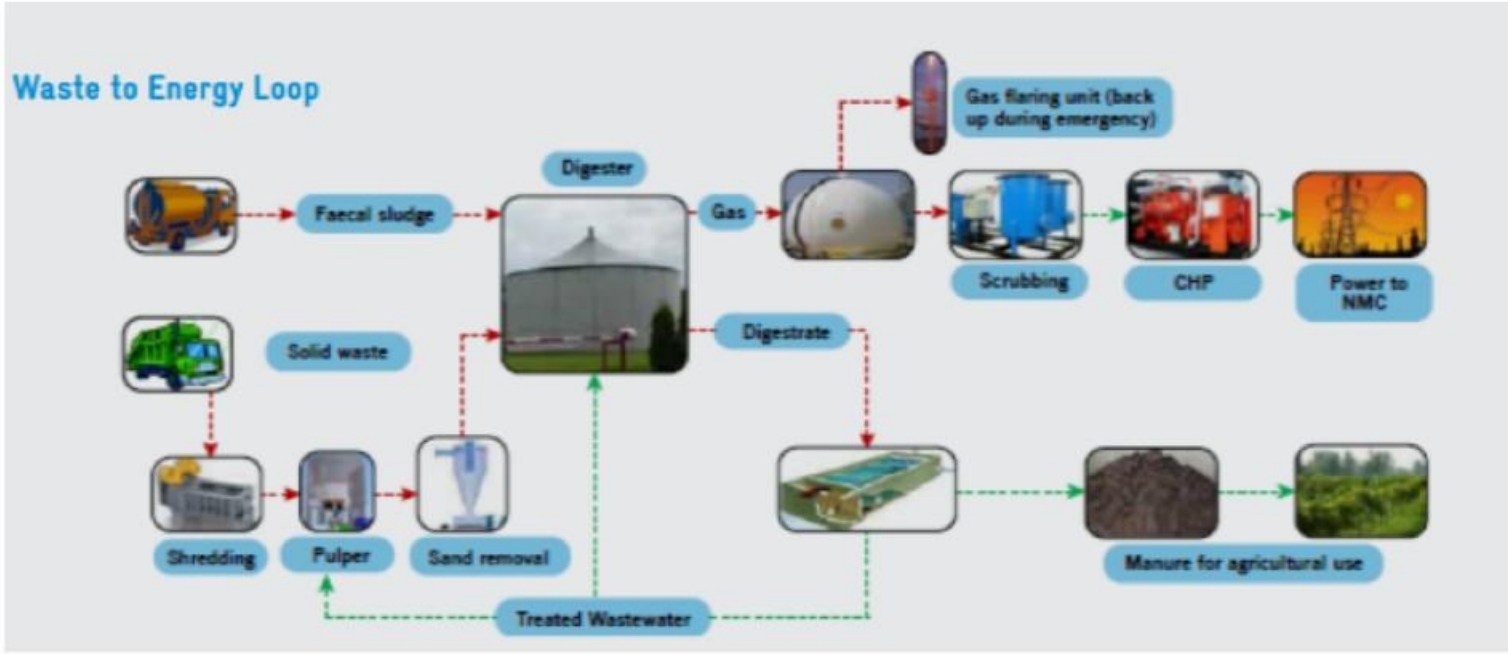
- Additional component needs to be added to support septage treatment at SWM treatment plant.

Financing aspects:

- Capital cost investment requirement decreases majorly. The only capital investment required would be a component for introduction of Faecal sludge into the treatment plant according to the treatment technology at SWM treatment plant.
- Operations cost will be for transportation of septage to the STP.

Treatment can be done at SWM treatment plant of the city..(2/2)

Co-treatment with SWM treatment plant- Waste to Energy through Co-fermentation of Organic Waste and Septage in Nashik



The Waste to Energy Project in Nashik, is a project of Nashik Municipal Corporation in cooperation with GIZ as implementation partner. The plant is treating biodegradable waste and septage generated in the city and generates energy through biogas for feeding it into the Maharashtra power grid. It is one solution which, through co-processing of septage (faecal sludge) with organic solid waste will generate energy from urban waste. This project is an attempt to showcase a viable business model for implementation of waste to energy projects through a Public Private Partnership (PPP) and is built on a comprehensive financial and operational model.

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. The organic waste from hotels is segregated at the collection points. In a first step, organic waste and septage will be treated separately. The organic waste will once more be cleared from any foreign matter, fed to a crusher and then mixed with septage to form a slurry. The slurry is continuously agitated and forwarded to the digester. Option of pasteurization of septage using excess heat is kept open for further use of excess digest-ate to produce organic fertiliser. The co-fermentation process takes place in the bio-digester producing approx. 2,500m3 biogas per day

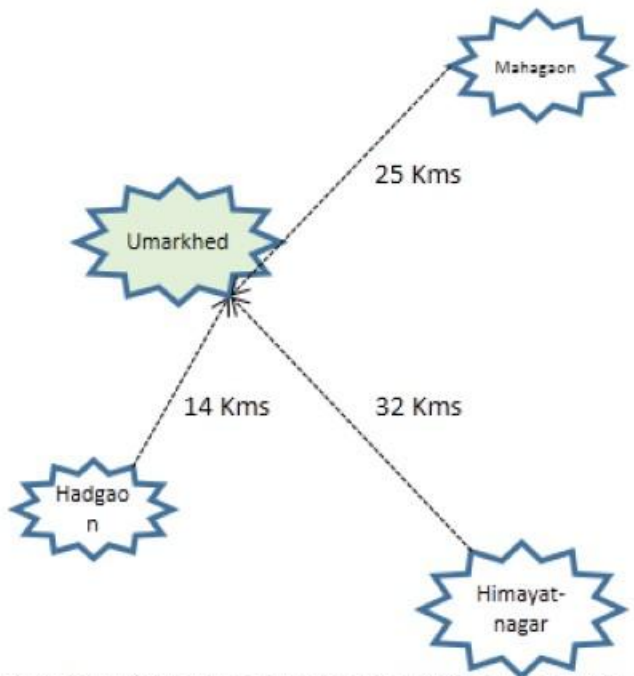
Source: https://www.international-climate-initiative.com/fileadmin/Dokumente/2017/171201_WtE_Brochure.pdf

A common treatment facility for a cluster of ULBs..(1/4)

Cluster based FSTP

When co-treatment at nearby STP and with SWM treatment facility is not a feasible option, then city should plan for new septage treatment facility. A cluster of cities (3-4 cities) who do not have an FSTP can create a common treatment facility.

- The Clusterization can be designed considering following factors:
  - Nearby cities within radius of 20-30km
  - Optimizing septage generated
  - Within same district
- In each of clusters, a regional FSTP may be developed.



Source:: Adopted from Guidance note on Municipal SWM on a regional basis, MoUD, GoI

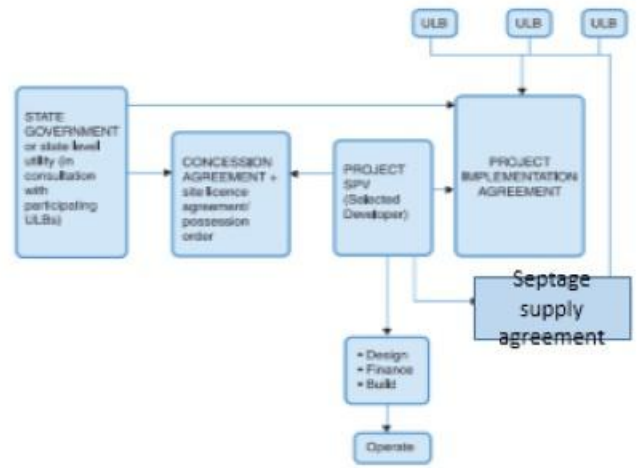
Land:

- Land can be provided by either of the ULBs and act as the leading ULB.
- Land can also be provided by the state.

Financing aspects:

Institutional framework:

Applicable only to projects where the land for the Regional FSTP Project is being provided by the state government and is vested with the state government.



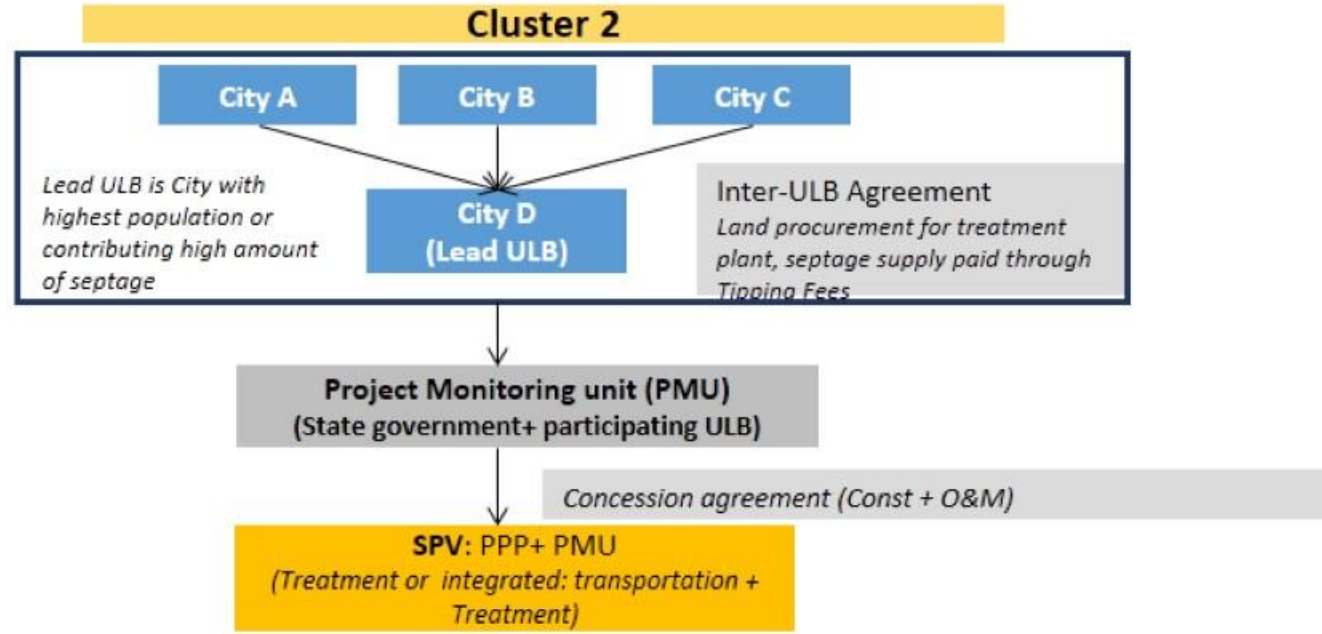
A common treatment facility for a cluster of ULBs..(2/4)

Cluster based FSTP

Institutional framework:

- **Authority Concession Agreement Structure:** applicable in projects where the land for the Regional FSTP Facility is being provided by a particular ULB. The ULB providing the land for the Regional FSTP Project or generating maximum waste will act as **LEAD ULB.** For each cluster, an inter ULB agreement will be signed among the participating cities.

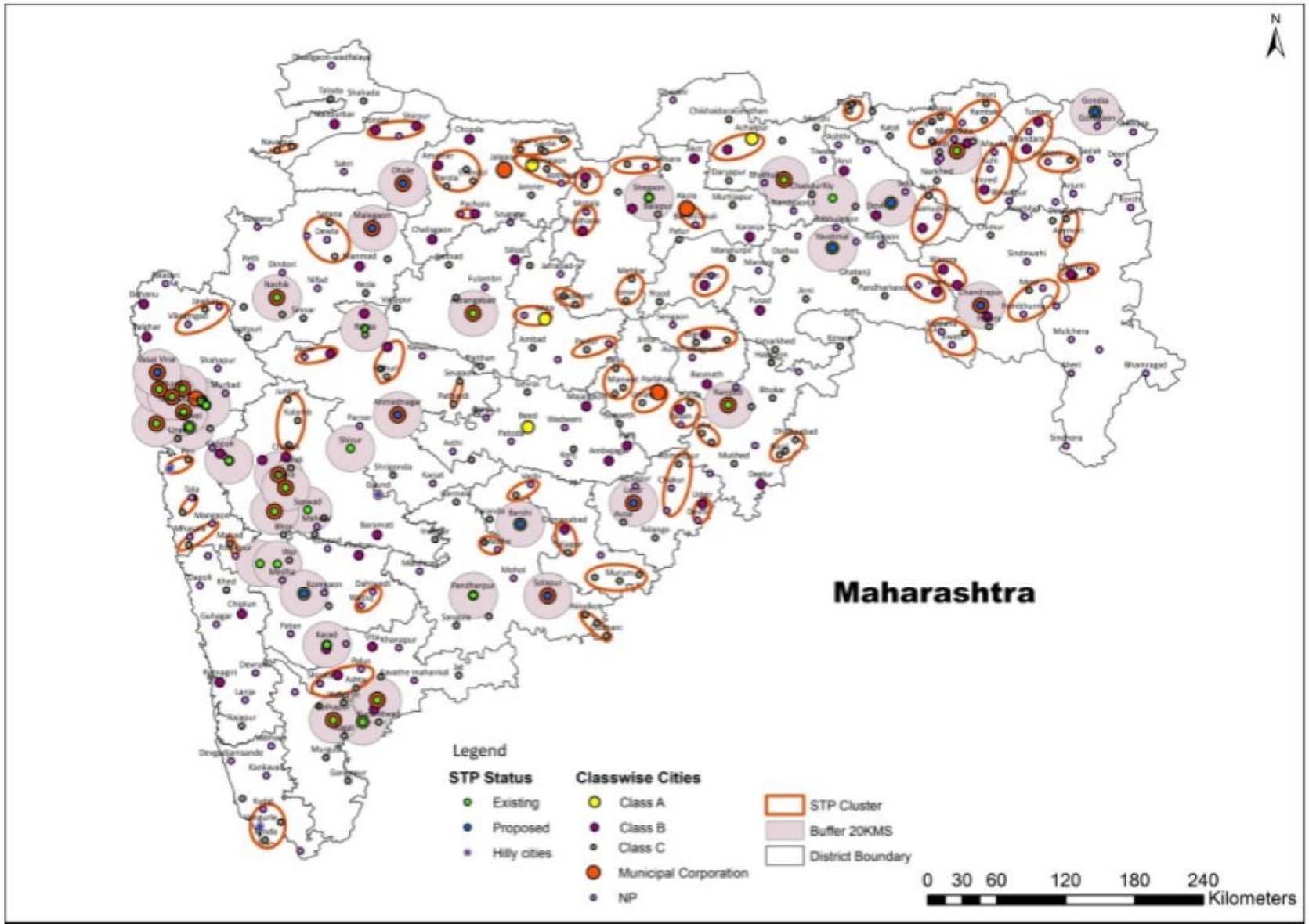
- The **lead ULB** will provide- land for FSTP, appoint independent engineer unit, manage escrow account with concessionaire, interfacing between **GoM** and participating ULB. Performance monitoring, regular meeting with monitoring committee.



Source: Adopted from Integrated Municipal Solid Waste (Msw) Management Project For Zone-iv Of Andhra Pradesh, Draft Detailed Project Report (Dpr) For Atmakur (Cluster V) Nellore Cluster – Atmakur, Kavali, Gudur & Nellore, Oct-2016

A common treatment facility for a cluster of ULBs..(3/4)

Cluster based FSTP

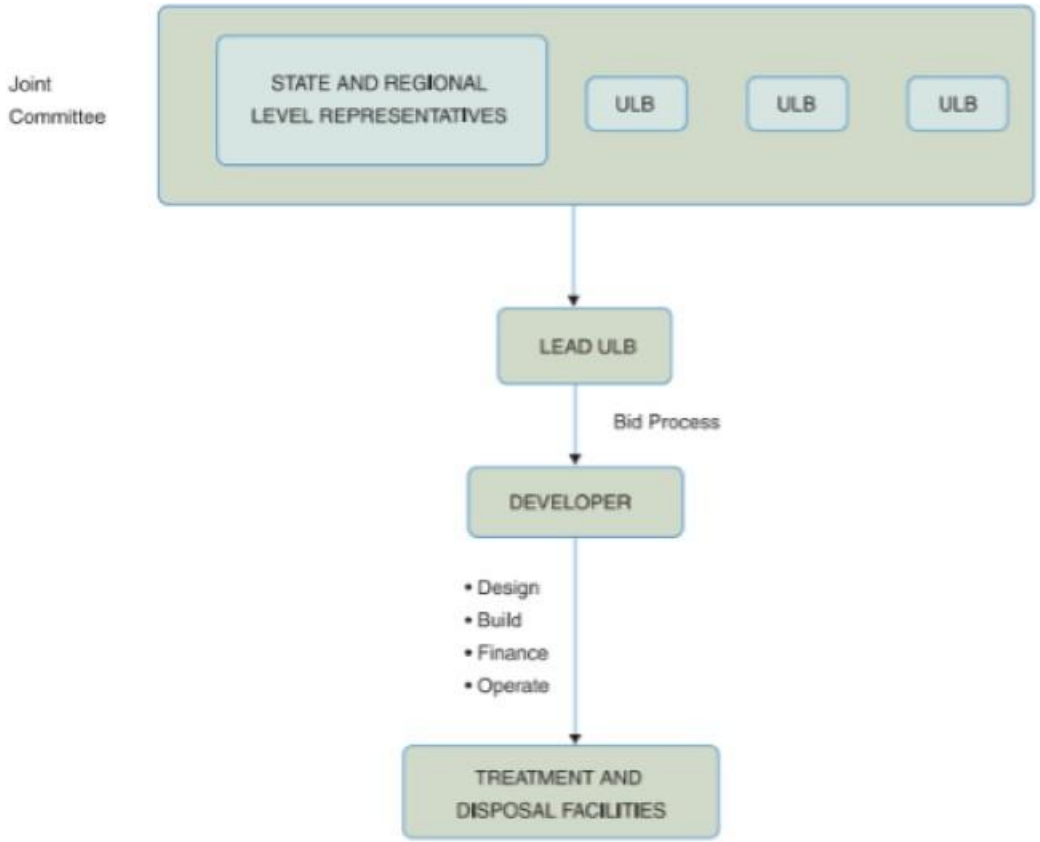


The case of Maharashtra

- Clusters within radius of 20-25 km radius are identified.
- The cities are present in the same district.

A common treatment facility for a cluster of ULBs..(4/4)

Cluster based FSTP- Learning from the case of cluster based SWM treatment plant



Shared Solid Waste Management Facility for Alandur, Pallavaram, Tambaram (Tamil Nadu, India)

Alandur, Pallavaram and Tambaram, three municipalities in the Chennai Metropolitan Development Area (CMDA), each faced issues with regard to disposal of MSW: Alandur was using marshy lands on the city outskirts to dump its untreated waste, and was facing public interest litigation from environmental groups in the city; Tambaram was facing objections to its dumping practices due to proximity to the air force base; and Pallavaram could not identify any site for treatment and disposal of its solid waste.

In 2007, the Government of Tamil Nadu, acting through the Commissionerate of Municipal Administration (CMA), urged the three municipalities to work jointly to address their MSW management issues.

The ULBs acquired a 50-acre site at Venkatamangalam from the State Revenue Department for the purpose, situated within 10 km (approximately) of each ULB. The cost of the site was met equally by the ULBs and through state funds. The land has been registered in the name of all three ULBs.

The contract for this was awarded in early 2009. The Concession Agreement was entered into by Pallavaram Municipality acting as the nodal agency for the project as designated by CMA. The Environmental Impact Assessment and clearances for the site were obtained in 2010

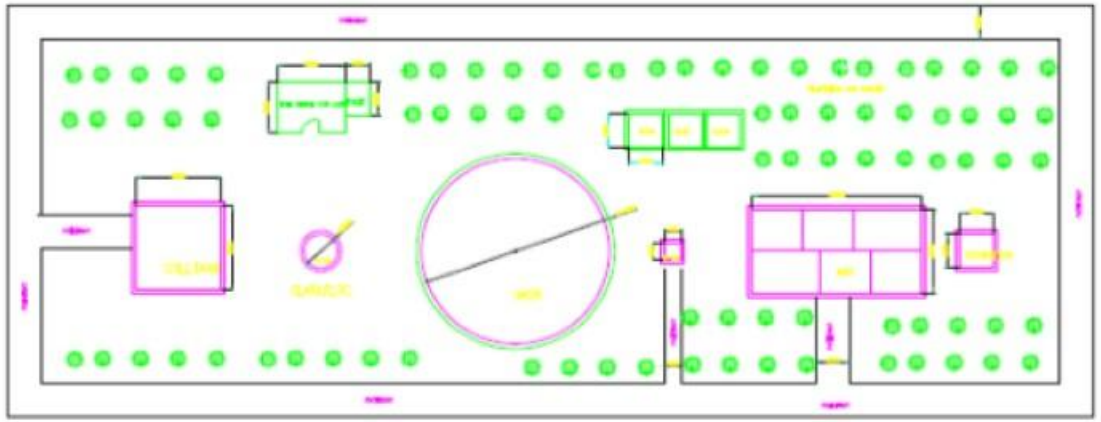
Source: MoUD "Guidance note on Municipal Solid Waste Management at Regional basis"

When no other option is feasible, individual FSTP must be adopted

Individual FSTP

- When an co-treatment at nearby STP and with SWM treatment facility is not a feasible option, then city should plan for new septage treatment facility.

Individual FSTP in Sinnar



Population	**~75,000**
Plant capacity	**70 m3/day**
Area	**650 Sq mt**
Construction Cost	**Public funds (Capital)** **Sanitation Tax (O&M)**
Operated by	**Private sector**

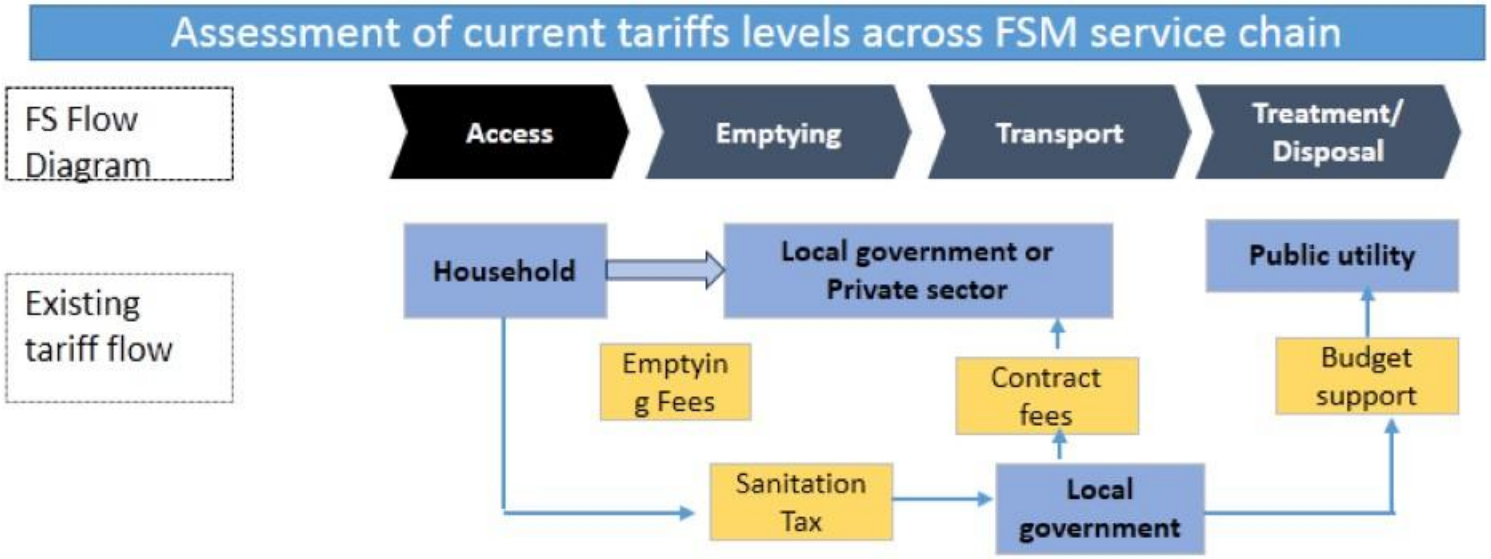
Land:

- Land would be required to build an individual FSTP.
- One of the major challenge for building an FSTP is of allocation of land. The NIMBY concept refrains people from building FSTP in their neighbourhood.

Financing aspects:

- Public funds can be used for capital investment for individual FSTP.
- PPP or VGF model can also be adopted for individual FSTP.
- O&M charges through contract fees paid by taxes.
- Options of tipping fees can be explored for operating expenses of FSTP.

To make FSM activities sustainable, meeting operating expenses is important



Once the FSM services are in place, a major challenge is be to ensure that sufficient funds for operation and maintenance activities are available. Typically the collection and conveyance of FSS is paid for by households as a fee to the service provider. However, FSS treatment, for which the capital costs are met by public funds, the operational costs have to be met by local authority from its general budget. Such assessments of O&M fund requirement are often not done. Local authorities will have to levy additional taxes and/or fees to meet the requirement of O&M funding.

In some cases, this may also be met by using some part of property taxes for this purpose through an appropriate escrow account mechanism. This would require analysis of municipal finance, buoyancy in local tax revenues and identification of threshold limits of general taxes that can be levied to fund operation and maintenance of FSSTPs.

- Local government become financially sustainable by leving taxes and/or user charges so as to recover O&M costs of recent urban development programmes.
- It is therefore imperative that any proposed investment plan includes ways to recover O&M costs.
- Besides meeting operating expenses, the ULB is required to keep sufficient surplus to meet repayment obligations in addition to its committed capital expenses.

Potential sources and approaches for recovering operating expenses of FSSM

Sanitation Tax/Other Taxes

To sustain the service chain recovering operating expenses must also be considered.

Sanitation tax can be levied to recover the operating expenses of FSSM services. Apart from sanitation tax, it is also possible to allocate a percentage of property tax or any other tax for FSM O & M expenses.

These service would be used in making payment to the operators for emptying (if private sector involved) as well as for operating the feacal sludge treatment plant.

User Charges

User charges are collected during the emptying of the septic tank. This is the most relevant practice which is observed in India.

Tipping Fees

Private entities are charged disposal fees for disposing FS at the treatment plant.
This service would be used in making payment to the FSTP operators.

Reverse Tipping Fees

Private entities are tipped by the treatment plant operator for disposing FS at the treatment plant.

Reuse Market

Resource recovery acts as source of fund for recovering the operating expenses of FSSM. Products having higher market value in that region must be considered as a by-product of the faecal sludge.

On the basis of the identification of the industry and market nearby the reuse of treated Faecal sludge must be decided.

The other factor deciding the reuse market would be the willingness to reuse the treated septage and water. Also assessment of how much they are willing to pay to buy these by-products must be done.

Existing practices of tariffs and reverse tipping fees for desludging...

Reverse Tipping Fee FSM Business Model of Faridpur, Bangladesh	In Faridpur, a business model is developed which involves three parties the municipality, the sweepers cooperative and a treatment plant operator (TPO). A PPP model was adopted to run the FSSM services in the city. The pit emptiers are paid by their clients for emptying services. Also the TPO pay (reverse tipping fees) the emptiers when they deliver sludge to the treatment and composting plant. Viability of the TPO is supported by cross-subsidies from the municipality, using income from the lease of machinery to the pit emptiers.
Clubbing Tariff with water charges Balipapan, Indonesia	In Balikpapan, Indonesia the city is planning for regular scheduled desludging of the septic tanks every 4 years along with demand based desludging. The desludging tariff is paid monthly over four years, charged in the monthly water bill of the city water utility's customers. This means the tariff for regular desludging depends on the customer's water tariff. The fee for on-demand emptying is higher than the total paid over four years for regular desludging to make the latter more attractive to households.

Source: Noemie de La Brosse, Dr. Lucy Stevens and Rafiul Islam (2017) 'Case studies compilation-FSM4 '

Examples of sanitation tax or user charges present across various states in India

State	Sanitation Tax	User charge/ fees/ cess
Gujarat	General sanitation tax upon private latrines, premises or compounds cleansed by municipal agency	
Maharashtra	Special sanitary tax upon private latrines, premises or compounds cleansed by municipal agency	
Uttar Pradesh/ Uttarakhand	a conservancy tax in areas in which the Corporation undertakes the collection, removal and disposal of excrementitious and polluted matter from privies, urinals and cesspools	-
Punjab	Scavenging tax as percentage of annual value	Sewerage Cess
Haryana	-	a fee with regard to a scavenging
Rajasthan	-	User charge for provision of drainage and sewerage

Content

Financial requirement will mainly be dependent upon the strategy/mechanism and approach selected for emptying and treatment

	Conveyance	Treatment and Reuse/Disposal
Approach	**Demand Based Desludging** Scheduled based Desludging	**Co-treatment at STP** Co-treatment at SWM treatment plant Cluster Based FSTP Individual FSTP
Service Providing Agency	Public Agency Private Agency Private Contracted	Public Agency Private Agency Private Contracted
Source and Mechanism of Financing – **Capex**	Public Grants/ Schemes State Bud. ULB Bud. Private PPP VGF HAM Pooled Fin.	Public Grants/ Schemes State Bud. ULB Bud. Private PPP VGF HAM Pooled Fin.
Source and Mechanism of Financing – **Opex**	Tax User charges Reverse Tipping Fees	Tax Tipping Fees Reuse Revenue

Wai

	Conveyance	Treatment and Reuse/Disposal
Approach	**Demand Based Desludging** Scheduled based Desludging	**Co-treatment at STP** Co-treatment at SWM treatment plant Cluster Based FSTP Individual FSTP
Service Providing Agency	Public Agency Private Agency Private Contracted	Public Agency Private Agency Private Contracted
Source and Mechanism of Financing – **Capex**	Public: Grants, State Bud., ULB Bud. Private: PPP, VGF, HAM, Pooled Fin.	Public: Grants, State Bud., ULB Bud. Private: PPP, VGF, HAM, Pooled Fin.
Opex	Tax User charges Reverse Tipping Fees	Tax Tipping Fees Reuse Revenue

Odisha- AMRUT towns

	Conveyance	Treatment and Reuse/Disposal
Approach	**Demand Based Desludging** Scheduled based Desludging	**Co-treatment at STP** Co-treatment at SWM treatment plant Cluster Based FSTP Individual FSTP
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Source and Mechanism of Financing – **Opex**	Tax User charges Reverse Tipping Fees	Tax Tipping Fees Reuse Revenue

Dumaguete city, Philippines

	Conveyance	Treatment and Reuse/Disposal
Approach	**Demand Based Desludging** Scheduled based Desludging	**Co-treatment at STP** Co-treatment at SWM treatment plant Cluster Based FSTP Individual FSTP
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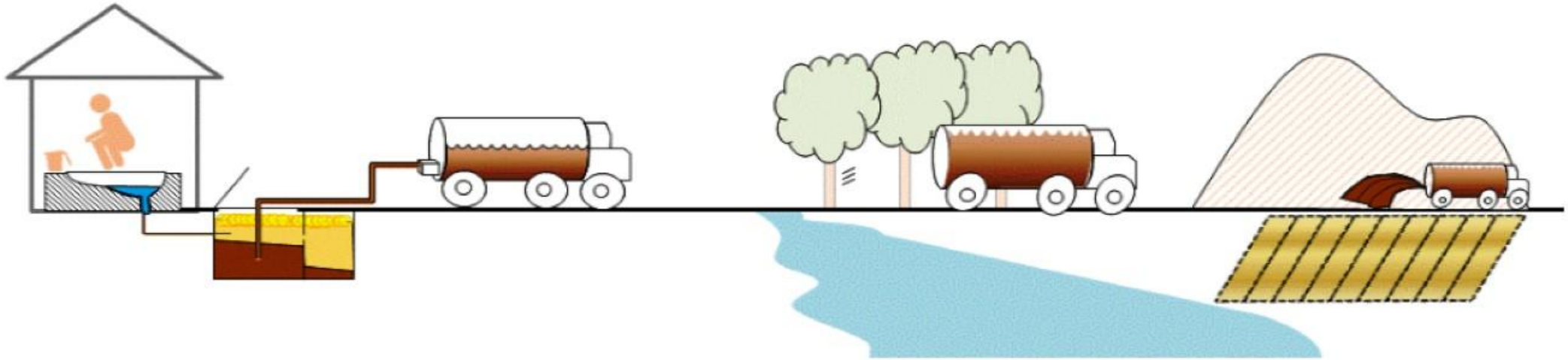
Source and Mechanism of Financing – **Opex**	Tax* User charges Reverse Tipping Fees	Tax Tipping Fees Reuse Revenue

*Tax based on user charges on water consumed bill

Content

Conclusion

- ✓ On the whole, the financing requirements for FSSM are not very large. It is generally felt, that these can be easily mobilized/leveraged from public finance.
- ✓ Innovative financing mechanisms- Hybrid Annity Model (HAM), Viability Gap Funding (VGF) etc. can be used to bring private sector investments in FSSM services.
- ✓ For conveyance of Fecal Sludge- Private enterprises are already active and invest their own capital. The revenue model is also clear (user fee/taxes) and sufficient to meet the cost. Private enterprises need short term capital finance as the payback period is short.
- ✓ For FS treatment - Public Finance will remain a key source, as the revenue models are not remunerative (tipping fee, sale of compost, treated water). But with HAM, VGF, it is possible to involve private enterprises.
- ✓ Co-treatment options and cluster based treatment approach can reduce the capital investment need.
- ✓ Various matrix can be explored for conveyance and treatment according to the context of the city and state.



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