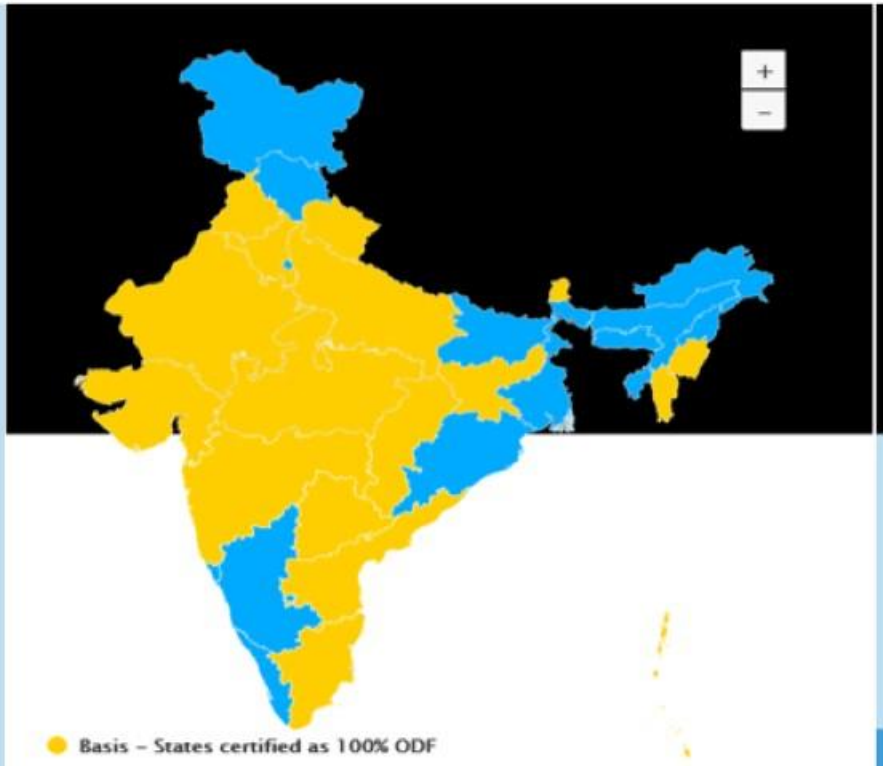
Exploring Development Impact Bonds for Faecal Sludge and Septage Management (FSSM) Urban Sanitation

Round Table Discussion
25th February, 2019

Center for Water and Sanitation, CEPT University

Achievements under Swachh Bharat Mission (Urban)

Focus has been largely on toilet construction



50,71,725	4,00,767	3,362
Constructions Achieved	Constructions Achieved	No. of Cities
Individual Toilets	**Community & Public Toilets**	**Open Defecation free**
100% Door to Door Waste Collection	**Waste to Energy**	**Waste to Compost**
Wards Achieved	Current Production (Mega Watt)	Current Production (Metric Ton)
67,085	**88.4**	**15,06,501**

The next challenge is to **sustain the ODF status** and move beyond to **attain ODF+ and ODF++** status with **efficient and scientific liquid waste management** across the sanitation value chain.

Source: SBM website (Dated – 27.11.2018)

Sustainable Development Goals (SDG) and safely managed sanitation

SDG 6 relates to clean water and sanitation

Target SDG 6.2 states that by 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation.

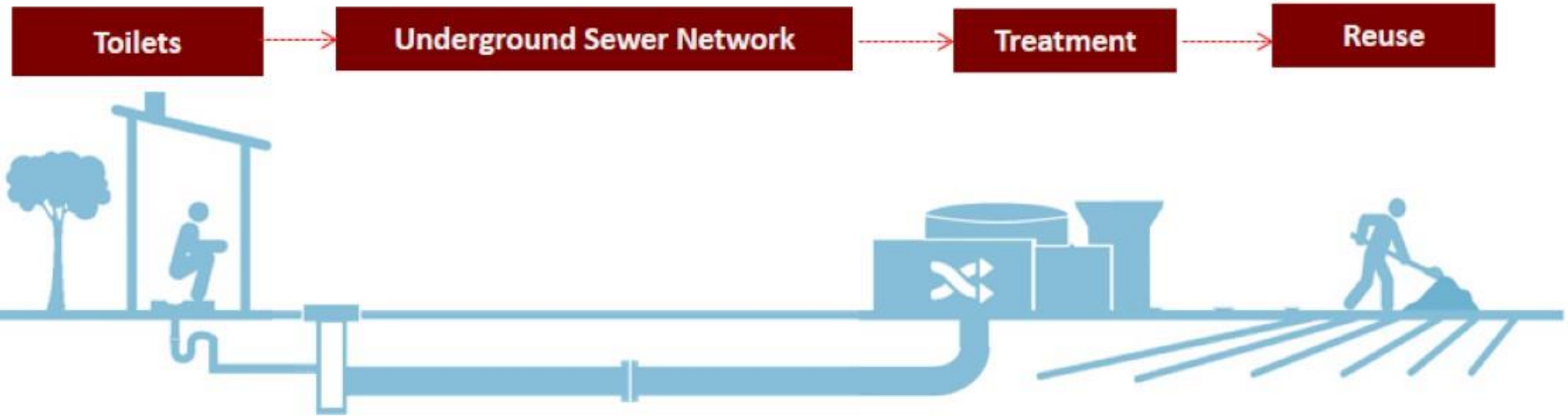
Sanitation ladder of JMP (WHO-UNICEF)

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	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
BASIC	Use of improved facilities that are not shared with other households
LIMITED	Use of improved facilities shared between two or more households
UNIMPROVED	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines
OPEN DEFECATION	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces, or with solid waste

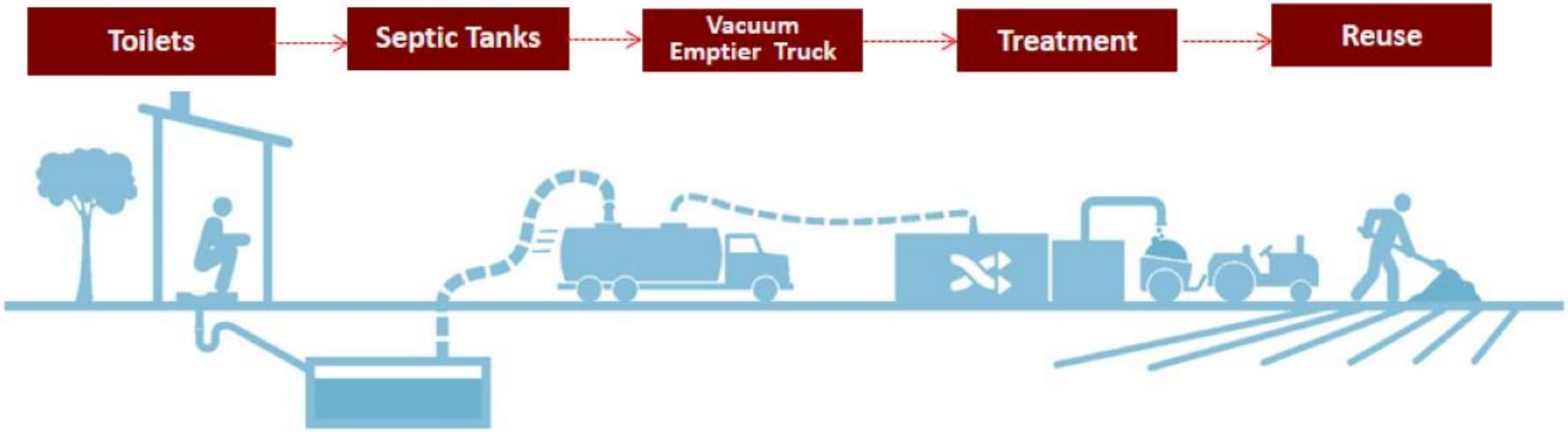
Note: improved facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs.

Safely managed sanitation systems can be achieved through Sewerage systems or through FSSM

Sewerage systems

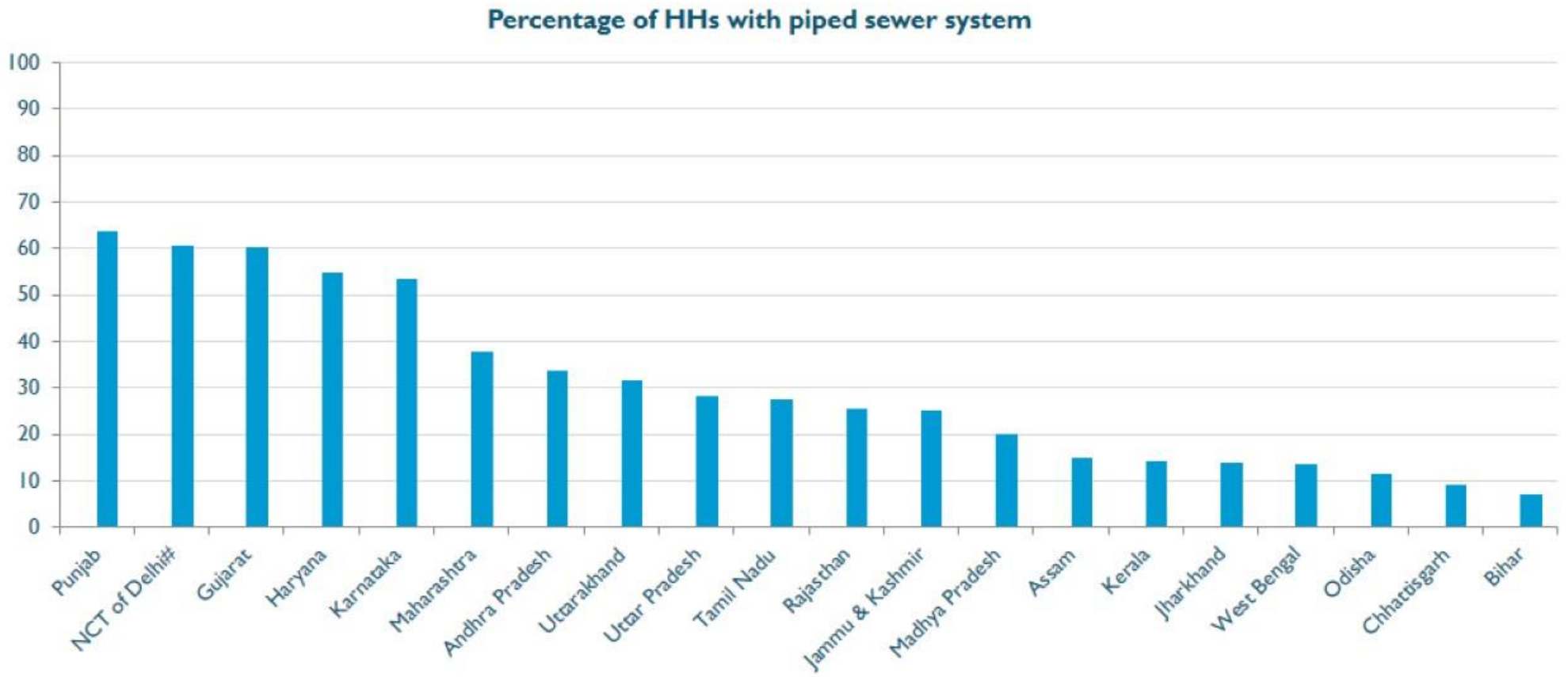


Fecal Sludge and Septage management



Sewerage systems are not common in urban India

Only 33% of urban households have access to piped sewerage system



Census of India. (2011); Availability and Type of Latrine Facility: 2001-2011 under Houselisting and Housing Census Data Highlights – 2011. Retrieved in April 2012 from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

Investment requirement for sewerage infrastructure in India

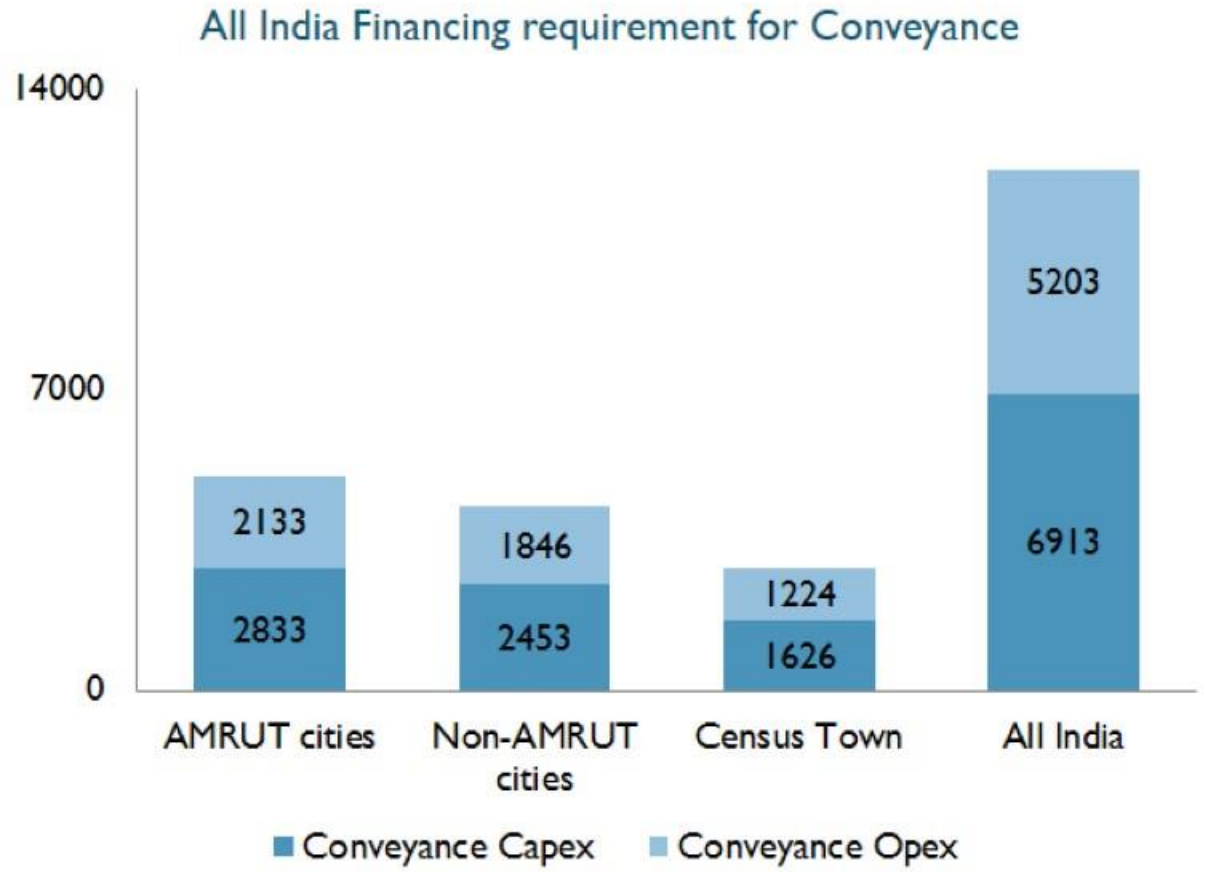
Investment requirement for 2012-2031
Rs. Crore in 2009-10 prices

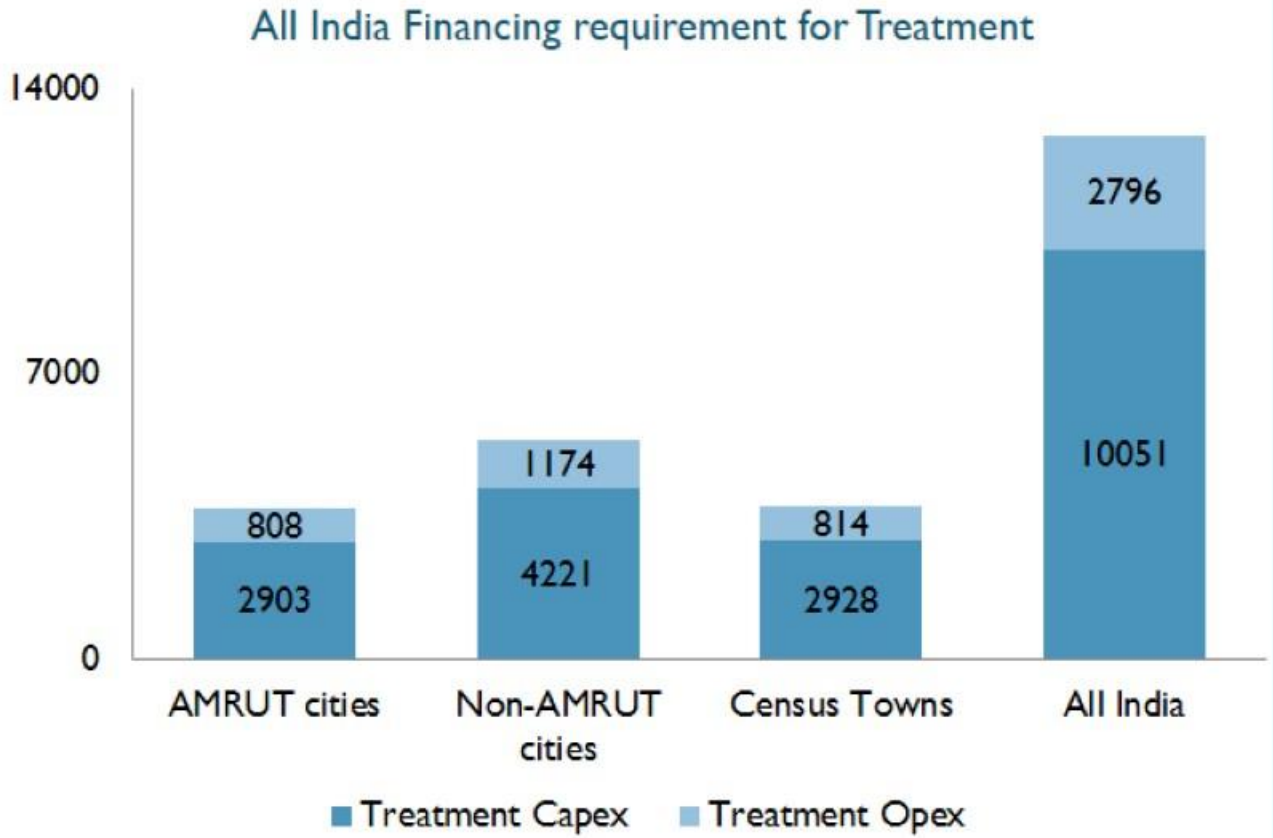
Capital investment Requirement	2,42,688
O&M Requirement	2,36,964

As per the 2011 HPEC Report, more than Rs. 242,000 crore required for 100% collection and treatment of wastewater using conventional centralized sewerage systems

HPEC (2011) "Report on Indian Urban Infrastructure and Services"

All India estimates for financing FSSM in urban areas capex ~ Rs. 17,000 Cr and opex ~ Rs. 8,000 Cr





Source: Analysis from CEPT study on Financing FSSM services across four states, BMGF grant, 2018

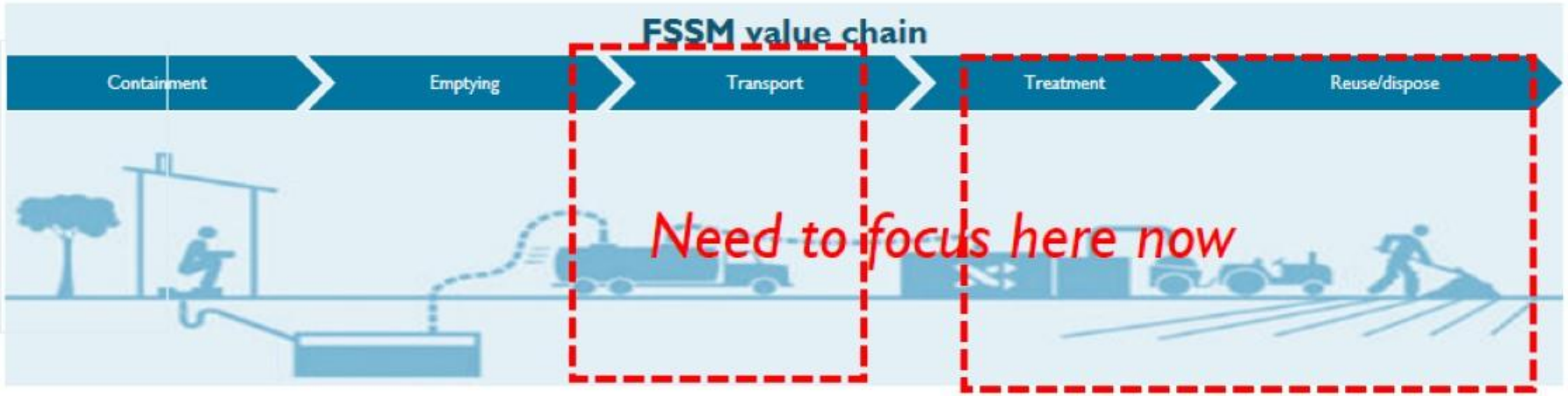
With FSSM it is possible to address the challenge of countrywide coverage of safely managed sanitation

Safely Managed Sanitation

How can India achieve universal access to safely managed sanitation?

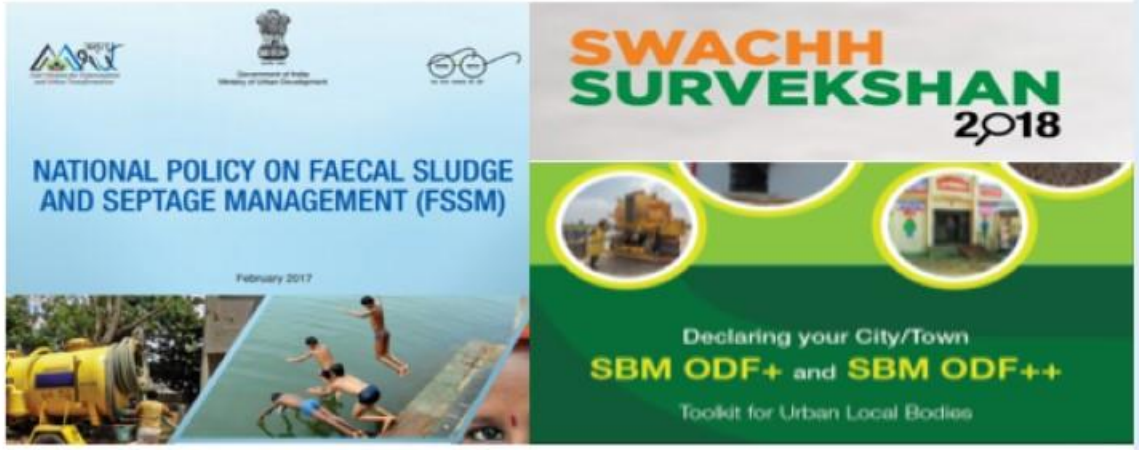
To achieve safely managed sanitation, a proven approach is the service chain of faecal sludge and septage management

Safe containment, conveyance, treatment, disposal/reuse



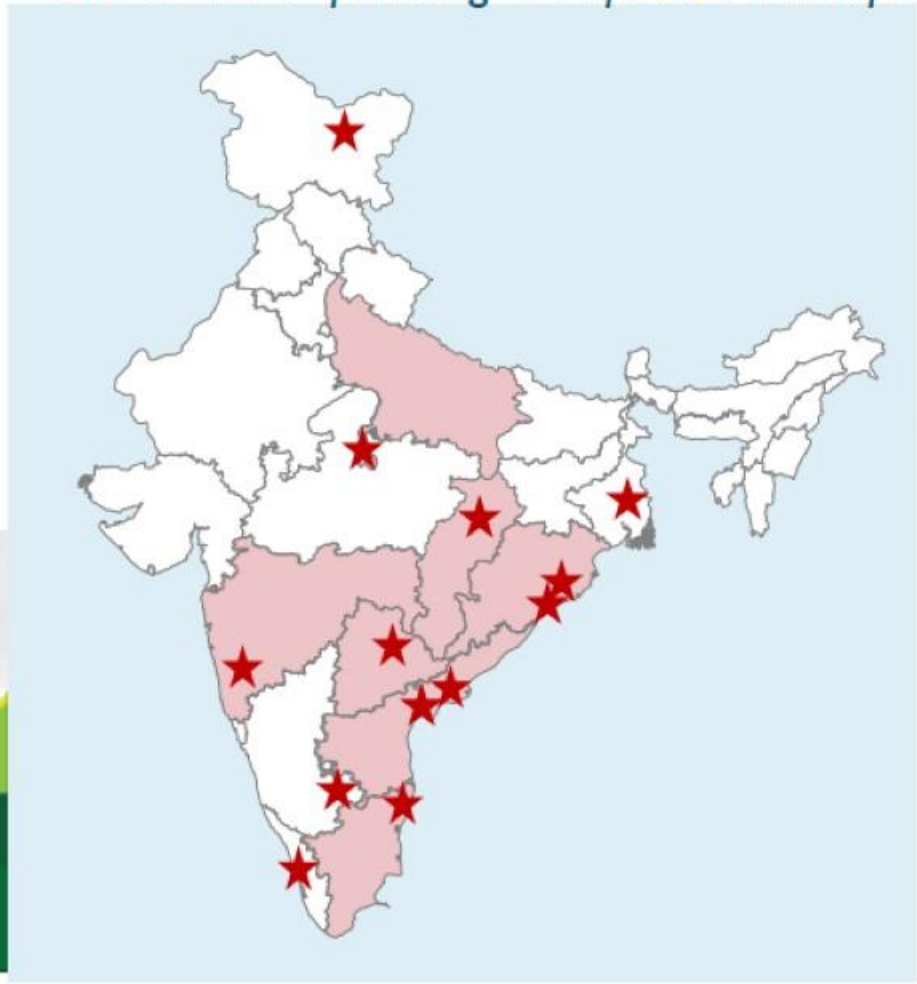
Recognition of FSSM at National level

- Over the past two years FSSM has received increasing attention and a national FSSM policy has been adopted.
- Government of India has undertaken several policy and programme initiatives, AMRUT FSSM sub-mission
- Many states have undertaken FSSM projects in their cities
- Their have been many innovative practices which have potential for scaling up in other cities/states.



Focus has been largely on FSTP construction…

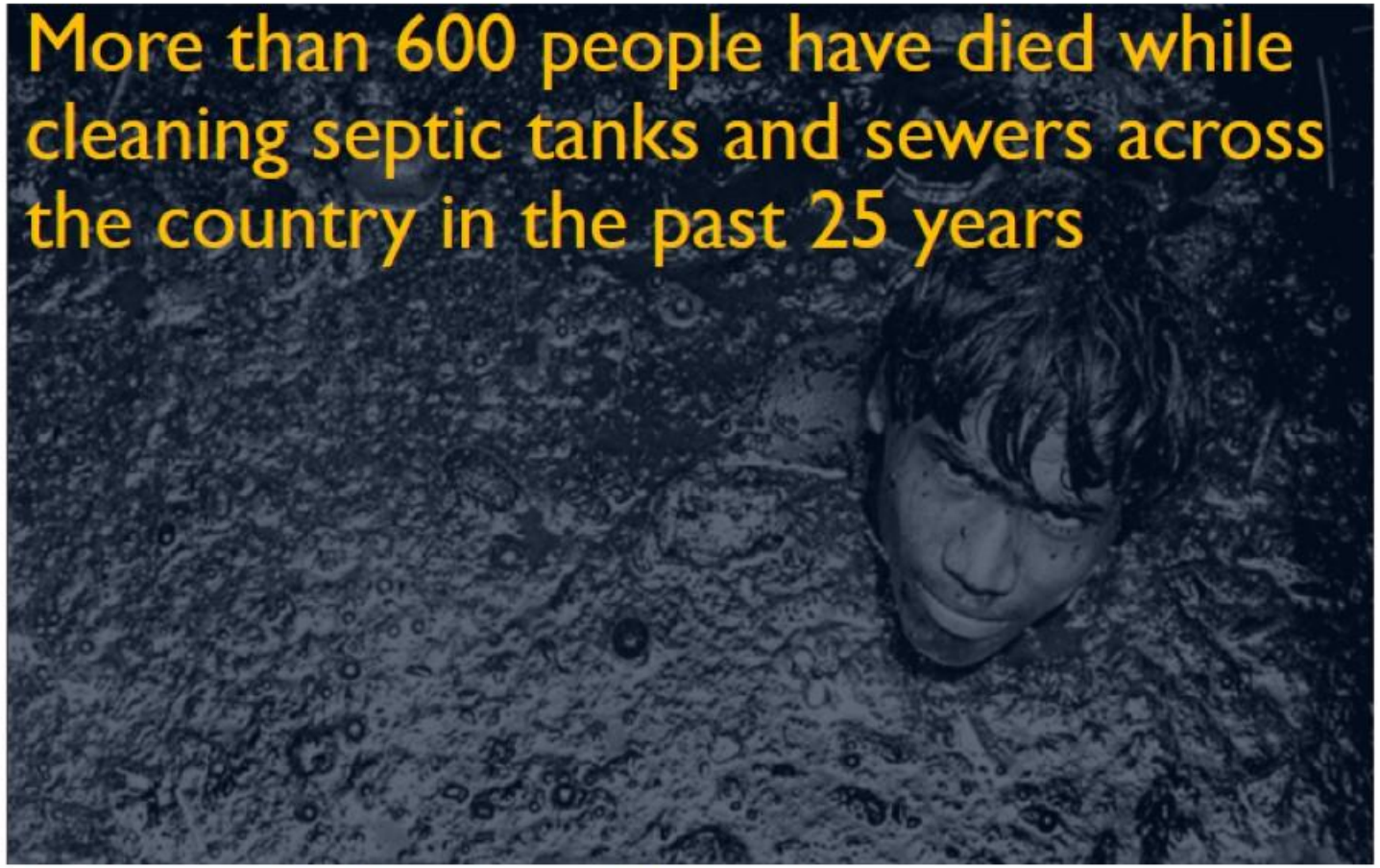
~300 FSTPs at planning or implementation phase



Progress is still slow…

Focus needs to be both on desludging and treatment …

Why it is critical to invest in FSSM?



According to data collated by the National Commission for Safai Karamcharis.

Benefits from investment in FSSM / sanitation

EXPECTED IMPACT

Improved health and reduction in disease outbreaks

Increased safety for sanitation workers

Significant reduction in water and soil pollution

The public health consequences of untreated sewage are immense; for example, diarrheal diseases contribute to 20% of deaths in children under the age of 5.[2]

Large social, economic and environmental benefits

- Improved health – morbidity and mortality
- Time savings
- Improved environment – river and ground water quality,
- Reduced exposure to FS in environment
- Improved safety and dignity for women
- Increase in property values

The health and environmental impacts of inadequate sanitation in India add up to Rs. 2.44 trillion (US$53.8 billion) a year —this was the equivalent of 6.4 percent of India's GDP in 2006.[3]

Studies by UNICEF, World Bank and BMGF

Source: Sector track report SDG #6 Clean water and sanitation, Prabhav 2018 by Intellecap, FSM brochure, Samhita

Current practice of desludging in Indian cities is of complaint redressal

Small towns pay higher prices

Low frequency of desludging

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

Will affect ODF sustainability

Poor and LIG households tend to avoid use of toilets as 'pits/tanks' will fill fast and they want to avoid paying high prices for 'emptying'

Informal service providers

Small towns Pay more

Low frequency

Environmental Impacts

High costs

Chances of Manual Scavenging

Current desludging models are operated by small private service providers, often informal

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

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

Scheduled desludging can achieve regular emptying as recommended by CPHEEO

Demand Desludging	v/s	Scheduled Desludging
Desludging is done **on-call** basis		Septic tanks is desludged **once in three years** on pre-determined schedule
Desludging **services** treated as a **complaint redressal** system		**Service provision (service contract) + regulations** to ensure scheduled desludging
Households **pay user charges**		**Sanitation tax levied** by the ULB

See MOUD and CPHHEO with JICA(2013), "Manual on Sewerage and Sewage Treatment Systems - 2013 ; Part-A Engineering", Chapter 9., p. 9-22

Why Development Impact Bond?

Focus on outcomes

Rather than only inputs or outputs

Monitoring systems

Introduce a culture of good and strong monitoring systems

Collaboration

Collaboration and partnerships are critical

Attract new investors

Create opportunities to attract new impact investors for sanitation

Structure to attract large and small investors

Create structures to attract both large impact investors (new generation of families/ Foundations) ones, but also smaller ones of the type that have invested in HDFC Cancer Debt Fund

Attract CSR funding

Attract CSR funding focusing on to results based outcomes and for sanitation- possibly as outcome payers

Why DIB for FSSM…??

An impact bond for FSSM is envisaged to provide –

- A case that scheduled desludging done in a proper manner is possible and profitable
- Enterprises and local governments need demonstration models to emulate
- Desludging operations require less initial outlays but benefits are large and residents are willing to pay taxes/ user charges for this service
- Treatment facilities may need to be at least partially funded by governments – but the emerging HAM models will require initial capital by private service providers
- Demonstrate effective role of private sector provider in the FSSM service chain

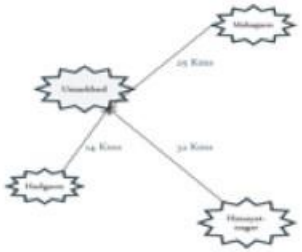
Possible options for a DIB in FSSM

1

Scheduled desludging of Faecal Sludge/septage

2

Integrated collection, transport and treatment of Faecal Sludge/septage



3

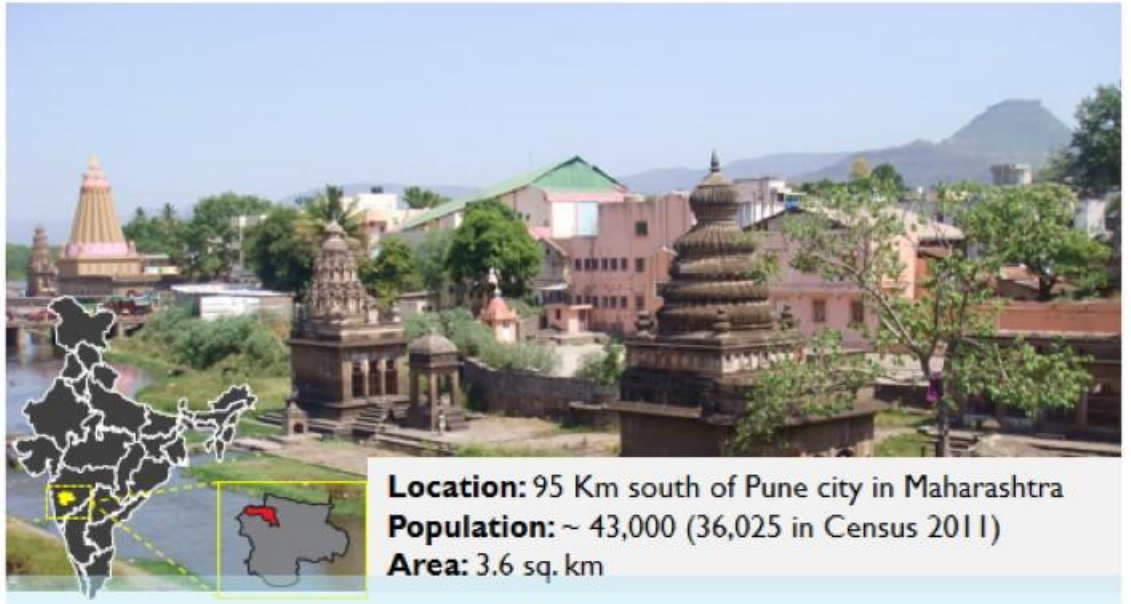
Integrated cluster model for scheduled desludging and treatment

CEPT is working with State Government of Maharashtra and supporting 9 cities for FSSM implementation

Wai: *1st city in India to implement scheduled desludging services*

Innovative approach:

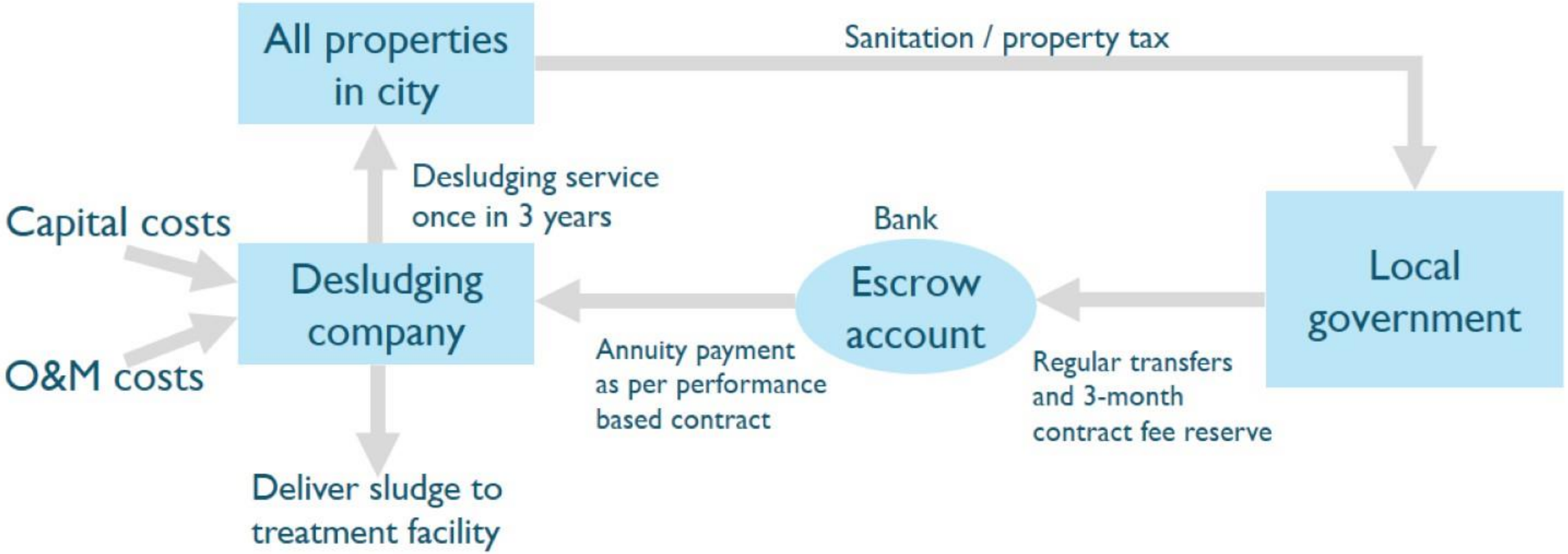
- Performance linked annuity model for scheduled desludging using a PPP route
- Levying a sanitation tax for FSM
- Fecal sludge treatment plant funded by BMGF
- Monitoring systems



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

- 7-8 septic tanks desludged per day as compared to 7-8 per month in 2017 when demand desludging was happening.
- 2.5 million litre 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

Performance linked annuity model for scheduled desludging …

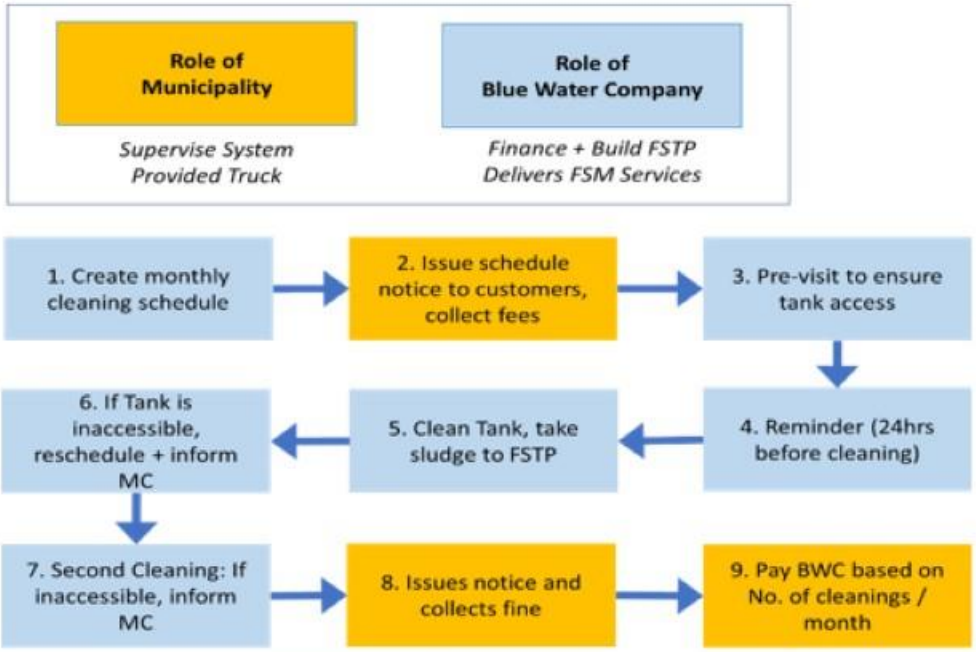


Scheduled septic tank desludging services started from June, 2018

Leh, J&K

Integrated model for scheduled desludging and treatment

LDA and Blue water Company have entered in 5 year Public Private partnership contract for scheduled desludging and treatment of fecal 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

Source: Poster on Leh (Ladakh)—India's first PPP in FSM

Leh, J&K

Integrated model for scheduled desludging and treatment

- 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

Source: Poster on Leh (Ladakh)—India's first PPP in FSM

Thailand

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

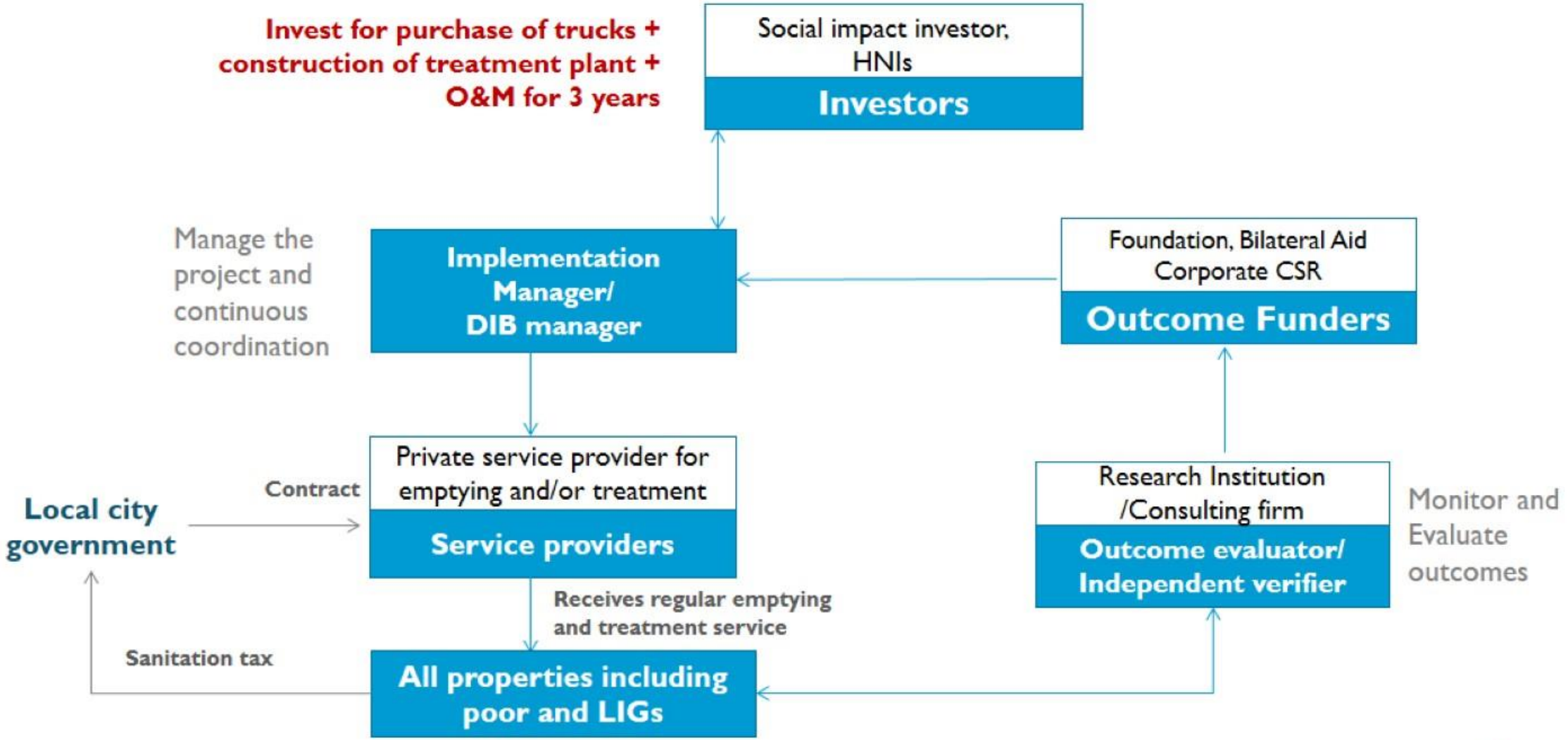
Population
3,98,656

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**
- **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 provides 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.

Source: NATS group at AIT (2018) "FSM Debrief - Thailand Twinning Program" Presentation at International Twinning Program on FSM in Thailand
Thongthawil service : https://thongthawil.com

Exploring a contract structure for a FSSM DIB



Measurable outcomes

	Scheduled desludging of FS	Treatment of FS
Activities	• Procurement of trucks • Operation and maintenance of emptying services for three year period • Monitoring systems	• Construction of treatment plant • Operation and maintenance of treatment plant for three year period • Monitoring systems
Measurable Outcomes	• All Households covered for emptying services, especially poor and low income households	• Volume of collected FS that is treated • Effluent characteristics of treatment plant meeting the environmental discharge standards (to be measured regularly for 36 months) • Amount of treated wastewater and compost reused
Social and environmental impacts	**Health:** Reduced diarrhea among children, reduce morbidity **Education**: school attendance **Environment:** Ambient water quality in rivers and other water bodies, improved ground water quality	

Monitoring systems for scheduled desludging

IT enabled systems

- Login for different user types
- Records desludging volume, status of access cover, photo of property
- Customer and operator signature – like Amazon delivery app

Dashboard

- Dashboard to show real time progress
- Downloadable MIS Results

Database

- Enables spatial information view

Septic Tank Desludging Report

Scheduled Emptying of Septic Tanks

SUMEET FACILITIES

Collection and transport record

Activity no: 14/02/19/01

Property details

Prop no: 07-1432-00
Type: Residential - Apartment
Address: समर्थ नगर, नाशिक पुना रोड, सिन्नर - 422103
Owner: श्री नितीन चंपालालचोरडीया
Phone no: 9873456234
Type of system Septic tank

Emptier details

Truck ID Sumit truck #1
Driver Raju.lal
Vehicle license no. 434/13/12345
Truck capacity 3000 L

Service details

Access cover open on arrival ✓
Volume collected 4560 L
Access cover replaced after emptying ✓
Emptier use proper safety gear ✓
Number of trips taken to empty 2

Emptying Date: 14/02/2019
Emptying Time: 14:20
Property owner
Emptier

Acceptance at treatment site and safe disposal

FSTP name: Sinnar FSTP and resource center
Disposal Date: 14/02/2019
Disposal Time: 14:50
FSTP operator:
Emptier

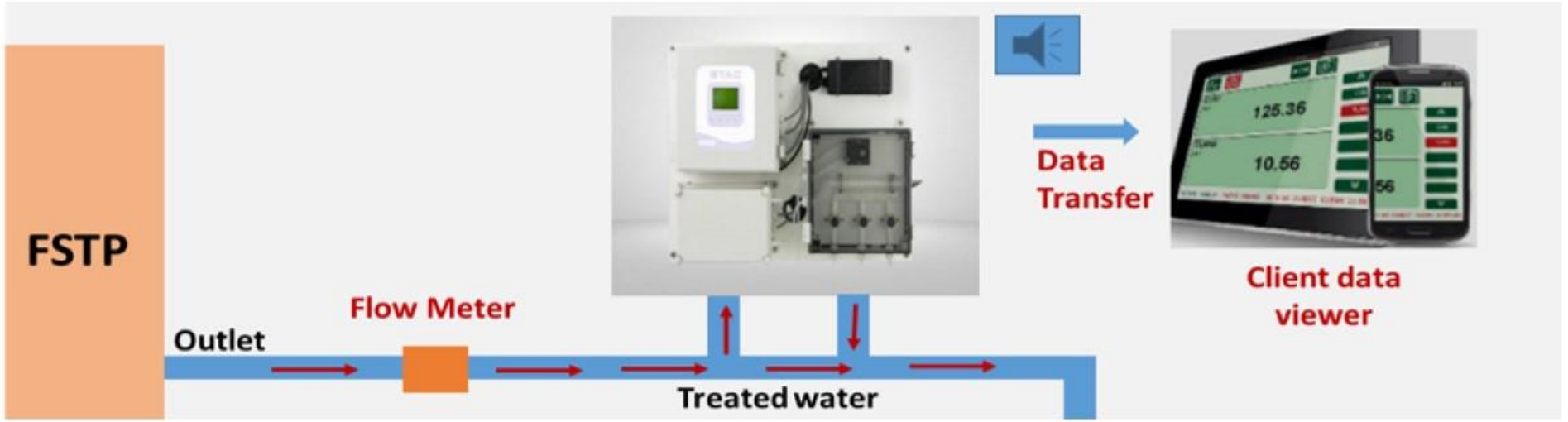
Monitoring systems for treatment

Online real time monitoring for treatment plant

- Captures safe unloading of collected sludge
- Interface to capture daily volume treated, quality testing results
- Alerts on web dashboard if results exceed permitted water quality levels

Treated water quality discharge (multi parameter)

- Multi parameter analyzer (Bod, COD, nitrate, turbidity)
- Online pH meter
- Flow meter
- Spares
- Real Time Online Effluent Monitoring- With On Line Calibration



Financial analysis

For an expected IRR for expected performance @12% at end of year 3

Scheduled desludging of septic tanks

Integrated desludging and treatment of FS

	Scheduled desludging of septic tanks	Integrated desludging and treatment of FS
Investment requirement*	INR 2.0 Crore *One time payment*	INR 4.0 Crore *One time payment*
Legal, monitoring and management cost By outcome funder	INR 0.5 Crore	INR 1.0 Crore
Outcome payment to investor @ Year 3 Considering threshold performance at achieving 50% of target	INR 2.7 Crore	INR 5.3 Crore
Total outflow of Outcome funder Considering Legal, monitoring and management cost	INR 3.2 Crore	INR 6.3 Crore

* For procurement of trucks and construction of treatment plant + O&M of 3 years

Discussion points (1/2)

- Size of DIB – Is there an appropriate minimum size ?
  - Design costs ??
  - Management and monitoring costs – through investors or outcome funders?
- DIB Structure – Experience from previous DIBs
- Indirect role of local government in DIB? Legal perspective?
- Challenges in implementing sanitation DIB?

Discussion points (2/2)

- Funding directly to for-profit service providers or through intermediary Institution/ NGO?
- Payment to investors at end of 3 years or intermediate payments? Expected IRR? Varying returns by performance levels ?
- Identification of potential investors and outcome funders
- How to take this forward?

Thank you

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About us

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.

CEPT UNIVERSITY

C-WAS Center for Water and Sanitation