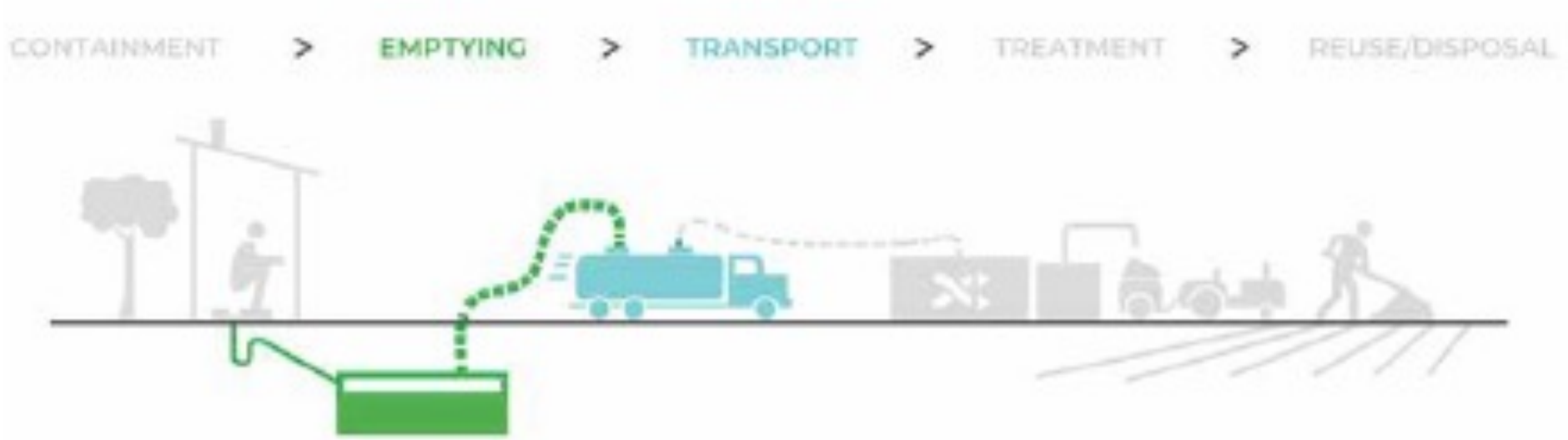


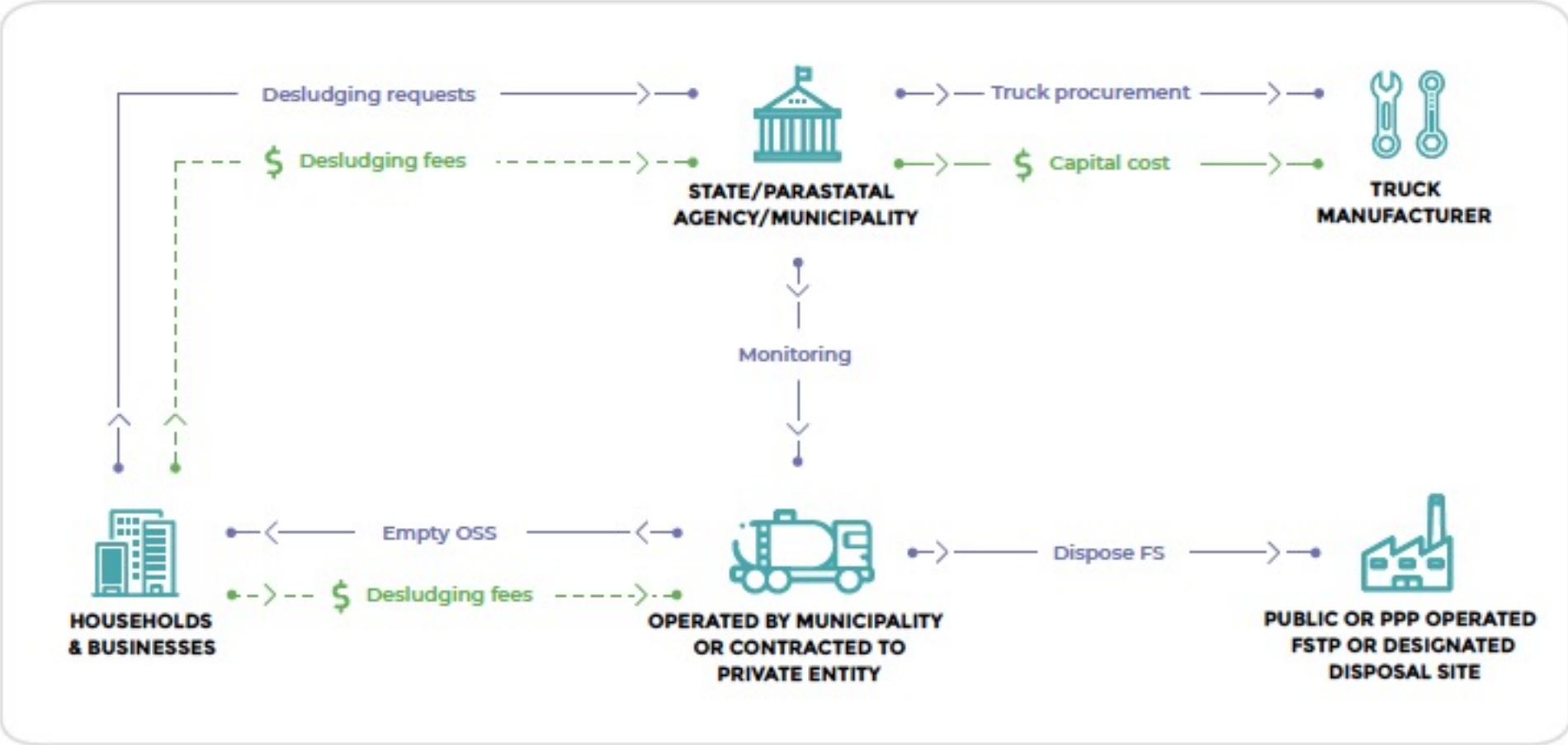
FSM Case Studies for Emptying and Transport and Market Structure

Krishna Rao

WASH Institute

Government owned E&T Model

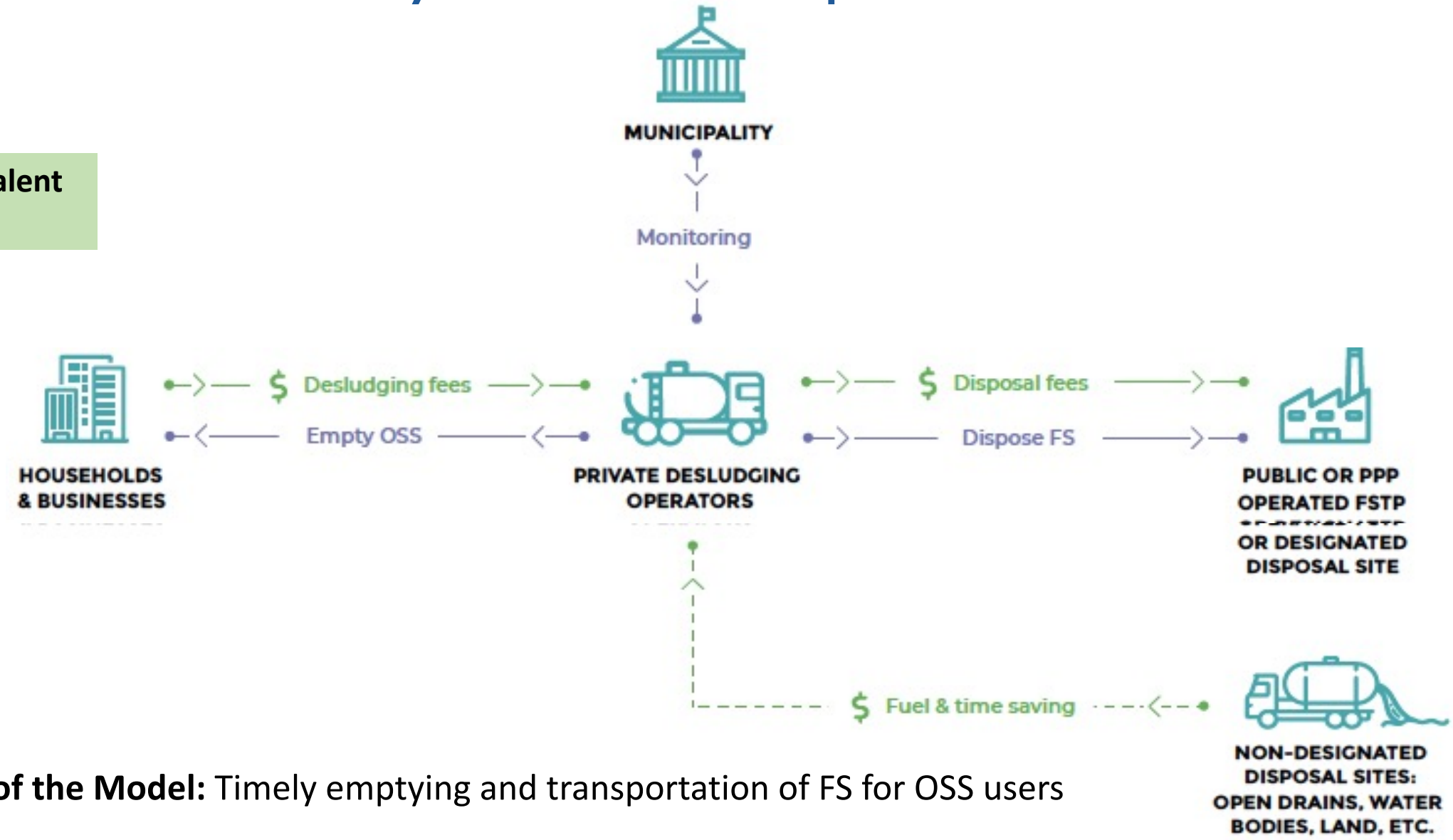
Cases: Most smaller towns in India less than 100K population



Objective of the Model: Affordable, timely and safe emptying and transportation of FS from OSS to designated disposal sites

Privately-owned and operated E&T Model

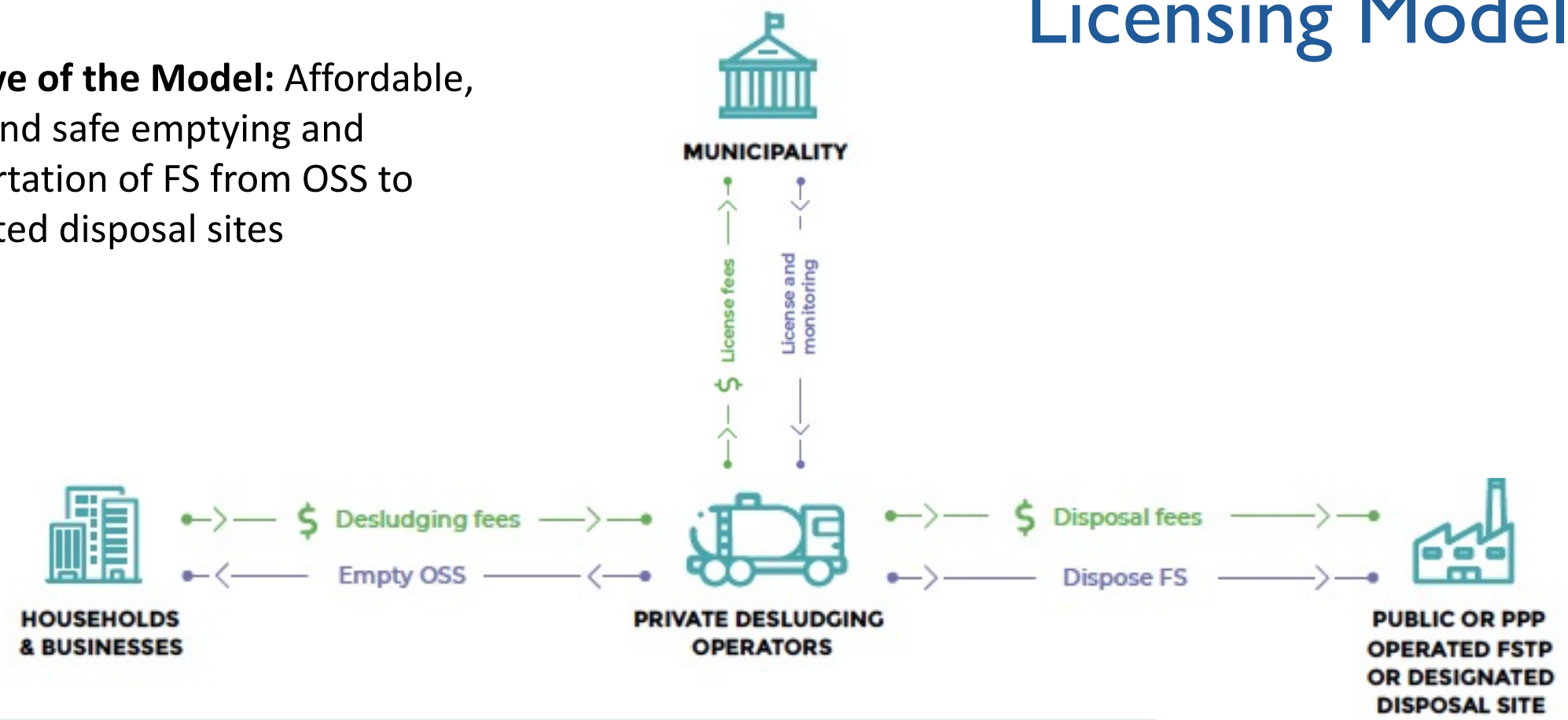
Cases: Prevalent across India



Objective of the Model: Timely emptying and transportation of FS for OSS users

Licensing Model

Objective of the Model: Affordable, timely and safe emptying and transportation of FS from OSS to designated disposal sites

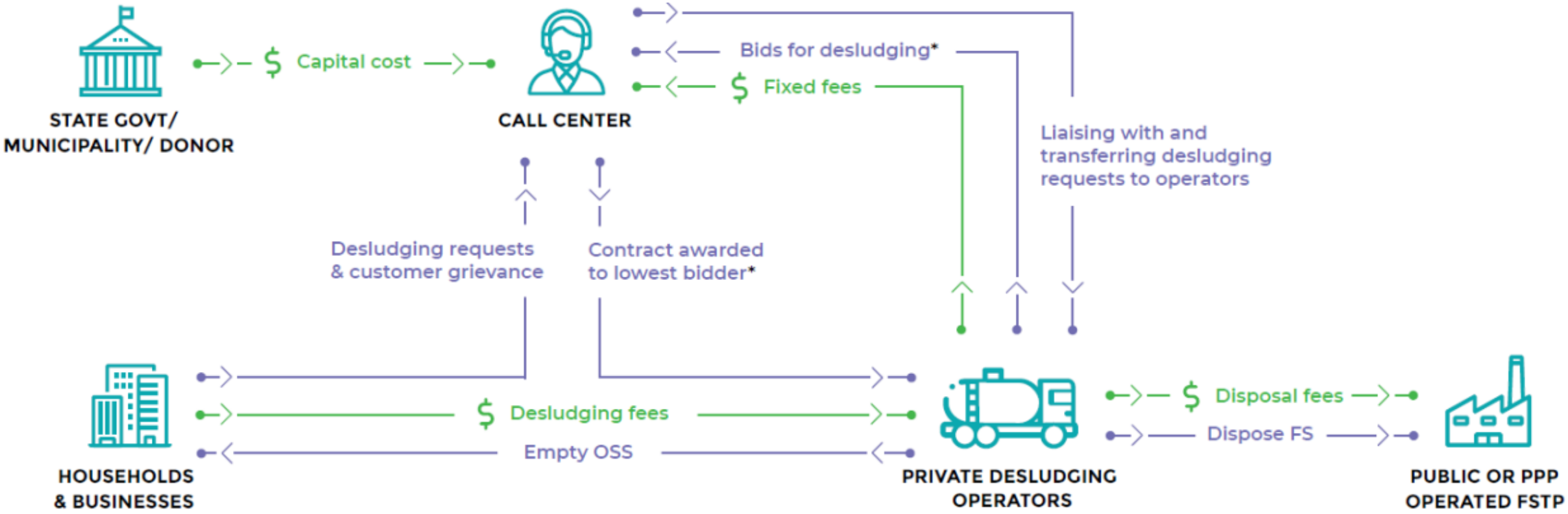


Different types of licenses are issued:	
• trade license	• FS disposal permit
• truck fitness certificate	• FS operator license
Licensing should closely go hand-in-hand with technology to monitor	

Cases: Many cities in India also seen in Asia and Africa

Call Centre Model

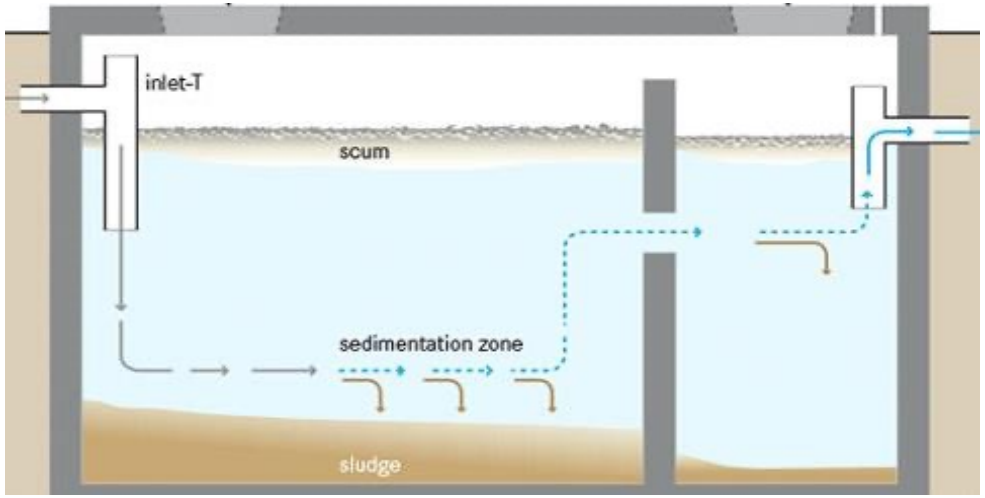
Objective of the Model: Affordable, timely and safe emptying and transportation of FS from OSS to designated disposal sites



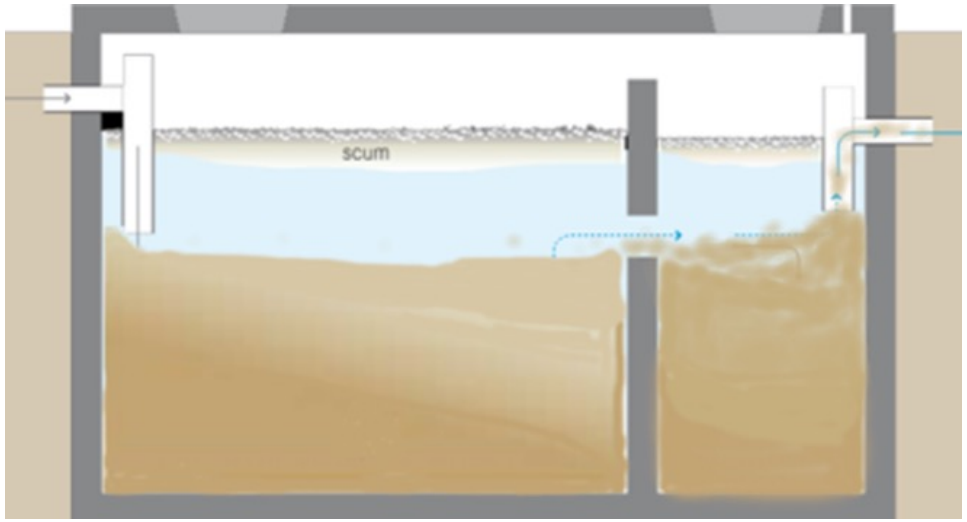
Different types of Call Centre models possible
- Lowest price or auction model
- Ola/Uber model or fixed price first responder model
- Zoning city and allocation of zones to desludging operator

Cases: Hyderabad, Trivandrum and Ahmedabad in India also Dakar, Senegal;

Why scheduled desludging?

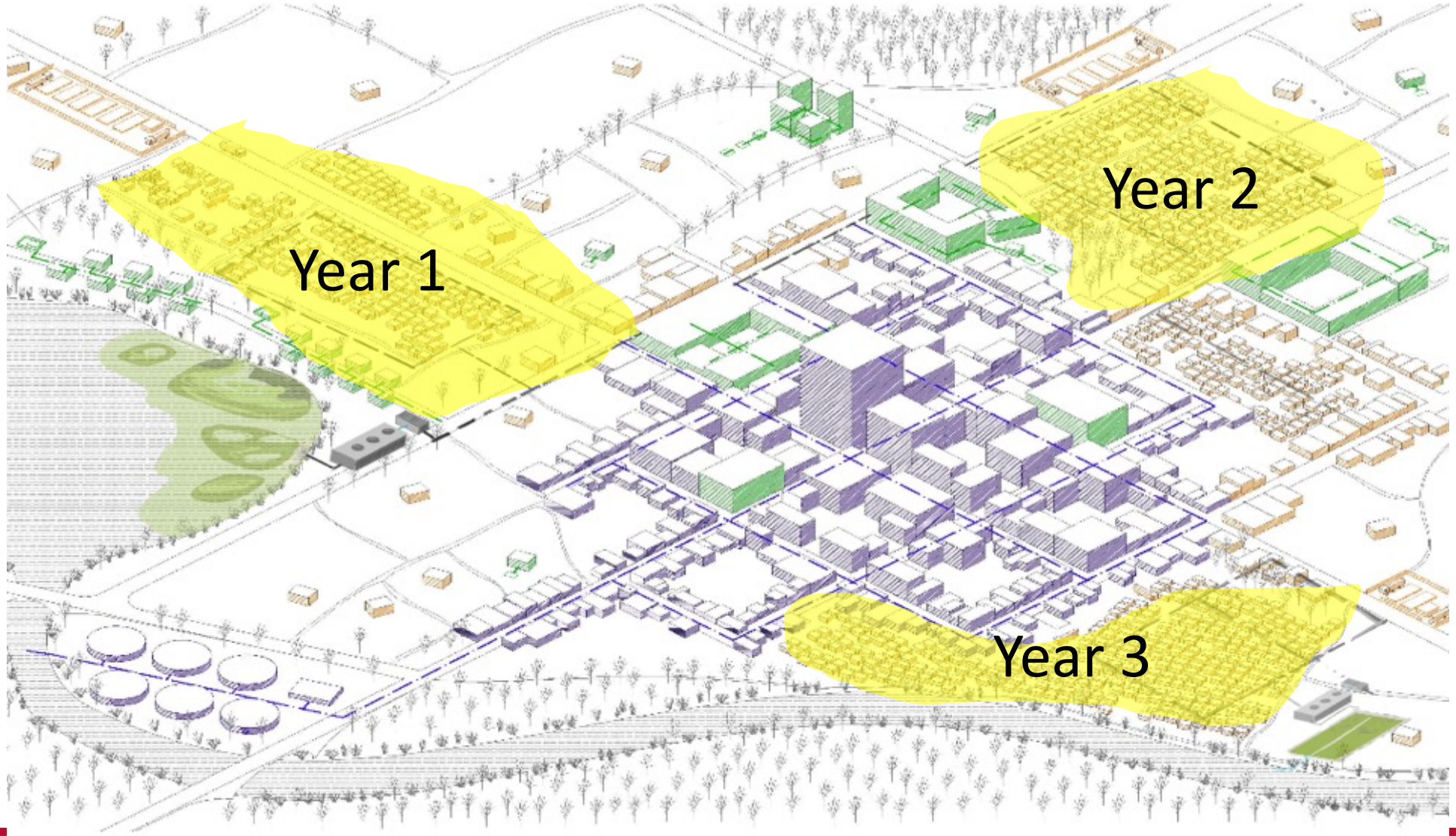


In 2.5-3 years



- Improving health of septic tanks
- Reliable quantity of FS collected for treatment
- Business streamlined and reduced cost of desludging
- Ease of monitoring of FS collected and delivered

Concept: Scheduled desludging

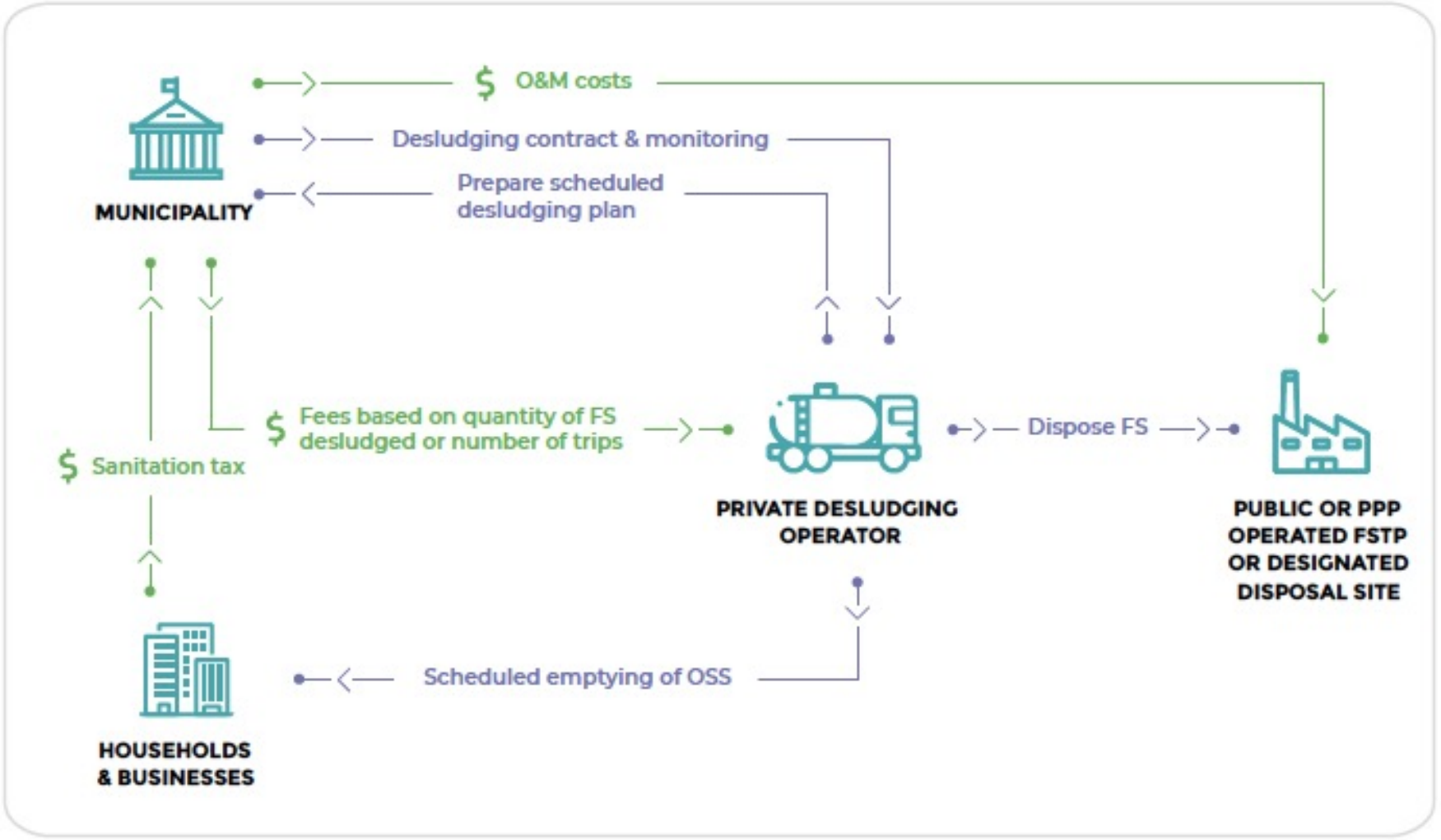


Scheduled Desludging Sanitation Tax Model

Sanitation tax can be collected via:

- Fixed tariff on per m^3 of water consumed
  OR
  Wastewater fee surcharge as percentage added to the water bill
- User fees through solid waste

- Fees through property tax



Cases: Wai and Sinnar in India. Also seen in Philippines and Indonesia,

Objective of the Model: Periodic and safe emptying and transportation of FS to designated disposal sites and to ensure improved performance of OSS and healthy community and environment

Key issues in Scheduled Desludging

- Challenges with containment system:
  - Significant planning required in case of non-standardization containment systems
  - Different types of containment system (septic tanks v/s pits) and size require different schedule for desludging

- Issues with tender contracts:
  - Performance based contracts based on no of trips vs septic tanks when containment is not standardized and of different sizes
  - Clarity on the responsibility for provision of appropriate access points for desludging
  - Information and awareness campaign to be included in scope of work of private contractor

- Equipment planning for narrow areas to be considered

E&T market structure and limitations

Objective of the E&T in FSM: Affordable, timely and safe emptying and transportation of FS from OSS to designated disposal sites

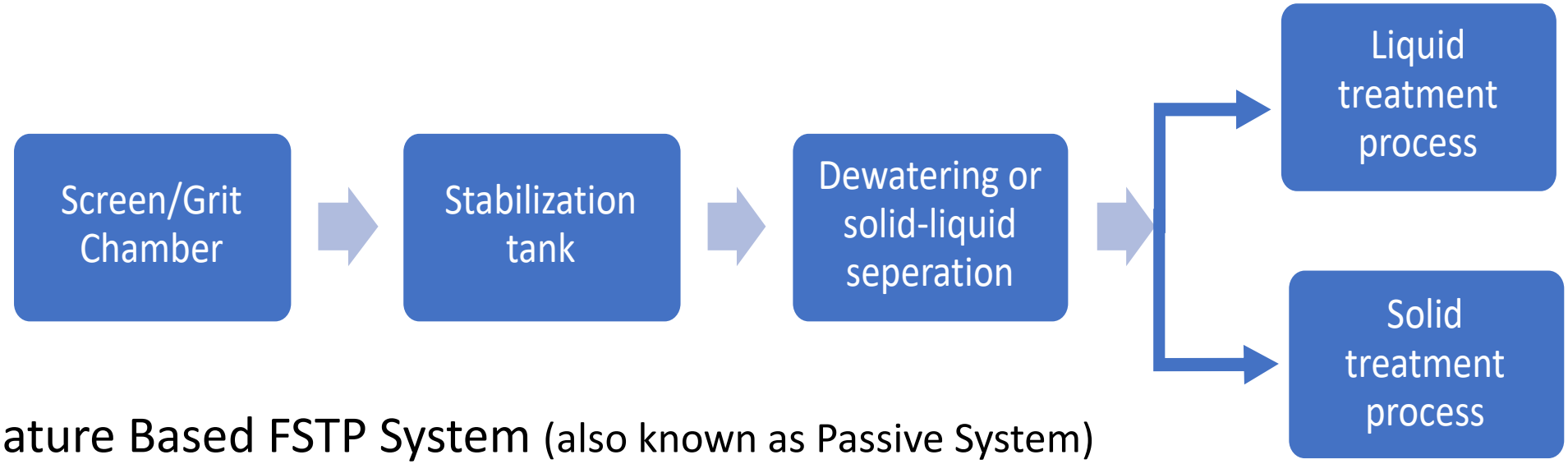
Types of E&T Market*	Timeliness	Safety	Affordability	Monitoring
Municipal owned and operated or outsourced operations	Rarely observed	Disposal safety is addressed however worker safety is a concern	Can ensure poor households are served	• Municipality on self assessment basis • Relatively less burdensome as process are internal
Private owned and operated	High	Low on disposal and worker safety	Fees is market based and can be unaffordable to the poor	• Greater role of municipality and can be burdensome in tracking private operations • Need for additional systems

* Mixed market – both municipal and private operations in E&T service

Preferred Setting for E&T :

- **Municipal owned trucks** outsourced to private with responsibility for collecting fees at prescribed tariff rates and given assurance on minimum guaranteed trips
- Municipality regulated **private operations** to ensure safety and affordability

Faecal Sludge Technologies - FSTP



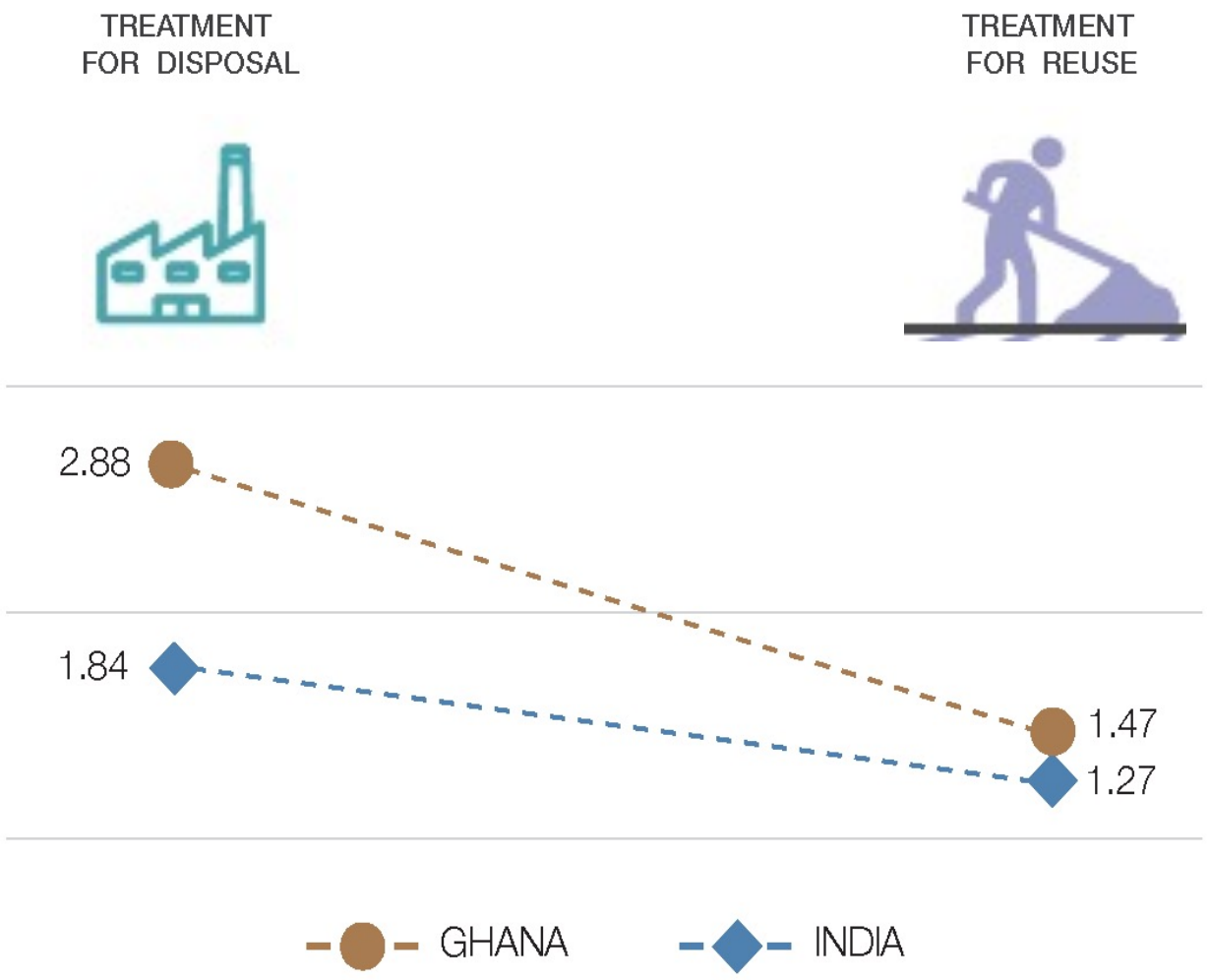
1. Nature Based FSTP System (also known as Passive System)
   a. Anaerobic digestion and unplanted drying bed based FSTP
   b. Planted drying bed based FSTP

2. Mechanical (Solid-Liquid separation) FSTP System

3. Thermal Solids Treatment FSTP System

4. Co-treatment

Cost Recovery from Reuse – User Charges



Why Reuse?

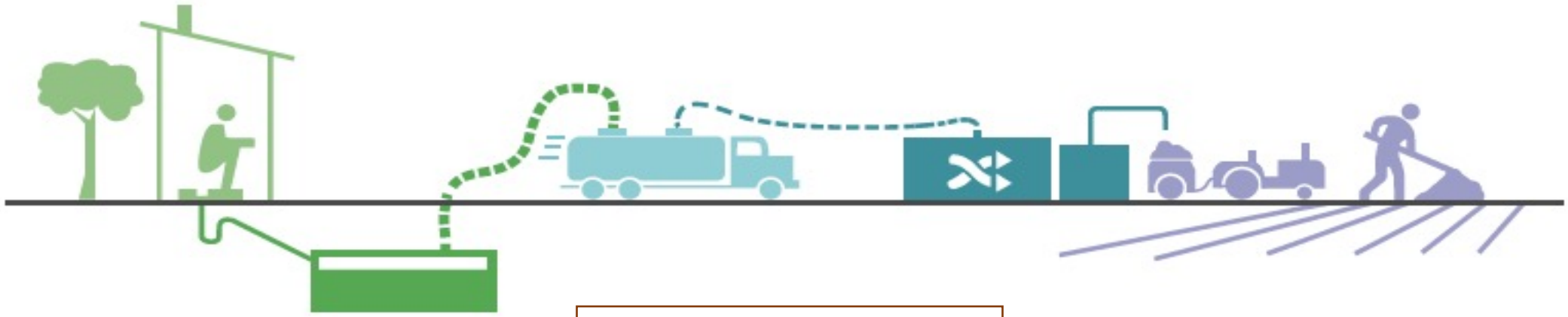
- Benefits to the environment far outweigh economic benefits – Food, Water and Energy Security
- Reduces treatment facility operations burden from solids accumulation

Key issue in reuse

- Need for change in mindset – service oriented to product oriented
- Treatment standards to be commensurate with fit for purpose
- Public acceptance

In ideal scenario reuse can reduce user charges by almost 50%, however in India its upto 30%

CONTAINMENT > EMPTYING > TRANSPORT > TREATMENT > REUSE/DISPOSAL

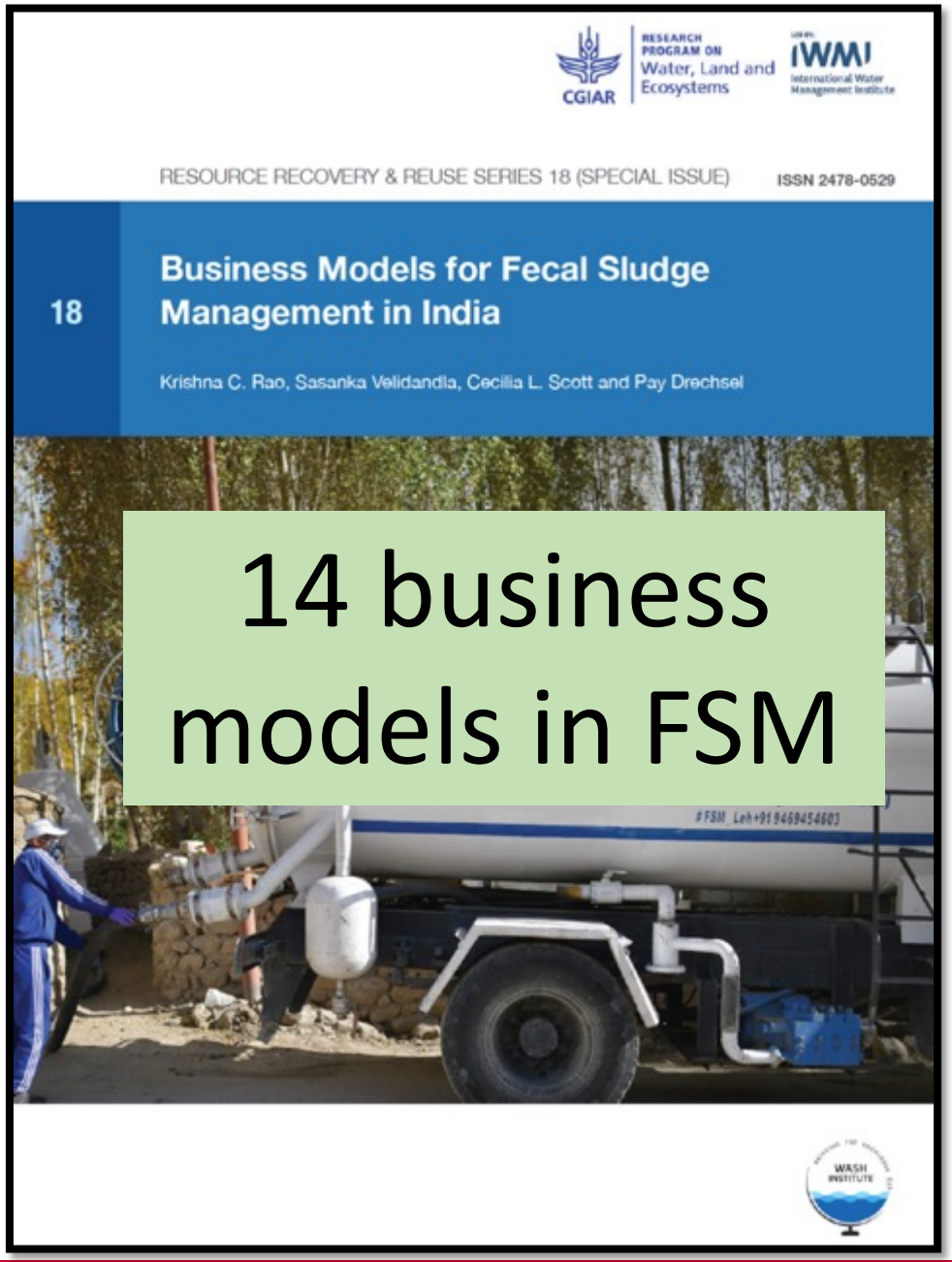


Policy and Guidelines

- Federal and State Policy on Sanitation and FSM
- Federal Environment Act - Prevention of Pollution Act;
- City bye-laws on sanitation
- Guidelines on Business Models
- Quality Definition and Service Level Benchmarks
- Guidelines on PPP in Sanitation
- Manual on Emptying, Transportation and Treatment
- Guidelines on monitoring and reporting

Regulations and Standards

- Building code on OSS and approval
- Regulations on sanitation tax and user charges
- Database of septic tanks and pit latrines
- Regulations on Emptying & Transport
- Licensing of emptying operators
- SOP for Emptying & Transport
- Database on desludging
- Effluent, Solid, emission and noise standards
- SOP for treatment plant
- Standards for reuse products



14 business models in FSM

A Models for Toilet Access and In Situ Energy and Nutrient Recovery.

1. Community or public toilet complex with energy recovery
2. Household toilet with nutrient recovery
3. Household toilet with energy recovery

B Models for Emptying and Transport of FS.

1. Government-owned E&T
2. Privately-owned and operated E&T
   - E&T licensing
   - Call center
   - Desludging association

C Models Linking Emptying, Transport, and Treatment of FS

1. Scheduled desludging & sanitation tax
2. Integrated emptying, transport, & treatment
3. Transfer station

D Models for Operating Treatment Plants. Including Reuse

1. Government-managed FSTP
2. Cluster FSTP
3. Public-private partnership FSTP
4. Co-treatment

https://doi.org/10.5337/2020.209

Thank You.

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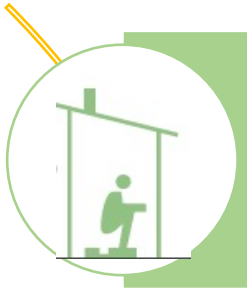
Summary costing for FSM in India



Containment

- Single Pit – INR 7,000 ($ 100)
- Twin Pit – INR 12,000 ($ 170)
- Septic Tank – INR 15,000 ($ 215)

Emptying & Transport

- Cost of desludging – INR 500-3,500 ($ 7 – 50)
- Cost of accessibility – breaking open sealed tanks, distance from the nearest road - INR 1,000 to 5,000 ($ 14 - 70)
- GPS Device – INR 15,000 ($ 215) & Vacuum truck – INR 7 lakhs to 20 lakhs

Treatment

- Capital cost – INR 5 - 200 per capita ($0.07 – 2.85) least for trenching and highest for independent FSTP)
- Operation cost – INR 1 – 25 per capita per annum ($ 0.01 – 0.35)

Reuse

- Per tonne sale of Compost – INR 1,500 to 8,000 ($ 21 – 114)
- Per tonne sale of Biochar – INR 2200 ($ 31)