

The Sanitation Technology Platform (STeP) partnered with FSG to conduct a study on Market Insights for the Reinvented Toilet (RT) in India. This body of work was designed to identify customer segments, value propositions, and technology insights for deploying the new technology categories of single- and multi-unit Reinvented Toilets into urban residential settings in India. The six-month study provided a robust and unique package of resources and insight to guide both technical and business decisions for a product category that is still emerging. The study helped answer both technical and market questions including the following: Who are my customers? How big are the segments and, by extension, how big is the market? What benefits may drive RT adoption among the segments? What features should the technology have and, equally as importantly, not have?

The Market Insights for the Reinvented Toilet, India study has been designed to help partners begin to answer these questions and many others at a category level to enable their own technical and market efforts, support investment and strategic decision-making, and inform partnerships. For the purpose of the study, the Single-Unit Reinvented Toilet (SURT) was defined as a small-scale system that performs on-site, complete treatment of fecal sludge for 3–10 individuals. The findings for the SURT and multi-unit RT are presented separately.

Age of construction (a)		New construction (< 1 year)		Existing construction (>1 year)			
Toilet ownership				No toilet		Toilet	
Drain availability		No drain	Drain	Old (> 10 yrs.)	Recent (< 10 yrs.)	No drain	Drain
Age of construction (b)							
Occupation of chief wage earner	Highest education achieved in family						
Skilled labor and small business owners		1	3	4	5	6	8
Salaried	Some college education						
		No college education	2				7
Unskilled labor							

Core Processing Box: SURT		
Inputs		Range of options
	Electricity	0–5 kWh/day
	Water for initial charge	0–25 L
	Urine and feces	3–25 ppl
	Footprint	0.5 m ³ to 1 m ³
	Steps up platform	0–4
	Additives/consumables	1–4 purchases/year
	Maintenance	1–12 times/year
	3rd party servicing	1–4 times/year
Outputs		Range of options
	Electricity	0–20 W/person
	Biogas	0–7 kWh
	Ash	Empty 1–4 times/year
	Non-potable water	30–45 L/day (HH of 5)
	Radiant heat	0°C to +2°C room temp
	Odor	None to chemical smell
	Noise	None to air conditioning unit level
	Fire flame	None to contained and exhausted

STUDY REACH

- 4 cities
- 30+ urban localities
- 245 customer interviews
- 109 institutional customers
- 59 value chain actors
- 230+ person-days of field research



Segment 1

Individual residential tenement planned for or under construction in an area without drainage provision; the chief wage earner is salaried with at least one college-educated household member, or is a skilled laborer, or small business owner

- The owner makes the decision about the septage management solution, which is required by law, by scanning multiple channels to identify the solution with best value-for-money.
- The owner values a solution that completely treats fecal waste, as community norms limit septage management options to holding tanks, which have high clearance frequency, and septic tanks attached to soak/choke pits, which have greater footprint.



Segment 2

Individual residential tenement planned for or under construction in an area without drainage provision; the chief wage earner is salaried without any college-educated household members or is an unskilled laborer

- The owner relies on masons/contractors for advice on selecting septage management solution, which is required by law. Masons/contractors are incentivized to push solutions built on site as opposed to turnkey, as they are paid per-day for installation labor. They are unlikely to try out unconventional technologies.
- Owners value a solution that completely treats fecal waste, as community norms limit septage management options to holding tanks, which have high clearance frequency, and septic tanks attached to soak/choke pits, which have greater footprint.



Segment 3

Individual residential tenement planned for or under construction in an area with drainage provision, either open or closed drainage

- The owner is involved in sanitation-related decision-making as part of home construction, as a septage management solution is required by law. Given this control, owners can make adjustments to construction design, leading to fewer constraints in terms of fitting a septage management solution on the property.
- The owner does not value a septage management solution that completely treats fecal waste as drainage can receive partially treated effluents.



Segment 4

Individual residential tenements constructed > 10 years ago, in which a toilet and septage management solution has not been constructed

- Owners use community or public toilets on a daily basis but would prefer to use an individual toilet, which they would install inside their home.
- Given the in-home installation, the owner values a septage management solution that does not store fecal waste, as in-home storage of fecal matter is against social norms.
- The segment typically has irregular cash flows and may be budget-constrained due to an inability to access formal lending mechanisms for upfront purchases.



Segment 5

Individual residential tenements constructed within the last 10 years, in which the toilet and septage management solution has not been constructed

- Owners use community or public toilets on a daily basis but would prefer to use an individual toilet, which they would install inside their home.
- Given the in-home installation, the owner values a septage management solution that does not store fecal waste, as in-home storage of fecal matter is against social norms.
- Recent home construction may have depleted savings and with typically irregular cash flows and lack of access to formal lending mechanisms for upfront purchases.
- The owner values gas and electricity as by-products for economic savings and as backup supply.



Segment 6

Individual residential tenements—in an area without drainage provision—for which a toilet and a septage management solution has been constructed; the chief wage earner is salaried with at least one college-educated household member, or is a skilled laborer, or a small business owner



- The owner is highly involved in sanitation, both making the decision on the purchase of a septage management solution at the time of construction and maintaining/emptying of system.
- The current system meets their needs, and they have a low propensity to install a new septage management solution.
- If the owner was to install a new sanitation solution, they would value a solution that completely treats fecal waste, as it would enable effluent outflow despite absence of drains and reduce clearance frequency.

Segment 7

Individual residential tenements—in an area without drainage provision—for which a toilet and a septage management solution has been constructed; the chief wage earner is salaried without any college-educated household members, or is an unskilled laborer



- The owner is not very involved in sanitation solutions, but is also very unlikely to try out unconventional technologies.
- The current solution meets their needs, and they have a low propensity to install a new septage management solution.
- If the owner was to install a new sanitation solution, they would value a solution that completely treats fecal waste as they are very conscious of community norms and want to avoid causing any inconvenience to neighbors.

Segment 8

Individual residential tenements—in an area with drainage provision—for which a toilet and a septage management solution has been constructed; the chief wage earner is salaried with at least one college-educated household member, or is a skilled laborer or small business owner



- The owner is highly involved in sanitation decision-making at the time of construction, but involvement reduces over time as the solution does not require frequent maintenance/emptying.
- The current solution meets their needs, and they have a low propensity to install a new septage management solution.
- The owner does not value a sanitation solution that completely treats fecal waste as the drainage system can receive partially treated effluents.

Segment 9

Individual residential tenements—in an area with drainage provision—for which a toilet and a septage management solution has been constructed; the chief wage earner is salaried without any college-educated household members, or is an unskilled laborer



- The owner is involved in septage management solution purchase at time of construction, but relies on contractors and masons to support decision.
- The current system meet their needs, and they are budget-constrained and therefore have a low propensity to install a new septage management solution.

PARAMETER	CUSTOMER INSIGHTS FOR TECHNOLOGY	TECHNOLOGY IMPLICATIONS
Placement and Footprint 	<ul style="list-style-type: none"> Segments have varied needs on placement and footprint depending on their social and building context, as houses sizes, layouts, and tenure rights vary. 	<ul style="list-style-type: none"> A flexible and modular design enables the unit to be placed inside or outside the living area and possibly separately from the toilet pan and superstructure. The technology has flexibility in increasing depth/height of the unit, as length and breadth allowances are often constrained. The detachable unit can be relocated for segments 4 and 5, which often do not have tenure rights.
Elevation of Pedestal 	<ul style="list-style-type: none"> Minimum elevation increase is preferred, with preference to keep in line with existing solution; some acceptability up to 2 steps. 	<ul style="list-style-type: none"> Systems should minimize the elevation of the pedestal/toilet seat.
Maintenance 	<ul style="list-style-type: none"> Customers are reluctant to perform tasks perceived as technical such as pouring maintenance fluid into the device, but are comfortable with familiar tools such as screwdrivers and gloves. Customers believe that periodic maintenance is necessary for device functioning and would be willing to spend ~5 minutes on maintenance; they desire costs to be minimized and in line with their current sanitation cleaning expenses for the interface (USD 1–2 per month). Additives such as engine oil and lubricant are considered important for the functioning of the device; chlorine and distilled water are perceived to be technical additives, and customers were not comfortable with these. 	<ul style="list-style-type: none"> Design self-maintenance processes as non-technical, simplified tasks that can be carried out by household members. Design self-maintenance processes such that no tool that requires force is used. Design a “plug and play” model to replace components with minimal device disassembly. Include an indicator to signal when material accumulates in the unit beyond a permissible level. Consider additives that can be designed to products that are added through the toilet interface like regular cleaning agents used by the segment.
Noise 	<ul style="list-style-type: none"> Most segments prefer discontinuous, low noise generation, preferably during the day. 	<ul style="list-style-type: none"> Design for minimum operation time or non-continuous noise generation (like a refrigerator compressor) if noise levels are higher.
Radiant Heat 	<ul style="list-style-type: none"> Radiant heat is acceptable for short periods of times and preferable at night so as minimize discomfort to residents. An open flame is not preferred, but a concealed visible flame was an indication the system was working. 	<ul style="list-style-type: none"> A flexible design allows for discontinuous use or timed operation. A flexible design enables the unit to be placed in a less noticeable spot and/or concealed, and sufficient ventilation for heat dissipation.
Water Production and Disposal 	<ul style="list-style-type: none"> Treated water was not perceived to be useful except for gardening. Disposal choices are driven by local context and social norms leading to preference for low water generation. 	<ul style="list-style-type: none"> A flexible design enables users to choose or switch the option for disposal. An indicator shows the quantity and quality of water produced.
Ash 	<ul style="list-style-type: none"> Most segments prefer clearance of ash in a closed container in small manageable quantities with regular periodicity; some are willing to accumulate ash for longer periods and dispose in larger quantities. Familiar tools and gloves are acceptable for ash clearance. Disposal would be in gardens, if available, or with solid waste. 	<ul style="list-style-type: none"> An indicator to show how much ash has accumulated. Design ash clearance mechanism to minimize spillage and contact with ash or in a compressed form (e.g., char blocks) and as biodegradable waste.