Surveying the Landscape of **Prevailing On-site Sanitation Systems**

The Role of On-site Sanitation in Non-Sewered Sanitation

More than 4 billion people globally lack access to safely managed sanitation.[1] For many, the cost of installing sewer networks and centralized treatment plants is out of reach, making non-sewered sanitation (NSS) critical to the management of human waste. When properly designed, maintained, and serviced, basic on-site sanitation (OSS) systems like pits and septic tanks can represent an important first step in the sanitation value chain. However, effective fecal sludge collection, transport, and processing are also necessary to achieve appropriate levels of treatment, which is complicated by the many challenges associated with creating vibrant and successful sanitation ecosystems. As a result, technologies that achieve higher performance and waste elimination or on-site reuse have gained acceptance across a variety of use cases and applications. This brief compares a selection of the most prevalent existing OSS systems in operation today.

More than 4 billion people globally lack access to safely managed sanitation.

Overview of Existing OSS Systems

Waste Treatment Processes in OSS Systems

OSS systems range in capacity, complexity, cost, and performance. These systems include simple ones that primarily contain waste to entirely new, captive treatment systems that achieve high degrees of treatment and produce valuable end products like compost, reuse water, and ash.

On-site systems can be broadly categorized as using biological or physical/chemical processes, with each bearing their own inherent benefits and challenges (see image 1). In some cases, systems combine both a biological and a physical/chemical process. Biological processes are more commonly used in OSS systems today and range from basic, household pit latrines and septic tanks to advanced, packaged treatment systems that meet the needs of commercial buildings or small neighborhoods. Physical and chemical process-based technologies are relatively new. Thermal incineration toilets are the most developed non-biological OSS system today, with other permutations like electrocoagulation, electrolysis, pyrolysis, pasteurization and super critical water oxidation, still early in their development.

Image 1: Trade Offs of Prevailing Biological and Physical/Chemical Treatment Processes

	Biological Processes	Physical/Chemical Processes
Advantages	Lower cost Often lower energy	Rapid and repeatable High reduction in pathogens in liquids and solids
Limitations	Relatively slow Microbes may be disrupted	High consumables High temperature and pressure
Pathogen destruction	Minimal to high	Moderate to Complete
Treatment speed	Liquid (minutes to hours) Solids (days to weeks)	Liquid (seconds to minutes) Solids (minutes to hours)
Energy input	Low to moderate	High
Operating conditions	Ambient temperature and pressure	Often elevated temperature and pressure
Safety risks	Low to moderate (varying based on microbes used)	High (if high temperature/ pressure or if toxic chemicals used)
Consumables	Low to moderate	Moderate to high
Waste products	Sludge	Ash, oxidants, metals

Common Permutations and Illustrative Costs for OSS Systems

OSS systems range from highly productized, packaged systems to those constructed on-site by masons. Basic pits and septic tanks are constructed locally, although some prefabricated system components exist. These systems are relatively low in cost. Pits cost around $111 to $227 USD per household in India,[2] whereas septic tanks range from $182 to $572 USD[3] in India and cost more than $15,000 USD in Europe.[4] A multitude of system permutations exist aimed at improving treatment performance and/or extending useful life. Dual pit systems exist for both waterless and pour flush applications, with dry systems incorporating a regularly applied cover material to accelerate the degradation process and generate a humus output. Upstream and downstream system add-ons for septic tanks, like Imhoff tanks and constructed wetlands, improve liquid and solid separation, expedite solids digestion, and increase the removal of nutrients, helping septic tanks comply with local effluent discharge regulations. However, outright closure (of pits) or regular servicing is still required. Ongoing operations and maintenance include periodic repair along with regular desludging, the cost of which varies widely depending on location and type of removal (manual versus mechanical). In India, the cost of manual emptying can be as low as $12 USD,[5] whereas mechanical desludging in the United States can range from $250 to $500 USD.[6]

Composting toilets can be grouped into two basic types—those that function as simple container-based sanitation (CBS) systems requiring waste collection and off-site processing and self-contained systems that compost waste on-site. CBS systems typically seek to isolate the human waste in a container or bag for safe storing until it is picked up by a local service provider and are extremely low in cost- one bag-based system reportedly costs $10 USD per person per year.[7] Self-contained composting toilets rely on the user to maintain operations, often through regular turning, addition of bulking agent and end product removal. Productized systems come in a range of different configurations and sizes and are available from numerous technology providers through both online and brick and mortar retailers. Cost for these systems range from between $500 and $3,000 USD CAPEX for a household unit and up to $20,000 for a large commercial-scale unit.[8] Bio-toilets function in a similar way to baffled septic tanks but introduce a proprietary inoculant to speed up the biodegradation process.

Similar to septic tanks, biogas reactors are commonly constructed by local masons and can range from ~$300 to ~$700 USD per household in China.[9] In recent years, a few productized solutions have emerged with costs for a household system around $1,000 to $2,000 USD CAPEX. Unique to biogas reactors is that they can co-treat a multitude of waste streams including animal, food, and yard waste, offering a compelling value proposition for those seeking to manage numerous household waste products and product gas for on-site cooking.[10]

Incinerating toilets achieve the highest degree of pathogen destruction but require significant input energy in the form of electricity or auxiliary fuel to drive off water and convert solids to ash. At approximately $2,000 to $5,000 USD CAPEX for a household system,[11] they cost less than some advanced biological systems; however, operating costs associated with energy inputs can be significant (e.g., thousands of dollars per year).

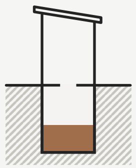
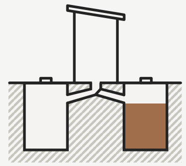
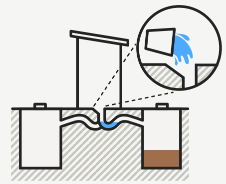
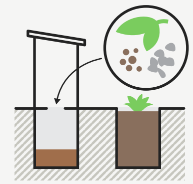
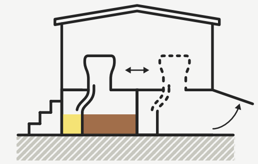
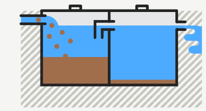
Advanced biological systems—designed to mimic centralized sewage treatment plants (STPs)—leverage aerobic, anaerobic, or a combination of both processes. Anaerobic processes offer a high reduction of biological oxygen demand (BOD) through the digestion of organic molecules and other benefits (like methane production). However, they provide limited reduction of pathogens and nutrients.[12] Aerobic processes provide efficient nutrient reduction through nitrification/denitrification. Thus, combination systems may include both processes, as a key benefit of aerobic digestion complements a limitation of anaerobic digestion. Advanced systems commonly exist at a building or neighborhood scale and based on a study of systems in India, can have CAPEX's ranging from $20,000 to more than $50,000 USD for a 20 KLD system. Energy consumption is also high in these systems, making up more than 50% of total operating and maintenance (O&M) expenditures.[13] However, these technologies boast small footprints (relative to volume treated), high treatment levels for liquid waste streams enabling conformity with local discharge requirements, and reduced desludging of solids.

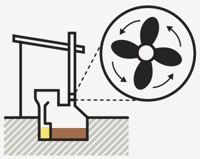
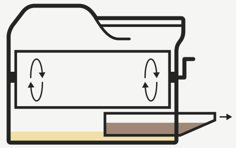
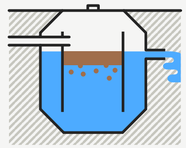
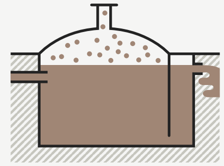
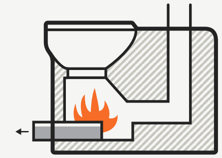
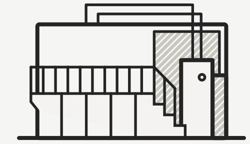
The Future of OSS Systems: Overcoming Challenges and Leveraging Opportunities

The current landscape of OSSs is diverse and effective when integrated into a well-functioning sanitation system, but it is not without challenges. Although most systems can contain and reduce the organic load of waste, none are designed specifically for complete pathogen destruction in both the solids and liquids waste streams. Overall effectiveness of treatment is linked not only to the design of the system but also to often uncontrollable environmental factors. Variables such as temperature, sludge moisture levels, retention rates, storage times, aeration, pH, and carbon/nitrogen ratios can significantly impact BOD/chemical oxygen demand (COD) and pathogen reduction efficiencies. As a result, variations in design, construction, and local environment make it difficult to generalize and extrapolate the effectiveness of a particular technology to circumstances other than those under which it was tested. This means that OSS performance is as much about the technology itself as it is about the way it is operated and maintained.

Beyond on-site treatment challenges, technologies that rely on off-site treatment of sludge, such as septic tanks, are dependent on local infrastructure for conveyance and treatment. If appropriate collection and treatment infrastructure and complementary enforcement mechanisms do not exist, waste may be re-introduced into the environment with no or insufficient treatment, causing a risk to human health and the environment. Even when robust systems are in place, natural disasters such as floods can inundate pits or septic tanks, release contaminants into the environment before safe emptying of the OSS takes place.

The sanitation technology market continues to evolve as researchers and engineers work to improve existing OSS systems and create entirely new solutions. With the advent of the International Organization for Standardization (ISO) standard 30500:2018 for non-sewered sanitation systems, technology developers are working to develop solutions that can consistently achieve both high levels of organic and/or pathogen reduction. Due to existing challenges, the market is ripe for new solutions; reasonably priced solutions that meet ISO treatment standards, enhance the user experience, and are easily adopted and maintained will likely lead the way.

	 **Pit**	 **Dry Twin Pit**	 **Pour Flush Twin Pit**	 **Fossa Alterna Twin Pit**	 **Dehydration Vault Twin Pit**	 **Septic Systems & Modifications**
Overview	A pit toilet or latrine is a 3+ meter deep hole in the ground generally housed beneath a small superstructure. Pit toilets are designed to contain human excreta and limit human and environmental exposure to waste. Modern pit toilets may incorporate a cement slab with a hole to cover the pit, reinforcing materials in pit walls, and ventilation designed to reduce odors and trap insects.	A dry twin pit toilet or latrine generally consists of two, ≥ 1 meter deep holes in the ground and a superstructure that covers one pit at a time. The active pit is housed beneath the superstructure and the resting pit is sealed. The incorporation of a resting pit enables storage and partial treatment of excreta.	A twin pit pour flush toilet or latrine incorporates a superstructure and two, ≥ 1.5 meter deep fully lined pits located ≥ 1 meter apart from each other to minimize cross-contamination and > 1 meter from structural foundations to prevent negative impacts from large quantities of leachate.	A fossa alterna is a short cycling twin pit technology that incorporates two shallow 1–1.5 meter deep pits and a superstructure that generally resides above one pit at a time. The active pit is housed beneath the superstructure and the resting pit is sealed. Cover material (soil, ash, leaves) is added after defecation to promote accelerated degradation.	A dehydration vault or dessicating toilet or latrine is generally built above ground and is a fast cycling twin pit technology that incorporates two, 0.6+ meter deep vaults and at least one urine collection tank housed within a single superstructure. To accelerate dessication, small amounts of ash, lime, dry soil, or sawdust are added after defecation.	A septic tank is a watertight chamber constructed from concrete, fiberglass, PVC or plastic that is generally built underground. As waste flows into the tank, heavy particles sink and the effluent flows to a an open drain, or a dispersion system such as a soak pit or leach field. Septic tank modifcations such as Anaerobic Baffled Reactors and Anaerobic Filters incorporate additional filteration media such as gravel that increase contact area with active biomass and enhance degradation of organic matter.
Benefits	Relatively inexpensive; long lifespan; very small footprint; easily built and repaired with local materials.	Relatively inexpensive; produces humus (not sludge); long lifespan; small footprint; easily built and repaired with local materials.	Relatively inexpensive; produces humus (not sludge); long lifespan; easily built and repaired with local materials; water seal acts as a barrier, reducing flies and odors compared to other dry pits; can handle small amounts of flush water.	Relatively inexpensive; produces humus (not sludge); long lifespan; small footprint; easily built and repaired with local materials; fast cycle time; shallow pits are easier to empty; cover material reduces odors; little to no leachate.	Relatively inexpensive; produces dried feces which are generally safer to handle than humus but not as nutrient rich; produces urine that can be used as fertilizer; long lifespan; easily built and repaired with local materials; fast cycle time; shallow pits are easier to empty; cover material reduces odors; little to no leachate.	Low odor; long lifespan; depending on design can process greywater; easily built and repaired with local materials; commercially available products also on the market.
Challenges	Produces odors; potential health risks from insects migrating into and out of pit; requires desludging or complete closure; low reduction in organics and pathogens; suseptible to water infiltration and collapse if not properly constructed; leachate can contaminate groundwater.	Manual removal of humus required; potential health risks from insects migrating into and out of pit; susceptible to water infiltration and collapse if not properly constructed; leachate can contaminate groundwater.	Manual removal of humus required; elevated risk that leachate can contaminate groundwater compared to other dry pits; stagnant water can promote insect breeding; susceptible to water infiltration and collapse if not properly constructed; frequent clogging when bulky cleansing materials are used.	Manual removal of humus required; requires constant source of cover material; susceptible to water infiltration and collapse if not properly constructed.	Manual removal of dried feces required; moisture must be kept out of vaults; requires training to be used properly; requires constant source of cover material; in urban setting, use for urine is necessary.	Generally low organic and pathogen reduction; requires regular desludging; susceptible to water infiltration in flood-prone areas; lower efficiency in cooler climates; absence of dispersion system leads to incomplete treatment.

	 **Single Vault Composting**	 **Self-Contained Composting Toilet**	 **Bio-toilet**	 **Biogas Reactor**	 **Incinerating Toilet**	 **Packaged STP** (Activated Sludge Processes)
Overview	A single vault composting toilet can be built above or below ground and generally consists of a composting chamber, a ventilation fan, and a leachate collection system. It can be incorporated into a home or a separate superstructure. The system requires constant aeration (passive or active), maintenance of proper moisture levels (45–70%), temperature monitoring (maintaining at 40-50 C), and maintaining a ~25:1 carbon-nitrogen ratio for proper conversion of excreta to stable, sanitized compost.	A self-contained composting toilet is a productized, all-in-one system that houses a small composting chamber or drum within the base of a dry toilet user interface. These systems require intermittent mixing and often incorporate a fan and heating element to facilitate evaporation of urine and maintain thermophilic conditions. They also generally require the addition of organic materials to maintain the proper carbon:nitrogen ratios and the regular removal of compost, by the user.	A bio-toilet is a waste fermentation tank or modified septic tank that is Inoculated with a proprietary consortium of micro- or macro-organisms that accelerates waste biodegradation and reduces pathogens. The tank generally sits under or within close range of a small superstructure that houses the user interface.	A biogas reactor or anaerobic digester is an airtight locally-constructed dome or prefabricated tank that can be built above or below ground. The dome can be fixed or floating and is used to collect biogas generated from the anaerobic dedradation of biodegradable waste. Waste is piped from a user interface to the reactor. Increased gas production can be achieved through co-digestion with other organic waste streams such as animal manure, or food waste.	Incinerating toilets are relatively small, self-contained productized units that generally consist of a combustion chamber and a dry toilet user interface. These systems contain a gas-fired or electric heating system that converts human waste to steam and sterile ash.	Packaged sewage treatment plants (STPs) include activated sludge-based technologies such as Moving Bed Biofilm Reactors, Membrane Bioreactors, and Sequencing Batch Reactors. These systems generally incorporate a primary settler, a reactor chamber where mixing and aeration enable aerobic degradation of organics and nutrients, and a clarifier where remaining sludge either settles for recirculation or extraction and effluent is released for tertiary treatment/disinfection.
Benefits	Produces compost; ability to codigest with other organic waste streams; long lifespan; low operating costs, low odor relative to pits; easily built and repaired with local materials.	Very small footprint; produces compost; low odor relative to pits; commercially available products on the market; produces little to no leachate.	Higher reduction in organic load than septic tank translating to higher volumetric reductions in sludge; reduced desludging frequency compared to septic tanks; marketed as achieving higher pathogen destruction than septic tanks.	Biogas can be used for onsite cooking; long lifespan; potential to codigest other organic waste streams.	Very small footprint; high/complete pathogen destruction; no desludging required; minimal outputs (ash); commercially available products on the market.	Capable of processing much higher volumes of blackwater and greywater than septic tanks; high BOD removal; can process greywater; bypasses need for centralized sewer network; system dependent, effluent can be used for onsite irrigation; commercially available products on the market.
Challenges	Requires continuous management to achieve optimal composting conditions; additional carbon source needed; leachate requires management; compost must be removed regularly by the user or an independent service provider; must have local use for compost.	Requires continuous management; additional carbon source needed; compost must be removed regularly by the user; must have local use for compost; more costly than basic, locally constructed systems; may require power source.	Requires special Inoculant of organisms (generally either bacteria or worms); generally must be combined with tertiary treatment and/or disinfection.	Requires expert design and skilled construction; generally requires temperatures above 15 C for gas production (not ideal for cold environments); low levels of treatment in solid and liquid streams; potential hazards associated with management of biogas.	Current commercially available products have higher cost than locally constructed systems; high operating costs for auxiliary fuel to maintain combustion process—higher when using flush water; potential user aversion to in-house combustion processes.	High capital and O&M costs; trained operator required for O&M; requires access to spare parts.

	Pit	Dry Twin Pit	Pour Flush Twin Pit	Fossa Alterna Twin Pit	Dehydration Vault Twin Pit	Septic Systems & Modifications
Use Case	• Single Family Residential • Multi Family Residential	• Single Family Residential • Multi Family Residential • Public and Community	• Single Family Residential • Multi Family Residential • Public and Community	• Single Family Residential • Multi Family Residential • Public and Community	• Single Family Residential • Multi Family Residential • Public and Community	• Single Family Residential • Multi Family Residential • Public and Community
Footprint (sq. meters rough est., excluding superstructure)	2.25	4	4.25	4.5	5	2–45***
Predominant User Interface	Dry Toilet	Dry Toilet	Pour Flush	Dry Toilet	Urine-Diverting Dry Toilet	Flush Toilet, Pour Flush Toilet
Additional Inputs	None	None	None	Soil, Ash, Leaves	Ash, lime, dry soil, sawdust	Septic Tank: None ABR: Inoculant
Waste Inputs	Excreta, ACW, DCM	Excreta, ACW, DCM	Excreta, ACW, DCM, FW	Excreta, ACW, DCM	Feces, DCM	Excreta, ACW, DCM, FW, Greywater
Outputs	Fecal sludge	Pit Humus	Pit Humus	Pit Humus	Dried Feces, Diverted Urine	Sludge and effluent
Estimated Lifespan*	5–20 years	Unlimited	Unlimited	Unlimited	Unlimited	15–40 years
Desludging/Emptying Frequency	5–15+ years (desludge or cover)	1–5+ years (humus removal)	1–5+ years (humus removal)	1–2 years (humus removal)	6 months—2 years (dried feces removal)	2–5 years (desludge)
Pathogen Destruction**	Not left to compost	1.5–2+ years	2+ years	1–2+ years	6 months–2+ years	N/A
General Pathogen Destruction Achieveable* (Log Reduction Ranges)	Highly variable Bacteria < 1 log Viruses < 1 log Protists < 1 log Helminths < 1 log	Highly variable Bacteria < 1–6+ log Viruses < 1–2+ log Protists < 1–2+ log Helminths < 1–2+ log	Highly variable Bacteria < 1–6+ log Viruses < 1–2+ log Protists < 1–2+ log Helminths < 1–2+ log	Highly variable Bacteria < 1–6+ log Viruses < 1–2+ log Protists < 1–2+ log Helminths < 1–2+ log	Highly variable Bacteria ≤ 6 log Viruses ≤ 4 log Protists < complete Helminths < complete	Highly variable Bacteria 0–8 log Viruses 0–3 log Protists 0–2 log Helminths 0–2 log****
Organics Reduction†* (BOD, COD, TSS, TOC)	LOW	LOW	LOW	LOW	LOW	LOW ← MED. → HIGH‡
Sampling Point for Pathogen Destruction & Organics Reduction	At time of desluding. Note: more pathogen inactivation at lower levels of pit	At time of humus removal. Sealed pit with no new waste added, storage time 2+ years	At time of desluding. Sealed pit with no new waste added, storage time 2+ years	At time of desluding. Sealed pit with no new waste added, storage time 1-2+ years	At time of dried feces removal. Sealed pit with no new waste added, storage time 6+ months	Effluent
Additional Treatment Required?	Sludge requires further treatment in event of removal	Humus may require additional composting to meet WHO standards	Humus may require additional composting to meet WHO standards	Humus may require additional composting to meet WHO standards	Dried feces may require additional composting to meet WHO standards	Sludge and effluent generally require further treatment
Expenses	CapEx $ / OpEx $	CapEx $–$$ / OpEx $	CapEx $–$$ / OpEx $$	CapEx $–$$ / OpEx $–$$	CapEx $$–$$$ / OpEx $–$$	CapEx $$$–$$$$ / OpEx $–$$

Abbreviations: ACW = Anal Cleansing Water; DCM = Dry Cleansing Materials; FW = Flush Water

* Estimates based on data surveyed. Ranges are highly system, use/maintenance, and environment dependent. Average systems are unlikely to achieve upper values of these ranges.

** time to WHO recommended levels for use in agriculture

† Tertiary treatment not considered

*** Generally underground, not including leach filed or other tertiary treatment

**** Majority settle into sludge, can still be present in effluent

†† When dispersion step included. ABRs and Anaerobic Filters can achieve relatively high reduction

	Single Vault Composting	Self-Contained Composting Toilet	Bio-toilet	Biogas Reactor	Incinerating Toilet	Packaged STP (Activated Sludge Processes)
Use Case	• Single Family Residential • Multi Family Residential	• Single Family Residential • Boats • RVs • Trains	• Single Family Residential • Multi Family Residential • Public and Community • Trains	• Single Family Residential • Multi Family Residential • Public and Community • City	• Single Family Residential • RVs	• Multi Family Residential • Public and Community • Commercial • Neighborhood
Footprint (sq. meters rough est., excluding superstructure)	2+	<1	2+***	15+***	1–1.5	15–180
Predominant User Interface	Dry Toilet	Dry Toilet	Flush Toilet, Pour Flush Toilet	Flush Toilet, Pour Flush Toilet	Dry Toilet	Flush Toilet, Pour Flush Toilet
Additional Inputs	Carbon source, electricity for heated or automated churning systems, other organics (optional)	Carbon source, many require electricity to control fan and heating elements	Proprietary Inoculant, chlorine (system dependent)	Inoculant may be required; other organics (optional)	Electricity or gas, paper accessories	Electricity, chlorine (system dependent)
Waste Inputs	Excreta, DCM	Excreta, DCM	Excreta, ACW, DCM, FW	Excreta, ACW, DCM, FW	Excreta	Excreta, ACW, DCM, FW, Greywater
Outputs	Compost, Leachate	Compost	Sludge and effluent	Sludge, effluent, and biogas	Sterile ash	Sludge and Effluent
Estimated Lifespan*	15–25 years	5–20 years	>30 years	10–20 years	10 years	15–20 years (more for some)
Desludging/Emptying Frequency	3 months–2 years (compost removal)	Monthly+ (compost removal)	Unknown	5–10 years (desludge)	1–2 times per week (ash removal)	3 weeks+
Pathogen Destruction**	≥ 6 months	≥ 6 months	N/A	N/A	N/A	N/A
General Pathogen Destruction Achievable* (Log Reduction Ranges)	Highly variable Bacteria < 1–3+ log Viruses < 1–2+ log Protists < 1–2+ log Helminths < 1–2+ log	Highly variable Bacteria < 1–2 log Viruses Unknown Protists Unknown Helminths < 1 log	Not well understood Bacteria < 2 log Viruses Unknown Protists Unknown Helminths Unknown	Highly variable Bacteria ≤ 3 log Viruses 0.2 log**** Protists < 0–2 log Helminths 0–<1 log	Bacteria complete Viruses complete Protists complete Helminths complete	Highly variable Bacteria < 1–3 log Viruses < 1–4 log Protists < 1–3 log Helminths < 1 log–complete
Organics Reduction†* (BOD, COD, TSS, TOC)	LOW	LOW	LOW ↔ MED. ↔ HIGH††	LOW ↔ MED.	HIGH	MED. ↔ HIGH
Sampling Point for Pathogen Destruction & Organics Reduction	Compost, at time of removal from system if thermophilic conditions are maintained.	Compost, at time of removal from system.	Effluent	Effluent	Ash	Effluent
Additional Treatment Required?	Leachate requires further treatement. Compost may require additional composting to meet WHO standards	Compost may require additional composting to meet WHO standards.	Sludge and effluent generally require further treatment. Some designs incorporate chlorine compartment for disinfection of effluent.‡	Sludge and effluent generally require further treatment	None	No treatement of effluent necessary if onsite disinfection is included. Sludge requires further treatment.
Expenses	CapEx $$–$$$ OpEx $$	CapEx $$–$$$ OpEx $	CapEx $$$ OpEx $	CapEx $$$$ OpEx $$$	CapEx $$$$ OpEx $$–$$$	CapEx $$$$$+ OpEx $$$–$$$$

Abbreviations: ACW = Anal Cleansing Water; DCM = Dry Cleansing Materials; FW = Flush Water

* Estimates based on data surveyed. Ranges are highly system, use/maintenance, and environment dependent. Average systems are unlikely to achieve upper values of these ranges.

** time to WHO recommended levels for use in agriculture

† Tertiary treatment not considered

*** Generally underground, not including leach field or other tertiary treatment

**** 6 log outlier for Poliovirus

†† when tertiary treatment included

‡ Marketed as delivering pathogen-free effluent but actual performance not well understood.

Definitions

Anal Cleansing Water (ACW)
Water used to cleanse oneself after defecating and/or urinating; it is generated by those who use water, rather than dry material, for anal cleansing

Dry Cleansing Materials (DCM)
Solid materials used to cleanse oneself after defecating and/or urinating (e.g., paper, leaves, corncobs, rags or stones)

Flush Water (FW)
Water discharged into the User Interface to transport the content and/or clean it.

Excreta
Consists of Urine and Feces that is not mixed with any flushwater

Greywater
Total volume of water generated from washing food, clothes and dishware, as well as from bathing, but not from toilets

Single Family Residential
Implies that the technology is appropriate for use by one household

Multi-family
Implies that the technology is appropriate for use by several households

Commercial or Institutional
Implies that the technology is appropriate for use by businesses or institutions such as schools or hospitals.

Public Toilets
Located in communities and near homes, this is the daily toilet access for many who lack inhome latrines and may serve inhabitants from several to several hundred households.

Community Toilets
Located in high-traffic areas such as bus stops and markets. They are often used by those in transit or those who are working nearby and may serve inhabitants from several to several hundred households.

City
implies that the technology is appropriate at the city-wide level (either one unit for the whole city, or many units for different parts of the city)

Desludge
Removal of fecal sludge from sanitation technologies such as pits or septic tanks.

Leachate
Liquid that results from water and Urine passing through a pit or composting chamber and extracting chemicals or constituents such as pathogens before leaching out into the surrounding soil or into a leachate collection system.

Dry Toilet
A user interface that operates without flushwater.

Flush Toilet
A user interface that uses flushwater to transport excreta out of the user interface and/or clean the user interface itself. The flush toilet user interface may be a pour flush or cistern flush design.

Urine-Diverting Dry Toilet
A user interface that operates without water and has a divider so that the user, with little effort, can divert the urine away from the feces

Sludge and Fecal Sludge
A mixture of solids and liquids, containing mostly Excreta and water. Faecal Sludge comes from onsite sanitation technologies, i.e., it has not been transported through a sewer.

Superstructure
The housing construction around a toilet that provides privacy to the user and protection from rain, wind and animals to the toilet

Humus
Nutrient-rich, hygienically improved, humic material that is generated in double pit technologies through dewatering and aerobic/anaerobic degradation.

Dried Feces
Feces that have been dehydrated until they become a dry, crumbly material.

Compost
Decomposed organic matter that results from a controlled aerobic degradation process

Feces
Excrement that is not mixed with Urine or water.

Urine
The liquid produced by the body to rid itself of urea and other waste products, not mixed with feces or water

User Interface
Describes the type of toilet, pedestal, pan, or urinal with which the user comes in contact; it is the way by which the user accesses the sanitation system.

Biogas
Common name for the mixture of gases released from anaerobic digestion. Biogas is comprised of methane (50 to 75%), carbon dioxide (25 to 50%) and varying quantities of nitrogen, hydrogen sulphide, water vapour and other components

Effluent
A general term for a liquid that leaves a sanitation technology, typically after Blackwater or Sludge has undergone solids separation or some other type of treatment

Inoculant
A live microbial consortium that may be introduced to a sanitation technology in order to provide a population of bacteria for waste digestion.

Log Reduction
Organism removal efficiencies. 1 log unit = 90%, 2 log units = 99%, 3 log units = 99.9%, and so on.

Organic Reduction
Low—commonly achieves less than 50% reduction;
Medium—commonly achieves up to 75% reduction;
High—commonly achieves 90+% reduction

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