

Make way for the future of sanitation

A review of new enterprise models
shaping the development of a
transformational sanitation economy.

The EY logo consists of the letters 'EY' in a bold, white, sans-serif font. A yellow triangle is positioned above the 'Y'.

Building a better
working world

The logo for the Toilet Board Coalition features the word 'TOILET' in a large, blue, sans-serif font. The letter 'O' is replaced by a white icon of a man and a woman. Below 'TOILET' is the text 'BOARD COALITION' in a smaller, blue, sans-serif font.

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Welcome

EY and the Toilet Board Coalition (TBC) are united in the belief that impact entrepreneurs are crucial to achieving the United Nations Sustainable Development Goals (SDGs). Fusing the social mission of a nonprofit with the market-driven approach of business, their enterprises are critical engines for powering inclusive growth, human dignity and potential, while crafting a different narrative about poverty altogether.

Such enterprises are already improving lives by bringing dignified sanitation within reach of some of the world's poorest and most marginalized communities. With this report, we aim to illustrate their potential to improve the lives of millions more, accelerating progress toward the Global Goal of access to adequate and equitable sanitation for all by 2030.

While we don't claim to have all the answers, we believe that we can help impact investors and entrepreneurs to keep asking the right questions – questions whose answers can help realize the vast potential of a transformational sanitation economy, driving sustainable inclusive growth for the benefit of everyone in society.

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A new wave of businesses is disrupting how we provide sanitation in some of the most difficult contexts, creating new enterprise models, new industries and a new sanitation economy.

Cheryl Hicks

Executive Director and CEO
Toilet Board Coalition



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A not so quiet storm has been brewing – from trickle to torrent.

A new wave of businesses is disrupting how we provide sanitation in some of the most difficult contexts, creating new enterprise models, new industries and a new sanitation economy. What has emerged and evolved since we started our Sanitation Economy Accelerator program in 2016 reveals a remarkable shift in evidence that toilets and sanitation systems can create valuable and transformative business opportunities, while addressing one of the world's most urgent development issues and an affront to human dignity.

The examples shared in this report demonstrate the powerful impact of the sanitation economy enterprise approach, where toilets create new value by becoming delivery systems for renewable resources, and information about human health and behavior. The breadth and depth of these diverse approaches represent an exciting new swell of innovation in a sector that needs reinvention to address enormous unmet needs globally.

As governments deliberate on national strategies for achieving universal access to safely managed water and sanitation within this next decade, we urge them to

take heed of these new approaches and their potential to transform historically unaffordable services into new engines of value creation. The time to apply circular and digital business approaches to sanitation is now, as new systems are built and as current systems are improved. If we don't, we'll miss a massive opportunity to unlock the value of renewable resources and data critical to future economic development, business growth and resilience.

By outlining what makes new sanitation enterprise models work, this report presents a compelling playbook for more businesses and communities to benefit from a transformational sanitation economy with the potential to improve hundreds of millions of lives. We continue to draw enormous inspiration from the courageous innovators and entrepreneurs who have already taken bold action to make this happen, and we are proud to work with EY toward accelerating the rate and scale of change.

The time to apply circular and digital business approaches to sanitation is now, as new systems are built and as current systems are improved.



Pragyal Singh
Partner, Ernst & Young LLP
(EY India)

When it comes to the case for driving more sustainable inclusive growth, there can be few more damning statistics than the fact that 4.2 billion of our fellow human beings still lack access to safely managed sanitation.

As leader of the urban sanitation practice in India, I've had the privilege of contributing to many initiatives with state governments and private enterprise, including those under the Swachh Bharat Mission (SBM) to bring an end to open defecation.

Considerable progress has been made in India. For example, around 108 million households have been provided with toilets in the last five years under SBM, leading to an Open Defecation Free (ODF) declaration by government. As well as sustaining this ODF status, now the focus is on providing means for the safe disposal of fecal waste to more than 850 million people who currently lack such services.

In this regard especially, much remains to be done and it's why this report is so important. As well as highlighting the massive missed opportunity in tackling this challenge, it also shines a light on exciting new business models that are springing up across the sanitation value chain to address it and shares valuable, practical insights on how such models can be made to operate and scale sustainably.

Systemic change requires systemic approaches and realizing the full potential of a transformational sanitation economy will need governments to remain proactive – not just in building infrastructure, but also creating the broader enabling environment for entrepreneurial sanitation enterprises to succeed. That includes support for innovative forms of financing, of the kind highlighted in this report, which I believe are vital to revitalizing cross-sector collaboration and to accelerating progress toward the SDGs.

4.2b

4.2 billion of our fellow human beings still lack access to safely managed sanitation.

Executive summary



Next time you go to the bathroom, consider this: two billion of your fellow human beings still don't have access to the basic amenity of a toilet or latrine,¹ and 4.2 billion don't have access to any form of safely managed sanitation.²

Of these people, 673 million still defecate in the open,³ which contributes to the spread of disease, malnutrition and environmental contamination. Some 827,000 people in low- and middle-income countries die each year because of poor water, sanitation and hygiene, and poor sanitation is believed to be the primary cause of more than half of these deaths.⁴ Combined with lost economic productivity and increased health care costs, this is estimated to have cost the global economy close to US\$225 billion in 2015.⁵

Compounding these costs is a massive lost opportunity. Toilet resources (the TBC's preferred term for human waste) are among the few natural resources that increase as the global population rises, and trillions of liters of these valuable stocks go lost and untreated every year. Safely capturing, treating and using them, as well as leveraging the huge amounts of data on health and consumer behavior that can be gleaned from use of sanitation facilities, could generate a multibillion-dollar economic bounty. With a global economic return of US\$4.30 for every dollar invested in water and sanitation services,⁶ the TBC estimates that, in India alone, the sanitation economy could be worth US\$62 billion a year by 2021.⁷

In short, the business case for accelerating progress toward the United Nations Sustainable Development Goal of access to adequate and equitable sanitation and hygiene for all by 2030 (SDG6) could hardly be stronger. The sanitation economy presents vast potential for global economic growth, while addressing one of the most

urgent social and environmental challenges of our time.

The question should no longer be about why we should seek to accelerate progress. The why is clear. What matters now, more than ever, is how scale can be achieved. With the UN suggesting that achieving universal access to even basic sanitation by 2030 would require doubling the current rate of change,⁸ we need to go further, faster. In particular, we need to go further, faster in scaling the impact enterprises whose innovative business models are reaching the people that conventional sewerage, waste treatment and processing can't.

Among them are past and present participants in the TBC's Sanitation Economy Accelerator program, several of which have benefitted from EY support to enhance their resilience, productivity and capacity to scale sustainably. The insights shared in this report stem from the combined experience that the TBC and EY have gained from working with these life-changing businesses – insights that we believe show how the potential of a transformational sanitation economy can be realized.

Drawing on the stories of Sanitation Economy Accelerator enterprises, these insights illustrate practical examples of pathways to scale for sanitation enterprises by:

- ▶ Making sanitation part of a broader user experience
- ▶ Joining forces with others to spread cost and risk
- ▶ Creating demand for toilet resources – as a quality agricultural input, an alternative energy source or both
- ▶ Recognizing that “closing the loop” on material flows requires different approaches in different settings
- ▶ Making full use of sanitation data – as both a means to improve operational

performance and to generate new revenue streams

- ▶ Becoming “asset light” to make investment capital stretch further
- ▶ Solving multiple problems to unlock multiple sources of capital
- ▶ Innovating new financial instruments to bridge the financing gap

The prize these insights can unlock is an alluring one, for both the public and private sectors. Governments can reduce the unaffordable public costs of sewered sanitation, while reaping huge cost avoidance advantages in improving community health and well-being. At the same time, entrepreneurial enterprises can unearth huge growth opportunities and not just in sanitation. A scaled-up and sustainable sanitation value chain can provide much-needed impetus to scale adjacent sustainability goals, too, such as water and food security, and renewable energy.

What's more, better answers to accelerating progress toward these goals – and SDG6 in particular – are readily available. They just need to be scaled. In sharing our insights, we aim to help Sanitation Economy Accelerator enterprises, and others like them, to continue plotting a path to even greater scale, and to stimulate the investment that can help make that happen.

¹World Health Organization, 2019. Sanitation. [online] Available at <https://www.who.int/news-room/fact-sheets/detail/sanitation> [Accessed 22 August 2019].

²WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation, 2019. Progress on household drinking water, sanitation and hygiene 2000-2017: Special focus on inequalities. [pdf] Available at <https://www.washdata.org/sites/default/files/documents/reports/2019-07/jmp-2019-wash-households.pdf> [Accessed 22 August 2019].

³World Health Organization, 2019. Sanitation. [online] Available at <https://www.who.int/news-room/fact-sheets/detail/sanitation> [Accessed 22 August 2019].

⁴ibid.

⁵LIXIL Group Corporation, 2016. The true cost of poor sanitation. [pdf] Tokyo: LIXIL Group Corporation. Available at https://www.lixil.com/en/sustainability/pdf/the_true_cost_of_poor_sanitation_e.pdf [Accessed 22 August 2019].

⁶World Health Organization, 2012. Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage. [pdf] Geneva: World Health Organization. Available at: http://www.who.int/water_sanitation_health/publications/2012/globalcosts.pdf [Accessed 22 August 2019].

⁷Toilet Board Coalition, 2017. Introducing the sanitation economy. [pdf] Geneva: Toilet Board Coalition. Available at https://www.toiletboard.org/media/30-Sanitation_Economy_Final.pdf [Accessed 22 August 2019].

⁸United Nations, 2019. Progress of Goal 6 in 2019. [online] Available at <https://sustainabledevelopment.un.org/sdg6> [Accessed 22 August 2019].

Practice joined-up thinking





True sustainability and scalability depend on improving gross margin, which in turn, depends on increasing revenues or reducing costs.

While many would define poverty as a lack of money, low-income communities tend to consider their experience of poverty much more broadly. Oftentimes, they are experiencing multiple deprivations simultaneously, including lack of affordable access to health care, energy and safe drinking water, for example, as well as sanitation.

Identifying opportunities to bundle sanitation with other services, targeting the same people in need, can help create new revenue streams, attract a wider customer base and provide for a better and more “joined-up” user experience. It can also create opportunities to improve efficiency by sharing operational costs, for example, of water, rent and asset maintenance.

As highlighted by [previous EY research](#) into container-based sanitation (CBS) models, gross margin is king. It reflects the capacity for sustained, profitable growth inherent in a business model and, if gross margins are inadequate, scalability becomes impossible without subsidy. True sustainability and scalability depend on improving gross margin, which in turn, depends on increasing revenues or reducing costs.

Entrepreneurial sanitation enterprises involved in the Sanitation Economy Accelerator program are demonstrating how joined-up thinking can help achieve both and, in doing so, they are greatly improving their capacity to scale.

Insight 1

Make sanitation part of a broader user experience



Developed by 3S, a division of Sara Plast Pvt Ltd (Sara Plast), the Toilet Integration (TI) Bus is a sanitation model specifically developed to provide safe, clean and familiar sanitation experience for low-income urban women in Pune, India. Old city buses that would otherwise be destined for landfill are repurposed as sanitation kiosks, complete with toilets, shower cubicles, diaper changing stations and sanitary pad vending machines. There's even a snack counter at the entrance of the bus, with a female attendant ready to help any customer.

Neatly encompassing this “more than a toilet” value proposition, Rajeev Kher, founder and CEO of Sara Plast, says, “You can call our TI Bus a ladies’ room or lounge, where women can freshen up and pick up a kokum sharbat on their way out.”



Similarly targeting specific demographics – this time blue collar workers, commuters and tourists in Indore, the most populous city in the state of Madhya Pradesh, India – Lootel has pioneered another innovative value proposition. Mostly on the move, two very typical features of these people's days are using the toilet and having a cup of tea. Recognizing this, Lootel has created a clearly differentiated user experience – a “refreshing break” that combines

visiting a luxury toilet with a cup of tea to go. Working on a “pay, use, redeem” model, customers of its Lootel Cafés can pay to use its “Smart Restrooms,” then immediately redeem a coupon at the café, offering that refreshing break at a cost that's lower than accessing other (dirtier) facilities.

The point in all of this is that toilet use, in and of itself, is not a high margin service. However, by integrating toilet use as part of a broader user experience – whether an opportunity for women to “freshen up” or for workers to take a “refreshing break” – TI Bus and Lootel's services are perceived as higher value and attract greater footfall.

In the case of TI Bus, additional revenue streams have been almost equal to toilet revenues, improving margins substantially. For Lootel, the charge of INR10 per use represents a modest premium that has enabled the business to achieve breakeven at the outlet level. Currently serving up to 700 people per day across its four existing outlets, Lootel is targeting 1,000 self-sustaining outlets and creation of 9,000 jobs by 2025.

By integrating toilet use as part of a broader user experience — TI Bus and Lootel's services are perceived as higher value and attract greater footfall.

Insight 2

Join forces to spread cost and risk



Fitting into toilets of many shapes, sizes and specifications, UK-based Loowatt's waterless flush technology and sanitation systems have been used to serve more than 250,000 paying customers at both the top and bottom of the income pyramid – from high-end customers at prestigious festivals and events in the UK to low-income households in Madagascar.

Based on that experience and a four-year pilot with Laguna Water in the Philippines, Loowatt's technology has now been selected for "Kubeta Ko" – a new project launched by the Filipino Department of Environment and Natural Resources (DENR) in January 2020. Starting with installation of 400 toilets in 2020 and eventually scaling to reach more than 10,000 households, the goal is to deploy CBS to bring dignified sanitation to informal settler families (ISFs) living along Manila's waterways, preventing pollution from open defecation emptying into Manila Bay.

Involving Loowatt in a unique collaboration across government, regulatory body and utility company – respectively the City of Manila, the Metropolitan Waterworks and Sewerage System (MWSS), and Maynilad Water Services Inc. – the project aims to prove an operating model whereby the city provides household sanitation services to ISFs, and the utility remains responsible for the safe treatment and disposal of waste.

Critical to Loowatt's selection has been the evidence base gathered by the previous pilot, which focused on the rollout of the Laguna Portable Toilet Solution (PTS) – a first-of-its-kind utility business model

for providing non-sewered household toilets. With a multi-criteria analysis score of almost 90%, this clearly established the efficacy of Loowatt's services across financial, environmental and customer acceptance criteria.⁹ In turn, this has helped establish CBS as a viable and more suitable alternative to septic tanks or sewers in metropolitan Manila's informal settlements, leading MWSS to approve it under sanitation regulation.

The financing of the Kubeta Ko project leverages a split of DENR and philanthropic funding to support the City of Manila in providing services directly to its constituents. A blueprint for future blended finance models (see also insight 8), it allows philanthropists to invest directly alongside government in supporting services that specifically target people living at the base of the pyramid, that are underpinned by strong regulatory and enforcement mechanisms, and that reduce the distortion typical of most sanitation subsidies around the globe.¹⁰ As well as providing for a simple implementation model and efficient cost structure, from Loowatt's perspective, this public-private partnership (PPP) approach offers obvious benefits over a private enterprise model – not least more straightforward and reliable revenue streams, and reduced customer acquisition and capital costs.



Photo credit: Loowatt

⁹Erica, C., 2018. Utility Business Model (Piloting two portable toilet systems (PTS) in Laguna, Philippines). [online] Available at: <https://forum.susana.org> [Accessed 22 August 2019].

¹⁰World Bank Group, 2019. Doing More with Less: Smarter Subsidies for Water Supply and Sanitation. [pdf] Available at <https://www.worldbank.org/en/topic/water/publication/smarter-subsidies-for-water-supply-and-sanitation> [Accessed 22 August 2019].

Monetize toilet resources





Creating a more robust market for renewable resources, data and information flows could dramatically accelerate the pace of change needed to achieve SDG6.

Transforming waste into productive resources has long been held up as a huge economic opportunity, while eliminating (or at least substantially reducing) the harmful effects of unsafely managed waste on human health and the environment. But, while well understood in principle, in practice, these benefits have yet to be realized at scale.

What's more, the principle of "waste to resource" applies to far more than just physical resources. It also applies to the vast amounts of information and insight that can be gleaned from people's use of sanitation facilities and how that can be put to productive use – not only in the service of sanitation enterprises fine tuning their strategies and operations, but also of cities, municipalities and governments implementing more integrated waste management strategies and more effective public health campaigns.

Creating a more robust market for renewable resources, data and information flows could dramatically accelerate the pace of change needed to achieve SDG6. Sanitation enterprises making the most significant progress on this front illustrate three critical pathways to scale.

Insight 3

Create demand for toilet resources

On the face of it, this seems a simple exhortation; however, the reality is rather more complex. For low-income families, any purchasing decision – especially one involving an innovative solution – carries significant risk. This means that creating demand for toilet resources is fundamentally about de-risking those decisions. While traditional sales approaches might favor discounts and promotions to spur demand, Sanitation Economy Accelerator enterprises have learned that building trusted relationships and inducing trial provide a more effective route to encouraging productive use of toilet resources. They've also recognized the value of offering multiple end products, offering flexibility to different market and customer needs.

Toilet resources as quality agricultural inputs

According to the UN Food and Agriculture Organization (FAO), feeding the world's rapidly growing global population sustainably will require producing 70% more food while only being able to use

5% more land. That means future food security depends above all on higher yields, particularly among smallholder farmers. In turn, doubling their productivity and incomes, as envisioned by SDG2 (Zero hunger), depends heavily on improving affordable access to quality agricultural inputs.

In Nairobi, Kenya, Sanergy is using black soldier fly larvae to upcycle sanitation, agricultural and market waste into valuable resources, including organic fertilizer and insect-based animal feed. The larvae feed on waste transported to its centralized facility, developing a high fat and protein content that makes them an ideal replacement for conventional animal feed supplements; and when combined with carbon sources from plant waste, further processing of frass residue produced by the larvae makes an equally high-quality organic fertilizer.

These waste-derived products solve two huge barriers to achieving food security in Kenya – significant shortages of organic fertilizer to improve soil fertility and an overreliance on omena (dried small fish harvested from Lake Victoria) as a protein source for animal feed production.

Demonstrable quality (products are tested by third parties to ensure compliance with international standards) and demonstrable results (farmers have seen crop yields and animal weight increasing by 30%) have helped Sanergy build a customer base of more than 1,000 farmers for its fertilizer. But getting to this point has also been heavily dependent on building and leveraging trusted relationships.

For example, Sanergy doesn't sell its fertilizer direct to farmers. Instead, it's built a reseller model consisting of a robust network of agro-vets and farmer agents who have trialed the fertilizer, and

understand all about its benefits, usage and safety. Already trusted by farmers in their respective areas, it's easy for them to sell the product and provide personalized service, yielding stronger sales results.

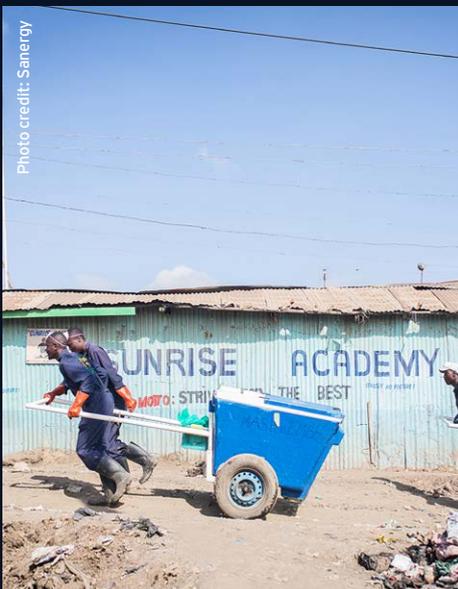
For animal feed, success has again been built on trust and proving product quality – in this case by engaging with big feed millers, and listening and responding to their concerns. Historically skeptical of other animal proteins, which are frequently bulked out with non-proteins that add weight but no nutritional value, Sanergy has been able to demonstrate the superior quality, consistency and traceability of its product, leading to successful sales.

Following on from these successes, and to maintain consistency in production as it meets increasing demand, Sanergy is now building a large-scale organic recycling factory. Currently upcycling roughly 15,000 tons of sanitation and organic waste a year, this new facility will be capable of treating and processing 200 tons every single day.

Toilet resources as an alternative source of energy

Biomass (charcoal and wood fuel) is the single-most consumed energy in Kenya, predominantly used for cooking, heating and lighting. However, unimpeded and unsustainable biomass consumption leads to mass deforestation that accelerates climate change, interferes with food production, and puts current and future livelihoods in jeopardy.

Deforestation due to biomass fuels has caused the loss of more than six million hectares of forested land in the last two decades, leading to the Kenyan government outlawing logging and charcoal production in March 2018. Recognizing the need to diversify and





decarbonize Kenya's energy mix – and the chance to capture a share of a solid fuel market worth an estimated US\$1.3 billion a year – Sanivation turned away from its original plan to turn human waste into fertilizer toward transforming it into a renewable fuel source.

Sanivation initially developed a process that combined human waste collected from its container-based sanitation services with agricultural waste from nearby industries, like sawdust from timber mills. However, the business now also takes in fecal sludge from pit latrines and septic tanks at a fecal sludge treatment plant, working in collaboration with the government. The sludge is heat-treated to inactivate all pathogens, and the sludge and biomass mixture is then placed into a machine that extrudes non-carbonized briquettes for industrial biomass boilers. Not only do these briquettes outperform the competition – their energy density and calorific content mean they emit less smoke and burn longer than traditional firewood – but also offer cost savings and a more reliable supply.

Better and more cost-competitive than traditional firewood they may be, but there's still the challenge of convincing people to switch to a product derived from human waste. Sanivation built its strong customer base by initially providing free samples, so that people could see for themselves that the fuel is odorless and

safe from pathogens. Once they try it and recognize its benefits, it isn't a hard sell, and Sanivation is now receiving inquiries from much larger customers, such as tea farms and pharmaceutical companies, interested in switching to more sustainable fuels.

With demand increasing in lock step with urbanization, and to protect urbanizing communities and the environment against the consequences of unsafely managed sanitation, Sanivation is partnering with municipalities to develop and operate city-wide fecal sludge treatment plants, the first of which will be capable of treating more than 36,000 tons of fecal sludge and producing 15,000 tons of fuel per year.

Toilet resources as both

ATEC produces, sells and distributes pre-fabricated biodigesters that turn kitchen, farm and human waste into biogas and organic fertilizer for rural farming households across Cambodia. Made from export-quality, UV-treated plastic, these biodigesters have an expected lifespan of 25 years and are the world's first that can be installed in any environment, specifically designed to withstand the challenging conditions (including flooding, high groundwater and earthquakes) that affect many rural, low-income communities.

Already serving more than 1,400 customers, those customers get up to 1,500 liters of biogas per day, plus 20 tons of organic fertilizer per year – all from waste and all at zero input cost. Not only are they saving an average of US\$521 a year vs. purchasing LPG gas and chemical fertilizers; they're also experiencing increased crop yields of up to 35% and enjoying a modern, smoke-free cooking environment, thanks to the biogas-fueled rice cooker and twin burner stove supplied with the biodigester.

While there's no doubting the value of its biodigesters to rural households, ATEC has nonetheless faced a significant barrier to scale: the up-front cost of owning them. To solve this problem, ATEC has adopted a pay-as-you-go financial model, which synchronizes the costs and benefits of the system. This means customers can pay for biodigesters in instalments, using the savings it generates, while also reducing pricing pressure on ATEC and helping to protect and grow gross margin. With this far more compelling value proposition, ATEC is now ready to expand into new markets across South Asia, in pursuit of its goal of installing one million systems by 2030.

US\$521

ATEC customers save US\$521 per year on gas and fertilizer, while enjoying the comfort of a modern kitchen.

Insight 4

Recognize there's more than one way to "close the loop"



Building on the insights above, while the likes of ATEC, Sanergy and Sanivation have all demonstrated that it's possible to "close the loop" on material flows by identifying and creating demand for toilet resources, they also show that unlocking and meeting this demand can require different approaches in different settings.

These approaches can essentially be divided into two. On the one hand, there are those, such as ATEC's, that are designed for the processing and productive use of toilet resources to occur on-site. On the other, there are those typified by Sanergy and Sanivation, which in their use of off-site processing and reselling of end products, are more heavily reliant on integrating different parts of the sanitation value chain.

As in the case of Sanergy, for example, it may require setting up different business units to manage the different operational demands of fulfilling different parts of the value chain – from its Fresh Life toilet franchising operation, which builds and services a network of 3,000 container-based sanitation units, to its City Fresh

organic waste management service, which collects and transports waste to Sanergy's centralized processing facility, to its Citywise advisory services, which helps cities design and develop safe, cost-effective sanitation approaches for residents of urban slums and other non-sewered areas.

A supportive, enabling environment is also vital, to which end Sanergy has participated in the development of various policies, including Kenya's national waste management bill, as well as working with the Kenya Bureau of Standards to help formulate appropriate legal and institutional frameworks for the efficient and sustainable treatment and upcycling of waste.

Unlocking and meeting demand for toilet resources can require different approaches in different settings.

Insight 5

Make full use of sanitation data



Photo credit: GARV



Photo credit: Biomass Controls

To address challenging and persistent issues of vandalism and improper maintenance, GARV Toilets (GARV), headquartered in India, makes toilets from vandal-proof stainless steel and integrates smart technologies, such as sensors and radio-frequency identification (RFID) tags.

LED lights and exhaust fans switch on automatically when users open the toilet door. When the user is finished, the same technology automatically activates floor and toilet pan washing systems. And a remote dashboard tracks the total number of users and their behaviors – e.g., how many times they flush and use the soap dispensers – providing data that can be made available to local governments and nongovernmental organizations to design informed behavior change communication plans. For example, when data from one school project revealed that fewer than 10% of children were washing their hands, it was uncovered that they weren't adapting to touch-free, sensor-based soap dispensers. This led to development of specific training, resulting in handwashing rising to more than 80%.

Of course, GARV can also use this data to inform decision-making and drive all manner of strategic and operational improvements. For example, GARV's service operations team has been able to improve efficiency by around 35%, as they're able to track any malfunctions in real time and provide required service on-site. Service turnaround times have also improved, resulting in an increased number of functional toilet facilities for users.

Biomass Controls PBC (Biomass Controls) is similarly using sanitation data, not only to inform decision-making and operations, but also to drive additional revenue streams.

Designed for communities of 500 to 50,000 people, its "biorefineries" are integrated into transportable shipping containers and capable of processing up to 30,000 liters or 1 ton of toilet resources at 85% moisture content a day. These biorefineries use pyrolysis – a thermal process that employs temperatures between 500 and 700 in a zero-oxygen environment – to decompose materials. As well as reducing solid waste volumes by 90%, the process produces thermal energy and "biochar," which sequesters minerals and nutrients, including carbon, and has proven beneficial as a soil amendment.

Shifting from equipment production to an infrastructure-as-a-service (IaaS) business model, Biomass Controls has differentiated itself further through development of its kelv^on™ software architecture and mobile application, which enables real-time control and monitoring of its refineries, both by itself and its clients.

Presented as key performance indicators (KPIs) that provide visual reporting for management and stakeholders, it's a great value add for customers. But it's also so much more. It boosts unit economics by generating additional revenue from app subscriptions, at zero marginal cost to the business; and it's building a hugely valuable bank of sanitation data, comprising more than two billion records, which offers exciting future product possibilities.

80%

Data from one school project led to development of specific training, which increased handwashing rates from 10% to 80%.



With every US\$1 invested in sanitation generating economic returns, the business case for investment in the sanitation economy hardly be stronger.

A photograph of a woman and a child walking through a slum. The woman is wearing a grey t-shirt and a light-colored skirt, carrying a white plastic bag. The child is wearing a striped shirt and dark pants. They are walking on a dirt path next to a polluted stream filled with trash. In the background, there are shacks made of corrugated metal and wood. A concrete structure with the word 'SAVE' is visible. The text 'sted in US\$4.30 the stment omy could' is overlaid on the left side of the image.

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Unlock investment





Investors look to invest in innovative business models with the potential to drive sustainable profits and scalable social impact.

With every US\$1 invested in sanitation generating US\$4.30 in economic returns, the business case for investment into the sanitation economy could hardly be stronger. But that's not enough, as shrewd investors look to invest in innovative business models with the potential to drive sustainable profits and scalable social impact.

With a limited pool of finance, Sanitation Economy Accelerator enterprises are attracting interest from investors, not only by collaborating for scale and monetizing resources, but also by employing strategies specifically designed to unlock finance.

By becoming asset-light through “product-as-a-service” and franchise model approaches, they're reducing upfront capital costs, de-risking investment and making invested capital go further. And they're tapping into different pockets of investment capital by effectively positioning the positive social and environment impact of their businesses beyond just equitable access to sanitation.

Insight 6

Become “asset light” to make investment capital stretch further

Making full use of sanitation data – as a means to provide value-added services, as well as to improve operational efficiency – isn’t the only thing Biomass Controls and GARV have in common. They’ve also both pivoted their business models to unlock greater investment and, with that, greater capacity to scale.

As described earlier, Biomass Controls was initially purely an equipment production business, manufacturing its patented pyrolysis biorefineries. While this business model offers strong margins, it’s also very capital intensive. In moving to an laaS business model, which includes an asset financing intermediary, the enterprise has been able not only to tap into alternative forms of finance, but also make each dollar go further by tapping into new markets with a much more affordable “pay-per-use” proposition. This has helped it to attract loan funding from WaterEquity’s WaterCredit Investment Fund 3 (WCIF3) to expand deployment of its refineries.

GARV’s smart toilets for urban and peri-urban communities are similarly capital intensive. To address this challenge, GARV has been piloting a franchise model,

whereby franchisees bring the capital and local management capability, while GARV, as the franchisor, brings the technology, systems and network operations. Again, this asset light approach is more attractive to investors, but it also brings a host of other benefits. Establishing community toilets requires local knowledge and adept relationship management with local government bodies – things that are likely best provided through highly localized, but connected and consistent, franchise enterprises. This new perspective also diverts dependency away from potential time-intensive PPPs, with governments and municipal authorities cast as channel partners rather than customers.

Already bearing fruit, this approach has enabled GARV to unlock new long-term contracts with municipal bodies, smart city projects and even the Delhi metro rail corporation, expected to generate annual aggregated returns of 16% for each franchisee.



Photo credit: Biomass Controls



Photo credit: GARV

Establishing community toilets requires local knowledge and adept relationship management with local government bodies.

Insight 7

Solve more problems to unlock multiple sources of capital



Photo credit: Sanergy

With some estimates valuing the impact investment market at nearly US\$9 trillion in the US alone, there's no shortage of capital that could be invested in scaling sanitation enterprises, but that market is also hugely fragmented. As a recent study by Bertelsmann Stiftung, Sphaera and Artha observes, this fragmentation makes it hard for entrepreneurs to find the funding and investment partners they need to scale their enterprises, as well as hindering the quick and effective flow of capital needed to achieve the SDGs.¹¹

As highlighted under Insight 3, by establishing models that incorporate transformation of toilet resources into quality agricultural inputs and alternative fuels, enterprises such as ATEC, Sanergy and Sanivation are not only tackling the issue of equitable access to improved sanitation (SDG6), but also helping accelerate progress toward adjacent sustainability goals, such as SDG2 (Zero hunger) and SDG7 (Affordable and clean energy). They're also using this to unlock multiple sources of capital – not by presenting different faces to different investors, but by telling and selling an integrated story of impact that speaks to how their models tackle the multiple challenges facing their target communities.

In the case of ATEC, for example, articulating the value proposition of their biodigesters is incredibly simple: waste

goes in; gas and fertilizer comes out. But that value proposition is wrapped in a bigger idea – that of building a “smart farmer community” where each of its members can turn waste into a US\$521 a year saving on gas and fertilizer, and enjoy the benefit of a modern kitchen to boot.

Anchored more in the outputs of their biodigesters than the inputs, this narrative has helped ATEC raise US\$2.8 million in debt and equity financing to date, with a further US\$5 million expected to be raised over the next five years – the majority of its funding objectives met by investors focused on energy and fertilizer, as well as some taking a more holistic view of the benefits of investing in water, sanitation and hygiene (WASH).

Sanergy similarly anchors its story in more than just access to improved sanitation. In painting the picture of the growing sanitation crisis facing urban slums, whose populations are expected to double to two billion people by 2030, it emphasizes lost productivity due to illness, which costs Kenya 1% of its GDP every year, thereby linking to SDG3 (Good health and well-being) as well as SDG6.



Photo credit: ATEC

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With some estimates valuing the impact investment market at nearly US\$9 trillion in the US alone, there's no shortage of capital that could be invested in scaling sanitation enterprises.

¹¹Bertelsmann Stiftung, Sphaera & Artha, 2018. Impact Platforms: towards an interoperable impact finance ecosystem. [pdf] Portland, Geneva, Gütersloh: Bertelsmann Stiftung, Sphaera & Artha. Available at https://impactfinance.network/wp-content/uploads/2018/10/Impact-Platforms-Report_Final.pdf [Accessed 16 October 2019].

Stimulate further investment





Realizing the full potential of the sanitation economy will require many other enterprises to spring up and follow the lead set by those in the Sanitation Economy Accelerator program.

As mentioned at the outset of this report, our intent is not only to illustrate sanitation enterprises' capacity to scale, but also to stimulate the supportive ecosystem and investment that can help make that happen. That the likes of ATEC and Biomass Controls have been able to raise commercial investment signals an important tipping point in the level of trust that entrepreneurial sanitation enterprises can build scalable, profitable and sustainable business models. But commercial investment to help take proven models to the next level is only part of the equation.

Realizing the full potential of the sanitation economy will require many other enterprises to spring up and follow the lead set by those in the Sanitation Economy Accelerator program. In turn, they will need help to bridge the gap between philanthropic capital at one extreme and commercial investment at the other. Between novel idea and proven concept lies the "dragon pit" of testing, iterating and validating the business model – a process that can take considerable time and requires access to appropriate finance.

As highlighted by previous EY research, even those that do take proven models to scale will likely still require ongoing financing from outside sources if they are to reach the very poor. While there is increased participation in PPPs, successful ones are few and far between. A better understanding of how to structure and finance PPPs, and how to include new business models in budget planning, loan requests and policy enforcement, can help emerging market countries move further, faster, toward 100% safely managed sanitation.

Insight 8

Innovate new financial instruments



Urgently needed are more blended financing and innovative financial instruments that recognize these gaps and are specifically designed to fill them – instruments that incentivize cross-sector collaboration, that emphasize impact as well as financial returns (to avoid promising models being overlooked), and that ideally focus specifically on the acceleration of progress toward the SDGs.

As sanitation enterprises and programs scale, and attempt to shift from grant financing toward commercial investment, development impact bonds would appear to offer just such a vehicle. They incentivize efficient provision of sanitation products and services, tie grant usage to achievement of development outcomes, and attract new sources of investment capital by distributing risk among investors and outcome funders. At the end of a successful development impact bond investment is a sanitation enterprise or program with a track record capable of attracting further investment, an outcomes funder with intended development outcomes achieved, and an investor with an attractive return and a greater appetite for investments in sanitation.

The increasing prevalence of such bonds points the way forward – particularly the Cambodia Rural Sanitation Development Impact Bond, the world's first impact bond for WASH launched by iDE, the Stone Family Foundation and USAID, with support from Social Finance. The outcomes-based financing approach of the bond is intended to allow iDE and the Stone Family Foundation to learn, adjust and innovate in

pursuit of the goal of 1,600 villages free from open defecation, while also enabling USAID, as the outcomes funder, to pay for results only. Grameen Impact Investments India (GII), which has already launched impact bonds specifically focused on SDG5 and SDG8, is similarly working to extend its Grameen Outcome Accelerated Learning (GOAL) series to launch an instrument focused on accelerating progress toward SDG6.

Crucially, these bonds aim to provide a successful, workable financial structure that brings together private investors and corporates, as well as the government, and that shifts the credit facility assessment from a solely risk-based model to one that includes impact-based assessment as well. For government and other outcomes funders, it reduces financial and operational risk, while promoting investment in the creation of positive development outcomes and encouraging innovation; for investors, it offers a “mission aligned” investment opportunity that can create positive impact as well as financial returns; and for social enterprises and other sanitation-focused organizations, it offers upfront funding to develop, refine and scale their business models.

In essence, it's a new model for PPPs – one that offers huge potential to stimulate the level of investment needed to make real the promise of a transformational sanitation economy.

Conclusions

Building a profitable, sustainable sanitation business serving low-income customers is hard, but as the examples in this report show, it can be done.

We sit at a critical inflection point in the pursuit of the Sustainable Development Goal of access to adequate and equitable sanitation and hygiene for all by 2030. With the UN suggesting that achieving universal access to even basic sanitation by 2030 would require doubling the current rate of change, we need to go further, faster. In particular, we need to go further, faster in scaling the impact enterprises whose innovative business models are reaching the parts that conventional sewerage, waste treatment and processing can't.

The business case has already been made – powerfully. And better answers to the global sanitation crisis already exist in the shape of past and present participants in the TBC's Sanitation Economy Accelerator program. But unless and until the debate meaningfully shifts from why a transformational sanitation economy is a good idea toward how to rapidly scale and replicate the success of these enterprises, the prize is likely to remain elusive.

That prize – estimated to be worth US\$62 billion a year by 2021 in India alone – deserves greater attention and commitment to act. It deserves greater attention and commitment from governments and municipal authorities who can reduce the unaffordable public costs of sewerage sanitation, while reaping huge cost avoidance advantages in improving community health. And it demands greater attention and commitment from entrepreneurs and impact investors who can unearth huge value, not only from serving the 4.2 billion people still lacking access to safely

managed forms of sanitation today, but also helping to tackle adjacent goals for sustainable development, such as safe water, food security, renewable energy, and good health and well-being.

Building a profitable, sustainable sanitation business serving low-income customers is hard, but as the examples in this report show, it can be done. From bundling sanitation with other services to create a better, broader user experience, to creating demand for transformed toilet resources, to becoming asset light to make invested capital stretch further, Sanitation Economy Accelerator enterprises are illuminating multiple pathways to greater efficiency, profitability and scale. And in so doing, they've already brought dignity and a better quality of life to millions of people.

With the right support – particularly innovative forms of finance – EY and the TBC believe that they, and others like them, can bring affordable, sustainable and safely managed sanitation to hundreds of millions more of the people who so desperately need it.

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About the Toilet Board Coalition

Established in 2015, the Toilet Board Coalition (TBC) is a business-led partnership platform with the goal to accelerate the transition to the Sanitation Economy. Our ambition is to transform sanitation systems from unaffordable public costs into robust marketplaces of sustainable business value. The TBC is facilitating private sector engagement; large company - small company partnerships; and public- private collaboration to contribute to the achievement of Sustainable Development Goal 6 - universal access to water and sanitation. We run the Toilet Accelerator, the world's first accelerator programme dedicated to Sanitation Economy business solutions that are smart, circular, and resilient to address the unmet sanitation needs of the world's most vulnerable. The members of the Toilet Board Coalition believe that accelerating the Sanitation Economy will deliver significant benefits to business and society.

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