

# SCALING UP THE SANITATION ECONOMY 2020-2025

NOVEMBER 2019



# 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.



# CONTENTS

<b>04</b>	Foreword - A Call to Action for Business Leaders
<b>06</b>	Scaling up the Sanitation Economy 2020-2025
<b>08</b>	The Business Case for Scale
<b>10</b>	The Economics
<b>14</b>	Investment Scenario
<b>18</b>	Impact
<b>20</b>	Business in Action
<b>24</b>	The Toilet Economy
<b>26</b>	The Circular Sanitation Economy
<b>28</b>	The Smart Sanitation Economy
<b>30</b>	Call to Action

## FOREWORD

# A CALL TO ACTION FOR BUSINESS LEADERS

Via the Sanitation Economy, sanitation is a net contributor to human rights, new resources, and data with vast opportunities for business and society.

Sanitation is one of the most pervasive yet overlooked development challenges facing us in the 21st century.

An estimated 2.3 billion people around the world still lack access to basic sanitation and 4.5 billion people – more than half the world’s population still lack access to safely managed sanitation along the entire service chain. Increasing urbanisation is aggravating sanitation issues, environmental degradation and public health.

**There are 3 pathways to scale via cities, sectors and standards.**

**Business leaders have a unique role to play.** Scaling up new Sanitation Economy approaches within businesses will ensure sanitation access and un-lock resources and data that will transform the economics of sanitation into commercially viable opportunities.

These solutions will enable companies to provide the human right of safely managed sanitation to employees, across supply chains and communities where they operate – while managing resource risks, generating new insights about health and behaviour, building positions in growth markets, and strengthening supply chains.

**Sanitation** needs to be an integral part of every company’s sustainability agenda.

Companies, across sectors, have the responsibility to **provide safely managed sanitation to their employees**, throughout **supply chains** and in **communities** where they operate.

In doing so, **companies** can have a significant effect on **SDG 6** – universal **access to water and sanitation** by 2030.

**Sanitation provision** can be converted from a **cost of \$ 200** per person to a **net value of \$ 10** per person.

**\$ 7 million** public expenditure can unlock **\$ 75 million** in commercial investments and yield **\$ 130 million** in new value.

**The Sanitation Economy provides us with a new lens through which to translate global sanitation needs into sustainable business solutions with compounding value across 3 Economies.**

**The Sanitation Economy has the potential to unleash innovation, economic growth and development – and is estimated to be a multi-billion dollar a year marketplace.**

Applying Sanitation Economy approaches that are circular and digitised enables new solutions for **water security, energy security, food security and health.**

## Companies hold the potential to transform sanitation systems from an unaffordable cost into delivery systems for renewable resources and information about human health and behaviour – critical to future business growth.

As global businesses, we are facing an unstoppable force of growing public demands for sanitation solutions by global governments, the inevitability of a rapidly increasing squeeze and competition for scarce resources, and an intolerance for inequity when it comes to human health and dignity. In our current business context, the Sanitation Economy presents new solutions in all of these areas, and **the business case just got stronger.**

In this report we share the work of The Toilet Board Coalition over the past four years, outlining **clear economic evidence, new business models, available technologies, and investment scenarios** for applying Sanitation Economy solutions. It provides insights into how companies are going beyond corporate responsibility in water, sanitation and hygiene approaches, shares actions leading businesses are taking to bring new solutions and recommends key steps businesses can take to unlock significant benefits for your company and society.

**We call on fellow business leaders to join us in mobilising business leadership to scale up the Sanitation Economy 2020–2025.**

**As water, energy, and nutrients become increasingly constrained for businesses globally, sanitation systems become new reservoirs for renewable resources, materials, and data.**

**Toilet Resources are one of the only resources that increases with population growth. The Toilet Resources of our current global population amount to 3.8 trillion litres of renewable resource per year.**

Erin McCusker  
Chief Strategy Officer  
SATO, a part of LIXIL  
Toilet Board Coalition Chair

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Link to Good Living

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Cheryl Hicks  
Executive Director & CEO  
Toilet Board Coalition

**TOILET**  
BOARD COALITION

# SCALING UP THE SANITATION ECONOMY 2020-2025

## FROM VISION TO IMPLEMENTATION AT SCALE

**Leading businesses are engaged in efforts to reimagine sanitation systems as a net contributor of resources and data while addressing critical human rights. More importantly these leaders are driving their companies to go beyond risk and compliance to bring transformative positive change to millions of people affected by their business operations.**

Global companies employ several millions of people. By proactively applying Sanitation Economy approaches companies have the potential to break down significant barriers to development and positively impact the lives of millions of the world's most vulnerable. The public expects companies to be providing 100% access to sanitation if they are to be seen as leaders on issues of sustainability and purpose - **with Sanitation Economy approaches the business case just got stronger for CEOs also facing resource constraints affecting business operations.**

**Our work estimates that the economics shift at a scale of just 1 million people.** New business models are already lowering the costs of sanitation from \$200 to \$6 per person. Toilet Resources from 1 million people up-cycled into feedstock for water, energy, nutrients, chemicals or health information will further shift the value proposition to a positive net value of +\$10 per person. Toilet Resources from 1 million people can produce 500,000 tonnes of new resources, data and insights.

**BUSINESS LEADERSHIP IS ESSENTIAL TO ACHIEVING THE TRANSFORMATION NEEDED TO ADDRESS ONE OF THE MOST PRESSING CRISES OF OUR TIME WHILE CREATING INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH FOR THE YEARS TO COME.**

## WHAT IS THE SANITATION ECONOMY?



### HUMAN RIGHTS THE TOILET ECONOMY

Companies, across sectors, have the responsibility to provide safely managed sanitation to their employees, throughout supply chains and in communities where they operate. In the Toilet Economy, toilets not only improve lives, but also become a delivery system for health and hygiene, renewable resources, and information about human health and behaviour. Providing toilets across business operations is no longer an unaffordable cost, but a net contributor to human rights and business value.



### RESOURCES THE CIRCULAR SANITATION ECONOMY

Human excreta, or Toilet Resources, provide new reservoirs of renewable resources for business operations such as water, energy, nutrients and more. In the Circular Sanitation Economy new technologies are creating more cost efficient decentralised alternatives to the capital intensive waste management systems of today. Applying circular economy approaches to sanitation un-locks valuable resources becoming more and more constrained for businesses and society and which are critical to future growth.

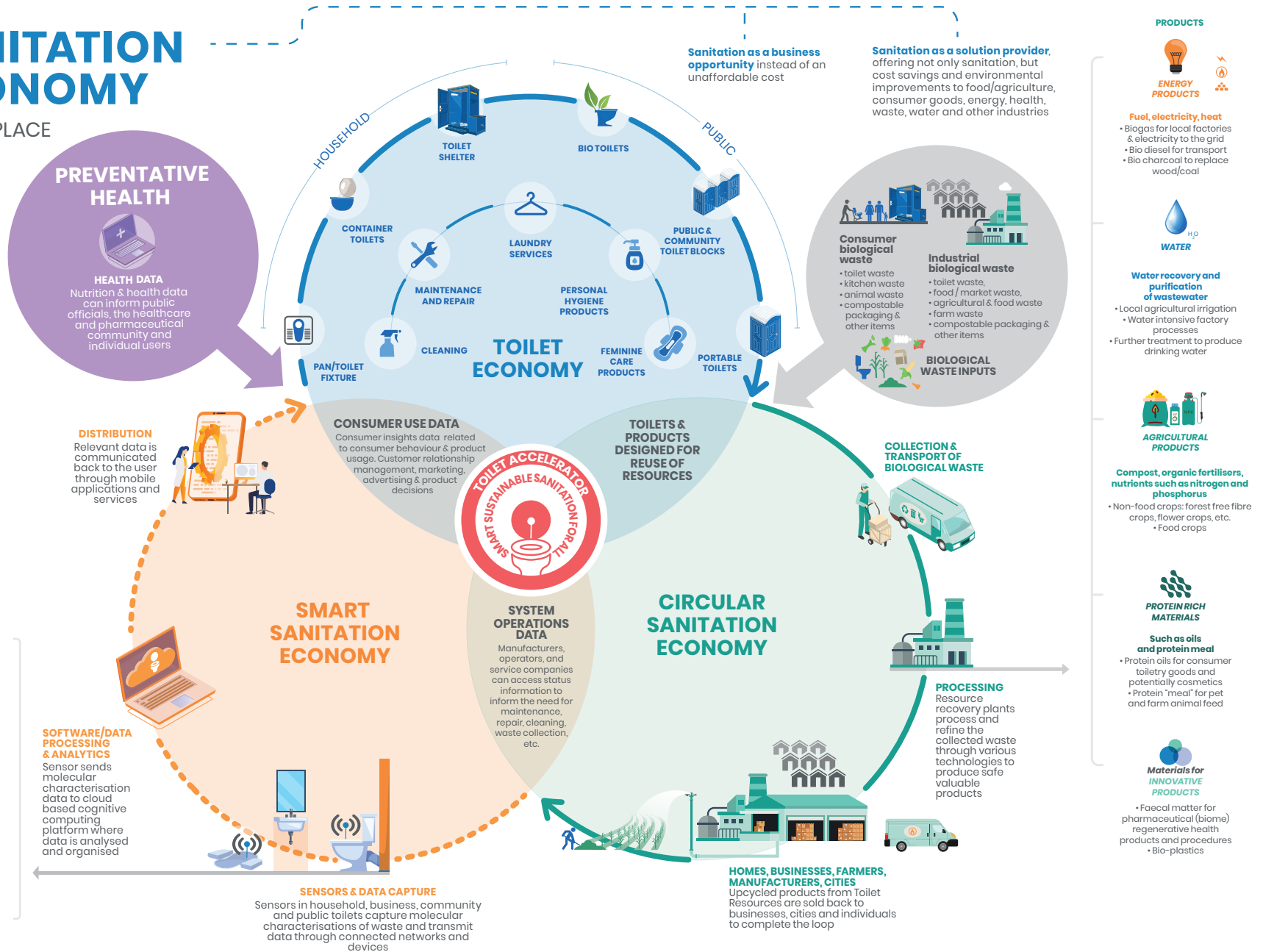


### DATA THE SMART SANITATION ECONOMY

In the Fourth Industrial Revolution (*World Economic Forum, 2016*) digital technologies and data are disrupting industries and providing new ways to create business value. In the Smart Sanitation Economy sensing technologies and earth observation via satellite technologies provide real-time monitoring of sanitation systems bringing operational efficiencies and new insights about human health and consumer behaviour.

# THE SANITATION ECONOMY

MARKETPLACE





# THE BUSINESS CASE FOR SCALE

ACHIEVING SCALE REQUIRES LOOKING BEYOND TRADITIONAL MODELS

Sanitation systems contain one of the world's most untapped reservoirs of resources and data critical to business growth, economic development, human rights and the improvement of lives for millions of people.

Businesses and governments have the opportunity to set new standards for sanitation that incorporate its real value and in doing so unlock significant benefits for business and society.

**4.5 billion** people currently without access to safely managed sanitation. *(WHO-UNICEF Joint Monitoring Programme, 2019)*

**3.8 trillion** litres of biological resources generated per year. *(Toilet Board Coalition, 2017)*

**4000 biomarkers** different bacteria and **58,003** viruses can be visualised from a 24-hour sampling of sewage. *(Massachusetts Institute of Technology, 2018)*

The Business & Sustainable Development Commission's *Better Business Better World* report (2017) cites water and sanitation infrastructure in cities amongst the 60 biggest market opportunities related to delivering the SDGs which it values could be worth at least **\$12 trillion** a year and generating **380 million new jobs** by 2030 in developing countries.

The Toilet Board Coalition estimates the Sanitation Economy to be a **\$62 billion** market opportunity in India alone by 2021. *(The Sanitation Economy in India: Market Insights & Estimates, 2017)*



## PUBLIC INTEREST IS HIGH

Sanitation is a priority for global governments

- Business solutions are in the spotlight
- Investor interest is rising
- Regulation is coming



## SUSTAINABLE ECONOMIC GROWTH

Sanitation is a net contributor

- Low carbon - carbon positive targets
- Water risks and security
- Closing the nutrient loop



## DRIVER OF INNOVATION

Technological development & efficiencies

- Decentralised sanitation is lower cost, more dynamic for changing conditions, less resource intensive, and faster to implement
- Mapping bacteria, viruses and chemicals data mined from raw sewage via sensing, satellite imagery and geospatial data we can optimise real-time disease and antibiotic resistance tracking for more targeted health response



## RESPONSIBILITY

Purpose enables profit

- Sanitation goes beyond Corporate Social Responsibility to material sustainable business strategies
- Investors and standards bodies are paying closer attention to sanitation
- Access to sanitation is a basic need and paves the way to financial inclusion & consumption



**Ultimately we want the most cost-effective and efficient services for citizens. Scale matters because it enables economies of scale that will accelerate the Sanitation Economy. But we need a new view on scale.**

### ● SCALE AT LOWER COST & FASTER CONNECTION

Urban sanitation has typically exploited the traditional view of scale with large scale sewered systems and treatment plants achieving economies of scale. However, at a high cost in capital investment, operations and maintenance. Smaller systems that are lower cost, more nimble, and faster to implement are now available, with scale enabled through connected mini-grids rather than physical size.

### ● SCALE THROUGH NEW TECHNOLOGIES & STANDARDS

If a small unit is replicated many times in a standardised form, design and supply chains achieve efficiency through their own economies of scale. Other benefits include consumer awareness and adoption, and development of new products and services. This can be applied to toilets, treatment plants and other equipment. Modular design allows this standardisation to be combined with local customisation.

### ● SCALE THROUGH CIRCULAR DESIGN & SHARED SERVICES

Multiple business units under a shared management structure, or industrial symbiosis design, can share information, expertise and resources; pool procurement leverage and investment. Businesses with this scale, either within their own organisation, or through extended networks such as industry bodies or franchising schemes, can open-up multiple markets and revenue streams.

### ● SCALE THROUGH OPTIMISED DIGITAL CONNECTIVITY

Interconnection (physical and digital) enables multiple forms of optimisation – of operations and maintenance, in learning, troubleshooting, loss prevention and reactive user solutions (indicating when a toilet is broken AND where I can find the nearest, most highly rated for cleanliness, working toilet). The network effect means big data is transformed into meaningful information for businesses, users and governments.

#### **A new definition of scale for the Sanitation Economy:**

The call for decentralised technologies is nothing new. The debate on the provision of infrastructure services, such as water and energy, has long been dominated by the controversy between advocates of small-scale decentralised technology, and defenders of large-scale networks.

The debate of large and small provision works with rather limited definitions of “scale” focused around extreme possibilities of network configuration. The claims are also highly normative about the relative benefits of alternative options.

*(Edited quote from Infrastructures of Consumption, Environmental Innovation in the Utilities Industries, (2005) B. Van Vliet, H. Chappells, E. Shove, Earthscan. P68-63)*

# 3 PATHWAYS TO SCALE

This is new territory. Moving business to a sustainable, Sanitation Economy, growth model will be disruptive, with big risks and significant opportunities at stake. It will involve experimenting with new circular and more agile business models and digital platforms that can grow exponentially to shape new social and environmental value chains. Knowing how to move first and fast is critical to reduce the risk of assets being stranded by the shift to the Sanitation Economy.

To achieve SDG6.2 universal access to safely managed sanitation, the Sanitation Economy needs to be implemented at scale. Building a robust market place of products and services, renewable resource flows, data and information via sanitation systems will transform sectors, cities, communities and businesses.

**Our work has identified 3 key routes to scale to unlock business and societal benefit:**



## CITIES

Cities are growing at unprecedented rates and will be home to an estimated 5 billion people in 2030, 60% of the world's population, with much of the increase in Asia and Africa. (UNESCO, 2018) All citizens will require access to safely managed sanitation.

Applying smart sanitation approaches can help cities to establish Sanitation Intelligence through smart public toilets, smart treatment and smart health.



## SECTORS

Sectors such as agriculture and manufacturing employ millions of people in economies currently without access to safely managed sanitation.

Establishing circular sanitation as a blueprint for sustainable and efficient business operations can provide access to sanitation for millions of people currently without; provide access to resources such as water, energy and nutrients currently scarce for business operations; address health risks for workers and environmental degradation in communities where businesses operate.



## STANDARDS

Establishing new standards for decentralised public and community toilets can empower cities with lower cost, faster implementation of sanitation services for growing populations.

Standards for the safe use of Toilet Resources for the regeneration of water, energy, nutrients can transform the economics of sanitation from cost to value.

Standards for the use of data from sanitation systems can unlock new Sanitation Intelligence to ensure sanitation access, more efficient sanitation system management, and information about human health and behaviour.

# 3 PATHWAYS TO PROFITABILITY

Transforming sanitation systems from unaffordable public costs to profitable and sustainable business opportunities will require a new systems approach, new business models and new financial models.

## NEW GRID TRANSFORMATION

Sanitation Economy systems models are based on the emerging “new grid” idea (*Toilet Board Coalition, 2017*) that blends the best profitability and service features of traditional sewer systems and decentralised “off-grid” solutions into a lower cost, more sustainable hybrid model – a network of flows of nutrients, water, energy, data, and finance. Optimisation of “new grid systems” will require scale-up to populations of at least 1 million people.

## NEW BUSINESS MODELS

The Sanitation Economy is yielding multiple business models which allow sanitation to generate revenue. Sanitation Economy entrepreneurs are achieving various combinations of revenues:

- Toilet Economy revenues include transforming toilet access into new consumer spaces of quality, affordable products and services bundled to compound revenue stream opportunities.
- Circular Sanitation Economy revenues include converting sanitation waste into Toilet Resources that can be up-cycled into sales of water, energy, organic fertilisers, and potentially high value proteins and other organic chemicals – optimised for local markets and regulation. Several models are already approaching full cost recovery.
- Smart Sanitation Economy revenues include the potential to optimise efficiencies with digitisation through operations monitoring, and monetise user data, consumer insights, and information about human health and behaviour.

## NEW FINANCIAL MODELS

The Sanitation Economy requires an update to the valuation and pricing of new sanitation business models. New evidence of higher value product and service models are emerging and need to be considered in financial models. Blended finance will be required in the short term to enable the needed investment in capital costs to build Sanitation Economy infrastructure that will unlock commercial finance for revenue generating models at scale.



# THE ECONOMICS

The Sanitation Economy transforms the economics of sanitation for business and governments from unaffordable costs into sustainable business opportunities.

With Sanitation Economy approaches, the current cost of sanitation provision can be transformed from a:

**COST \$ 200** per person

to a **NET VALUE \$ 10** per person

There is a compounding value effect in applying Sanitation Economy approaches across the 3 economies:



**TOILET ECONOMY**



**CIRCULAR SANITATION ECONOMY**



**SMART SANITATION ECONOMY**



The World Bank has estimated sanitation to be a **\$250 billion** cost to society each year.

*(WHO & World Bank, 2008)*

UN Water estimates a **\$1 trillion** financing gap per year to reach SDG 6 by 2030. *(WHO/ UNICEF JMP, 2017)*

# THE EVIDENCE

## COMPOUNDING VALUE OF BUSINESS MODELS AT SCALE

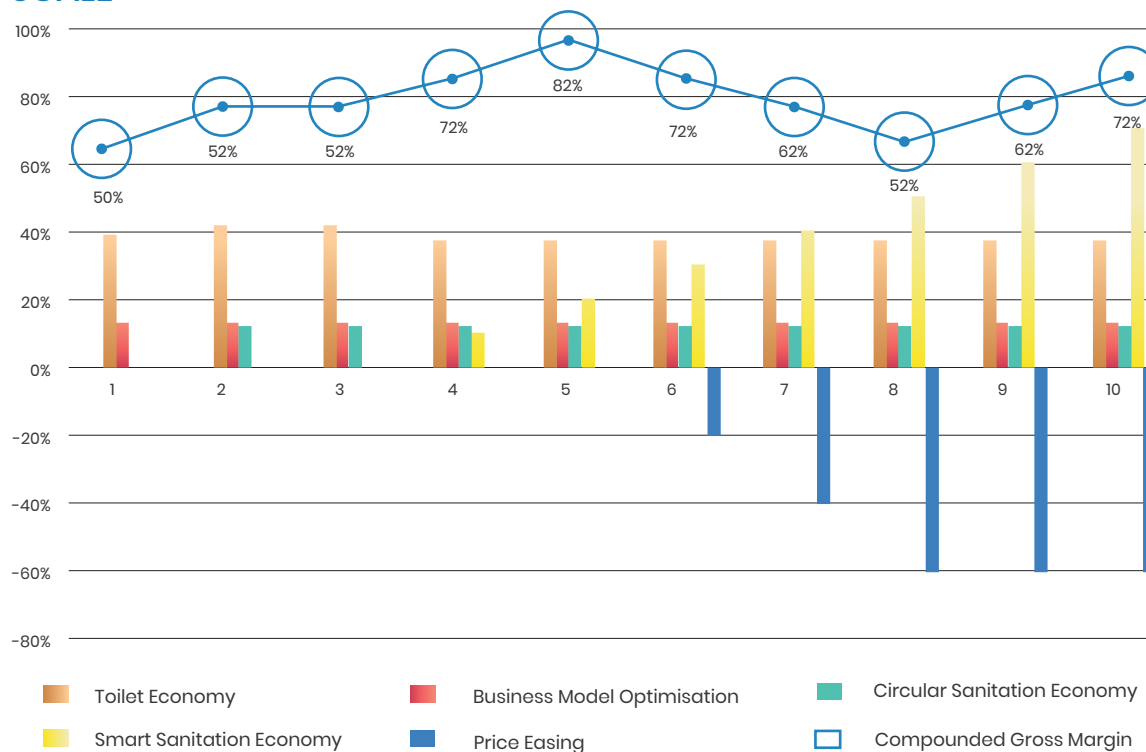
This analysis shows that the compounding effect of integrating the Toilet Economy + Circular Sanitation Economy + Smart Sanitation Economy

**50%** Gross margin of optimised Toilet Economy business models

**+12%** Gross margin of optimised Circular Sanitation Economy business models

**+10%** Gross margin of optimised Smart Sanitation Economy business models

The integration of Toilet, Circular and Smart Sanitation Economy business models over time delivers a solid improvement in the overall gross margin enabling price easing, the ability to provide broader levels of service and future growth.

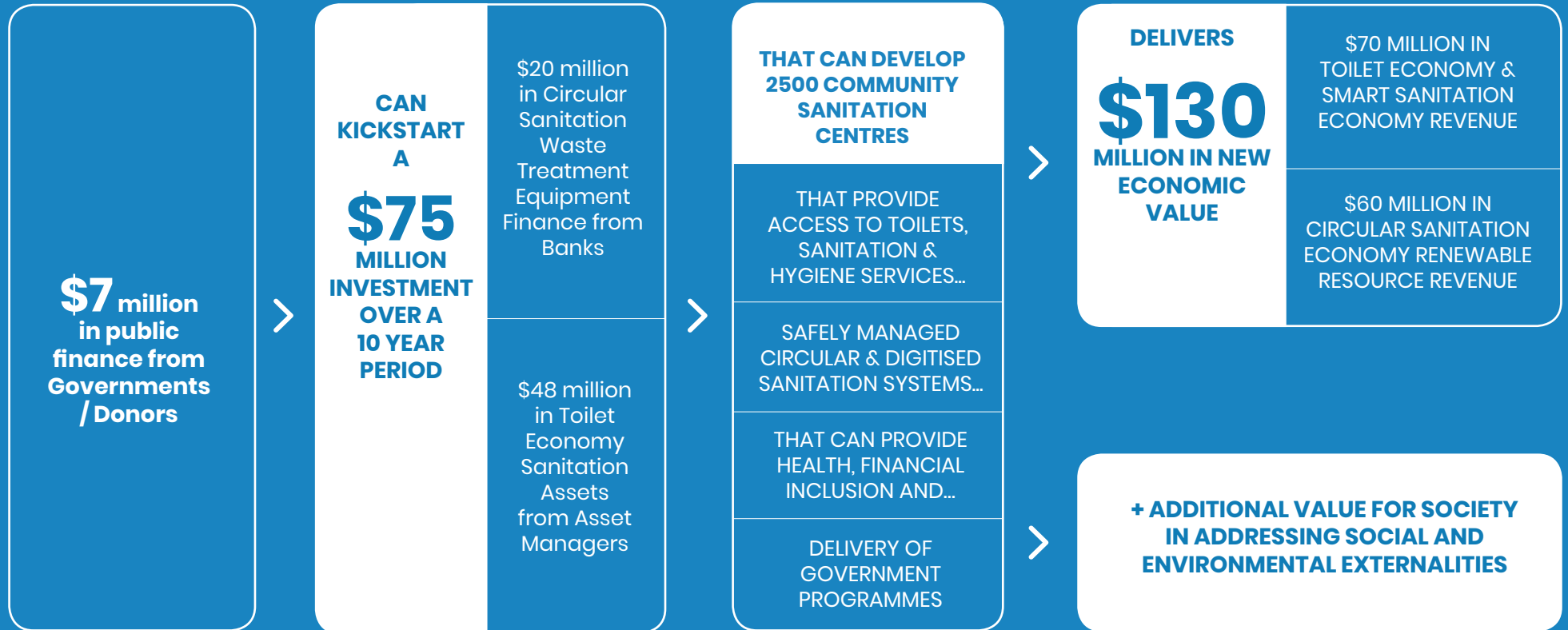


This analysis is based on Sanitation Economy business models serving at least 1 million people. Calculations of gross margin are based on existing business models of companies in the Toilet Board Coalition Toilet Accelerator programme. *Source: TOILET BOARD COALITION 2019*



# INVESTMENT SCENARIO

SANITATION ECONOMY SOLUTIONS FOR 1 MILLION PEOPLE



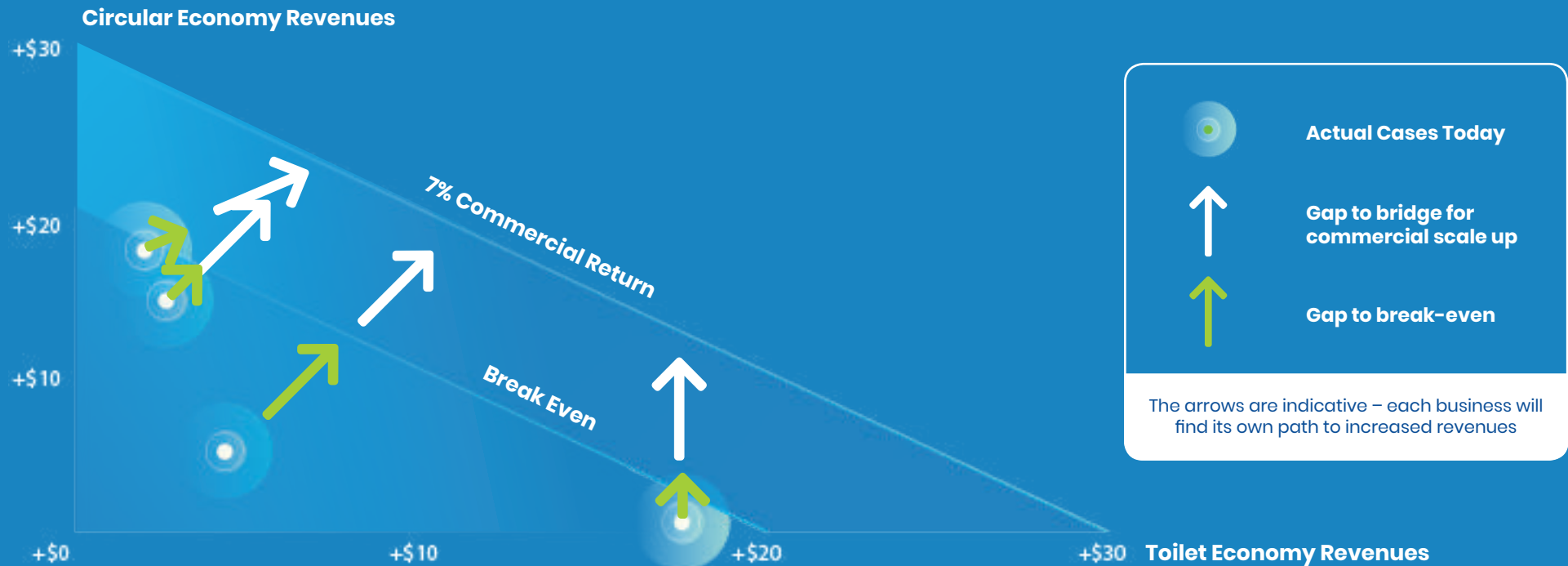
Source: TOILET BOARD COALITION 2019

# ASSUMPTIONS

	<p><b>01</b></p> <p>Assumes an average traffic of 375 persons per sanitation centre per day (operating at 75% capacity)</p>	<p><b>02</b></p> <p>A modular sanitation centre, that does not require land rights and is semi-portable costs approximately \$20,000</p>	
<p><b>03</b></p> <p>Technology integration in a sanitation centre costs \$2,000 per centre</p>	<p><b>04</b></p> <p>Water ATM integration costs \$3,000 per centre</p>	<p><b>05</b></p> <p>Biodigester can consume about 150 kgs of Toilet Resources per day; average Toilet Resource production is 0.8 kg per person, 70% of people use centre for defecation</p>	<p><b>06</b></p> <p>Average spend per person per day is about \$0.10 reducing to \$0.05 after price-easing</p>
<p><b>07</b></p> <p>One person per family does laundry every 5-6 days and pays \$0.80 per bucket of laundry</p>	<p><b>08</b></p> <p>Health and hygiene kit (toothpaste, soap) sales are estimated at 5% of sanitation revenue</p>		<p><b>09</b></p> <p>Estimated cost of one biodigester \$2,500</p>
<p><b>10</b></p> <p>Total human waste is converted into organic fertiliser and is sold at the rate of \$0.10/kg, contribution assumed at 50% to account for sales and distribution costs etc.</p>	<p><b>11</b></p> <p>Community commerce opportunities - product partnerships, advertisements are estimated at \$200 per site per month</p>		<p><b>12</b></p> <p>Each biodigester produces about 2.65 L of biogas per day. Assumed price of biogas is \$1.2 per L. Assumes 80% of the biogas is sold to account for fluctuations and inefficiencies</p>

# 3 STEPS TO A COMMERCIAL RETURN

## SANITATION ECONOMY BUSINESS MODELS



**1**

Design and build a system aiming for CAPEX + OPEX at \$20 per person per year – such systems are likely to be decentralised and will need to be at scale

**2**

Achieve break even with revenues of \$20 per person per year with a combination of Toilet and Circular Economy revenues

**3**

Add additional revenues – Toilet, Circular and Smart – to add a further \$10 per person per year – delivers 7% commercial Return on Investment



Centralised sewer network

**\$200 million**

Regional and global costs of attaining Water Supply and Sanitation Target 10 of the Millennium Development Goals (WHO & World Bank, 2008)



Transition to decentralised  
Circular Sanitation Economy  
approaches

**\$75 million**

Estimated public expenditure requirement of modular toilets and decentralised waste treatment approaches



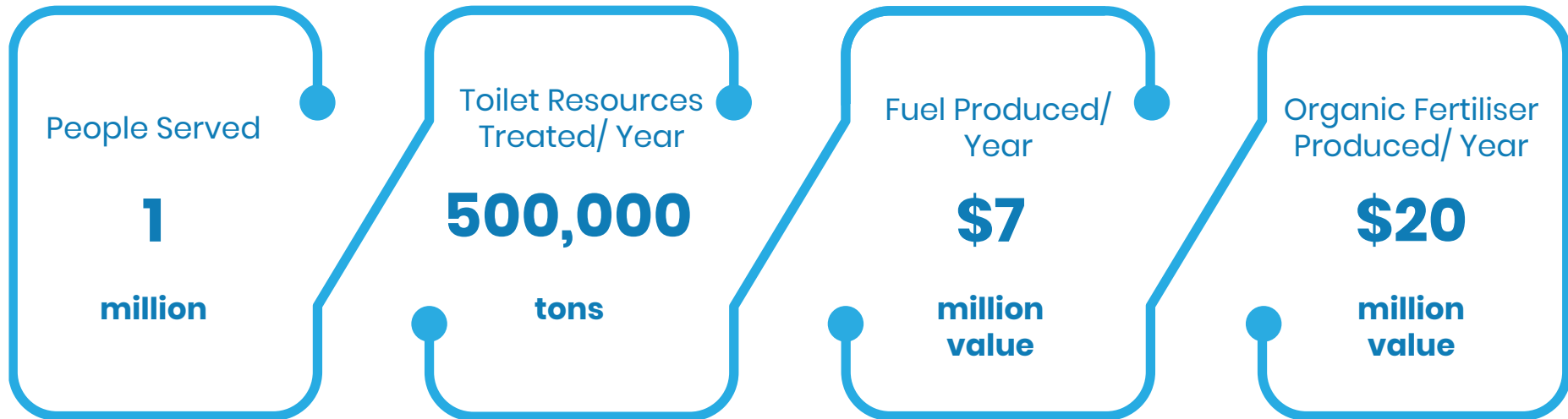
Transformation to full  
Sanitation Economy  
solutions

**\$7 million**

Estimated public expenditure requirement of Sanitation Economy approaches with compounding value of Toilet Economy, Circular Sanitation Economy and Smart Sanitation Economy business models that attract commercial investment at scale

# PUBLIC EXPENDITURE REQUIREMENTS FOR 1 MILLION PEOPLE

# IMPACT OF THE SANITATION ECONOMY AT SCALE



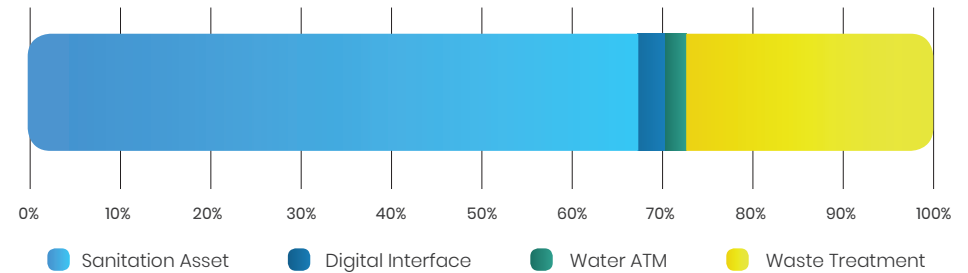
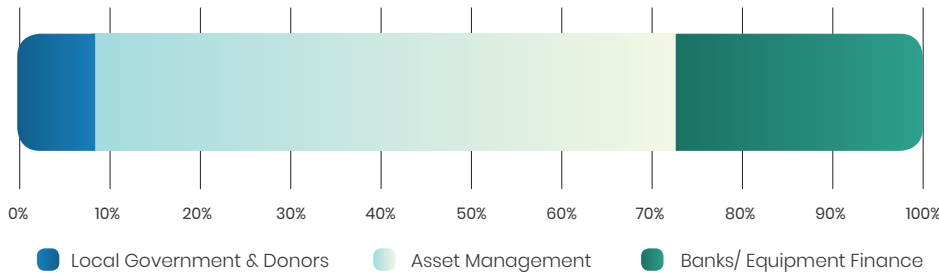
**OUR ANALYSIS SHOWS THAT INVESTMENT IN CIRCULAR DECENTRALISED ON-SITE WASTE TREATMENT HAS THE POTENTIAL TO RECOVER INVESTMENT WITHIN ONE YEAR.**

Our simulations with biodigesters that can yield both biogas and organic fertiliser shows that investment in biodigesters is recoverable within a year, provided ready monetisation of biogas and organic fertiliser are enabled by local governments. With the right mix of input waste and at reasonable levels of monetisation, 50% for organic fertiliser and 80% for biogas, the monetary value produced in a single year exceeds capital investment in waste treatment for that year.

**DECENTRALISED WASTE TREATMENT USING BIODIGESTERS IS ALREADY AN ATTRACTIVE EQUIPMENT FINANCE OPPORTUNITY FOR BANKS AND REQUIRES NO SUBSIDY OR FINANCIAL SUPPORT.**

Source: Toilet Board Coalition, 2019

# TAKING ACTION



**\$6** per capita cost

**\$0.6** government support needed



## BUSINESS ACTION

To accelerate the Sanitation Economy at scale businesses can:

- Mentor SME Sanitation Economy businesses in low-income markets, creating strategic partnership opportunities
- Audit and monitor safely managed sanitation access for employees and across supply chains
- Implement Sanitation Economy solutions within business operations, supply chains and communities to recover sanitation costs, renewable resources and data for the business



## INVESTOR ACTION

To accelerate the Sanitation Economy at scale investors can:

- Review and update the risk profiles of new Sanitation Economy business models to include new evidence of value creation
- Apply blended finance approaches (public-commercial finance blend) to enable new Sanitation Economy business models to scale
- Create innovative financing mechanisms that consider unique contexts for new Sanitation Economy sectors



## GOVERNMENT ACTION

To accelerate the Sanitation Economy at scale governments can:

- Engage with the private sector to co-create enabling policy environments for Sanitation Economy innovation and business approaches
- Promote and support entrepreneurship to attract more talent to grow Sanitation Economy sectors
- Support local financial sector strengthening with blended finance approaches to finance the Sanitation Economy in local markets

# BUSINESS IN ACTION

## NEW BUSINESS MODELS IN THE SANITATION ECONOMY

Since 2016 the Toilet Board Coalition's Toilet Accelerator programme has been supporting entrepreneurs with bespoke mentorship, partnership and the visibility to scale their Sanitation Economy businesses. More than toilets alone, there are commercially viable businesses operating today across the 3 Sanitation Economies.

Sanitation Economy Toilet Design | Container-Based Sanitation Toilets and Services | Connected Public Toilet & Hygiene Centres | Toilet Cleaning Products | Feminine Hygiene Products | Circular Waste Management | Re-usable Water | BioChar | Biogas | Protein-rich Animal Feed | Organic Fertilisers | Data Collection Technologies | Data Analytics | Data Visualisation



WE NEED AN ARMY OF ENTREPRENEURS AS SERVICE PROVIDERS FOR THE SCALE UP OF THE SANITATION ECONOMY.

*Pascale Guiffant, Founder Vetea, Toilet Board Coalition Vice Chair*



### North America

**Canada** P-pod Inc, PUREleau, Turtle Tanks

**Mexico** Gera Granavizus

**United States** Biomass Controls PBC, change: WATER Labs, digiBlitz Inc, Ecozoic, EMERITA, Hanalei River Heritage Foundation, KONSTRUKTOR, LaTrine, Loo, MICROrganic, Minoti, Oxergy, Pro, Alliance for Tech & Habitat, RevolOOtion, Sankoya Technologies, Sustainable Rural Sanitation, Sustainable Rural Sanitation LLC, Talakawa Focus Initiative, The New Loo, Toilets for People, Triangle Environmental Health Initiative, Wish for WASH, Youthaiti CSD

### South America

**Argentina** Permapreta

**Brazil** Plataforma Verde

**Colombia** Tierra Grata **Peru** Arrebol



**Applicants  
from 2016-2020**



**Europe**

**Austria** Alchemia Nova **France** HoPoo **Germany** 3P Sanitation, WASH United **Ireland** EMATEC **Netherlands** Tjebbi Social Enterprise **Slovenia** KAKIS Positive Sanitation **Sweden** ECOLOO Group **Switzerland** Cleanplus, Kompotoi, Mosan, NVTerra, W2AREX **Ukraine** VR Guide **United Kingdom** Ecosquared, Kildwick, Polipop, SOWTech CIC, The BioFactory Ltd, WASE, Wessex Social Ventures

**Asia**

**Bangladesh** World Sustainable Bangladesh, Bhumijo, Eau et Vie **Cambodia** ATEC, Rural Live Development Organisation, WaterSHED Ventures **India** A2Z Clean Tech Solutions, Airstacks, Basicshit, Bhpathi PL, Bioman Technologies, Caya Constructs, Fluid Robotics, GARV Toilets, Gowardhan Krushi Ayurved Pvt, Grassroots Energy, Green Acqua Solutions, Humble Innovations, Hygiea Global, Indra Water Systems, Lootel, Nagmagic, New Gen Livelihood Plus, Organica, Padmanabha, PooPee Technology, Saathi, SAFTo, Sanitation & Health Rights in India, Sarva Seva Samity Sanstha, Sintex Infra Projects Limited, SquatEase, Svadha Wash Pvt. Ti-Toilet Integration, Tide Technocrats Pvt, Toilet Advisors, Toiletwallas, Watsan Sanitareries Pvt, WOWLET, Wowsan **Iran** iNKarnet **Israel** Brightap, HomeBiogas **Jordan** AKYAS **Nepal** Manavta **Pakistan** Modulus-Tech **Philippines** Hiraya Technology Solutions, Smarter Good Philippines **United Arab Emirates** Tadweer.ly

**Africa**

**Cameroon** WeCo YEPEDDA **Democratic Republic of Congo** Stay Clean Association **Djiboti** Service évolution latrine **Egypt** 100 WASH Solutions **Ghana** Gh Toilets, Loo Works, SafiSana, SanSol Ghana Team, WASH4ALL, Won-Nyeya **Kenya** Banza Sanitation, ECOBORA Ltd, Japmor Enterprise, Sanergy, Sanivation **Liberia** Libra Sanitation **Libya** NAQA, Raed, Solar Power Team **Madagascar** Loowatt **Namibia** Joston Investments **Nigeria** Eteicon, Hidden Impat Ventures, MyWeb, PortShores Off Grid Toilet, Posh Potties, Sanitary Aid Initiative **Rwanda** Pit Vidura, TEMACO Builders Ltd **Senegal** DELVIC Sanitation Initiative **South Africa** Beyond Brightness, The Biocycle, Ct multi Company, Domavah Cleaning Services, Ecosan Cape, Envirosan, Footprints Foundation, Ihlala Water, Liquid Gold, Lusec Sanitation, Pennine Energy Innovation, Refiner Hygiene Solutions, SeeSaw, Technological Plumbing Solutions, Water and Sanitation Conundrum Crackers, Waterloo, Working Waste Ltd, ZerH2O Waterless Toilet **Tanzania** Suleiman Suleiman **Tunisia** Drone Aid **Uganda** Joelex, Sanitation Africa Limited, Sanitation Solutions Group, Whave Solutions **Zambia** Elephants Clean Up, LiveClean Initiatives



A sanitation e-commerce marketplace for rural communities with a network of entrepreneurs that provide a one stop shop for sanitation product needs



Affordable and innovative toilet product solutions for households developed for markets that lack safely managed sanitation.



Private utility model delivering water and sanitation to last mile customers via container based sanitation product and service model with a cross-subsidy between users.



Circular sanitation waste treatment at city-wide scale, converting the city's toilet resources into high value protein rich animal feed.



Container based household toilet solution with a circular sanitation waste treatment solution to convert toilet resources into high value biofuel.



Container based community toilet solution for high density urban environments with a circular sanitation waste treatment solution to convert toilet resources into high value organic compost.



Circular sanitation and organic waste treatment solution converting toilet resources into biogas as electricity source for the city, organic compost and agricultural products for local farmers.



Community toilet and marketplace of products and services for community health, hygiene and basic needs.



Pay as you go, container based household sanitation service model enabled with mobile money and with toilet resource collection and safe waste management.



A decentralized waste management and resource recovery solution based on the pyrolysis technology that is Menstrual Health Management (MHM)- ready and comes with real-time monitoring and control capability through the kelv'n mobile application.



Vermi-composting toilets with on-site waste neutralization offering flush and forget, zero maintenance off-grid solution for rural communities. The BioSTP is a simple replication of the bio-digester to function as a circular sewage treatment plant for community and facility scale applications.



Smart auto-cleaning community sanitation center and kiosk for urban and peri-urban slum communities with vandal-proof stainless steel fabrication.



Digitally enabled dignified public sanitation centres for women up-cycled from refurbished "scrap" city buses and enabled with toilets, laundry services, cafe, feminine health and hygiene products and services.



Urban community sanitation center offering toilets, showers and water facilities.



Smart containerised public toilet + cafe for urban areas and along motorways and road-sides.



Circular organic waste management solution via biodigesters that convert toilet resources with household organic waste into biogas for rural farming households.



A mini-utility model that ensures the supply of sustainable sanitation services in urban neighborhoods, in partnership with local concessionaires.



Affordable, biodegradable and compostable feminine hygiene products made from banana tree fiber.



Public toilet sanitation centres for peri-urban neighbourhoods with showers, feminine hygiene products and integrated circular toilet resource recovery upcycled into biogas and organic fertilisers.

# THE TOILET ECONOMY MARKETPLACE

The toilet, in the Sanitation Economy, provides new opportunities.

A Sanitation Economy toilet captures Toilet Resources optimised for conversion to value adding products.

A Sanitation Economy toilet captures data optimised to empower users, operations and maintenance, health and hygiene.

Pathways to scale include urban public and community toilet blocks, schools and healthcare facilities, housing developments, factories and facilities, agricultural plantations and mining communities.







**INDIA**

**Innovative and affordable public sanitation solutions for women in Pune, India**

Public toilets can become a vibrant consumer space by using data to understand user needs to offer relevant products and services such as health & hygiene products, and convenient services such as laundry and cafe kiosks.



**UGANDA**

**A pioneer of community sanitation centres in Kampala, Uganda**

Joelex has done pioneering work in the community sanitation centre space in Kampala, operating sanitation centres. Joelex is now taking the first steps at transitioning to a modular structure that doesn't require land rights and bringing in automation to plug revenue leakages and enrich user experience.



**GLOBAL**

**Malodour technologies created for low-income communities**

In the eyes of the user, malodour or «bad smells» is associated with «un-clean» and leads to avoidance and drives down usage of toilets. By understanding the user we can instead create user experiences that delight and invite usage, delivering better hygiene and safe sanitation.



**INDIA**

**A smart containerised public toilet + cafe for urban India**

Lootel is a smart containerised public toilet for urban areas and currently operates four facilities in India. Having doubled its footprint in 2019 and continuing on its ambitious growth phase, Lootel is building a seamless technology platform for real-time sensing of the operational parameters of its public toilets. LIXIL has partnered with Lootel on this growth providing specific inputs on design and infrastructure.



**Kimberly-Clark**

**GLOBAL**

**High quality sanitation for women and girls everywhere**

Women are disproportionately affected by the lack of safe sanitation solutions. Through our work with the Toilet Board Coalition and other partners around the world, we are championing women's progress through safe restrooms, education, and training on menstrual hygiene. This way girls can stay in school throughout the year and go on to fulfill their potential both personally and within their communities.



**GLOBAL**

**New toilet designs for safely managed sanitation in low-income economies**

Quality toilets designed for affordability and the highest standards of health and hygiene that suit local requirements and preferences. 2.5 million LIXIL SATO toilet products deployed to-date to low income markets with local manufacturing and community partners through a sustainable business model creating local jobs and improving health and hygiene.



**GLOBAL**

**Affordable toilet cleaning products for low-income economies**

High performing cleaning products for toilets designed for the needs of low income consumers that enable health and hygiene

# THE CIRCULAR SANITATION ECONOMY MARKETPLACE

The Circular Sanitation Economy offers multiple opportunities for toilet resources to not only be safely collected and treated but to then be converted into a variety of value-adding products.

The Toilet Board Coalition has been working with cities and businesses to assess the most valuable outputs for their context. Imperative to profits and a successful scaling of the Sanitation Economy is conversion of 100 % of the Toilet Resources.

Pathways to scale include Circular Sanitation Economy applications for cities, sectors such as agriculture, manufacturing and mining communities, and new standards for the safe re-use of Toilet Resources.





**GLOBAL**

**Leveraging sanitation-circular**

Re-thinking sanitation solutions along the supply chain for low income communities with new disruptive solutions such as container-based sanitation while creating value from Toilet Resources and closing the nutrient loop.



**KENYA**

**Premium organic fertilisers**

Toilet Resources can be regenerated into higher quality organic fertilisers that are safe, sustainable, and have the opportunity to bring needed nutrients back to the soil.



**GLOBAL**

**Protecting the human rights of workers is a top priority for companies everywhere**

Safe, hygienic sanitation is a human right that can no longer be ignored and, with Sanitation Economy approaches, is within reach of all companies and for all workers.



**GHANA**

**Toilet Resources to Energy**

New sources of carbon positive energy can be regenerated from toilet resources and sold back to the grid.



**Kimberly-Clark**

**GLOBAL**

**Innovation and cross-industry collaboration are key in unlocking the value potential of the circular economy**

By exploring new technologies, understanding consumer needs and supporting entrepreneurs, we can uncover ways to improve sanitation, health and hygiene for the world's most vulnerable communities while protecting the environment for future generations.



**GLOBAL**

**Circular sanitation solutions for tea plantations**

Waste management is integral to the Sustainability Strategy of Tata Global Beverages. We aspire to create sustainability leadership in our beverages operations with focus on zero waste to landfill, low carbon production and rain water harvesting. In India, as part of our Extended Producer Responsibility, we are collecting and reprocessing over 3000 tons of plastic packaging waste this year.

Across geographies, Tata Global Beverages is applying circular economy approaches to reduce, reuse and recycle waste - from converting biodegradable waste into compost, to using spent tea as a source of burning fuel, and recycling plastic as a packaging material. With a circular sanitation approach, therefore, we intend to take a holistic approach in managing and mitigating all waste streams.

Hygiene, is most important ingredient for health, and acts as a catalyst for education and the overall development of maternal and infant mortality key performance indicators. The development of an efficient sanitation system is the most basic and crucial need and we at APPL are committed to enhancing the abilities of our workers communities to meet their most basic needs - water, energy, sanitation.

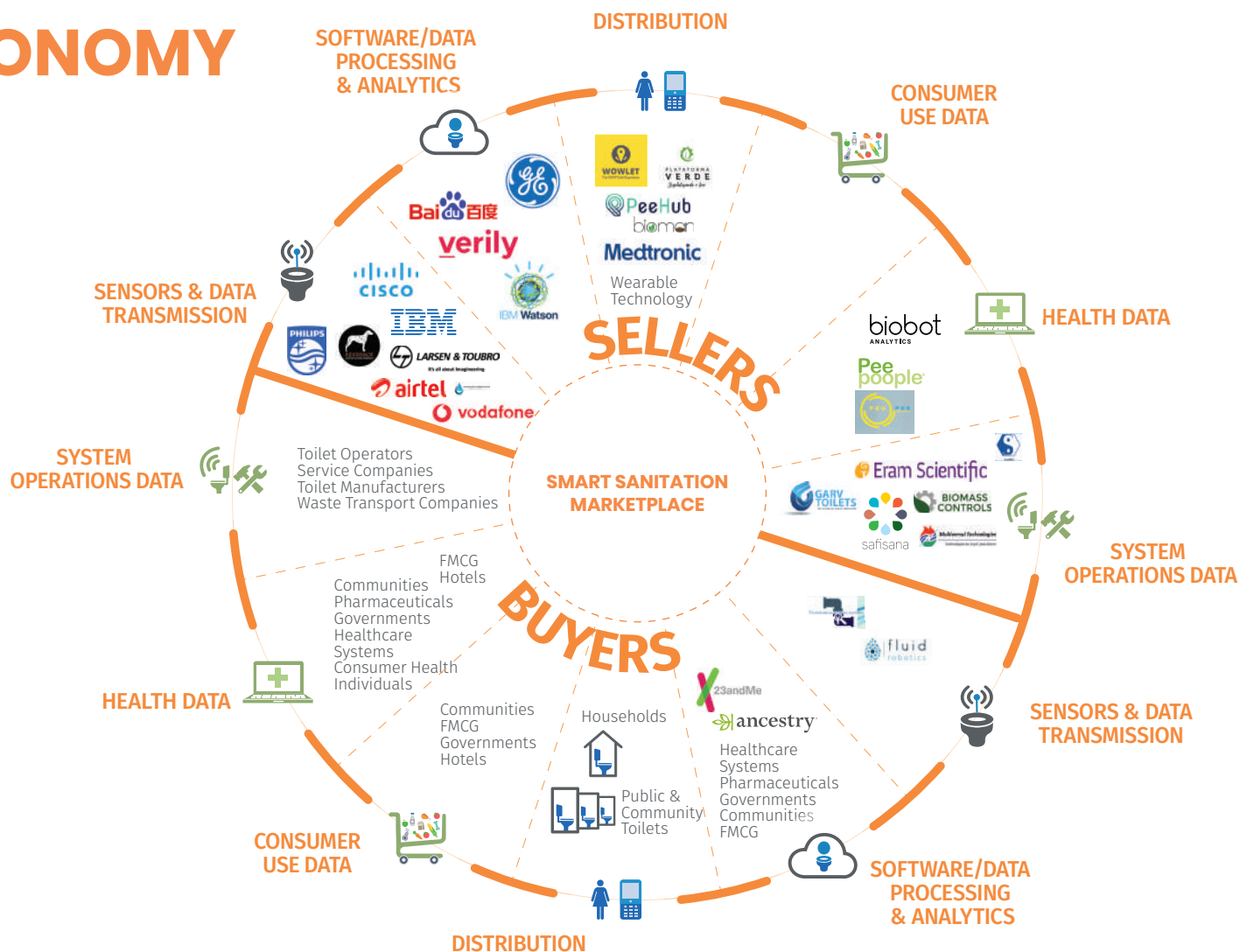
# THE SMART SANITATION ECONOMY MARKETPLACE

There is a rapidly growing sector of smart sanitation technologies, from business optimisation to sanitation system and community health monitoring and space technologies.

Data from sanitation systems offers the final push to take Sanitation Economy business models to profitable.

Digital technologies have the potential to activate new Sanitation Intelligence for cities, users, businesses and governments.

Pathways to scale include applying sensor technologies to toilets and sewage treatment connected to smart city control centres open data platforms to invite business solutions and innovation.





**INDIA, GHANA, BHUTAN AND NIGERIA**  
**Digitising toilet cleaning**

Digital technologies enable self-cleaning of toilets to ensure a consistently safe and hygienic experience.



**GLOBAL**  
**Digital health leadership & innovation**

New ecosystems are beginning to redefine the way healthcare is organised and delivered in India where participants can collaborate in new ways to promote better outcomes and improve patient experience.



**GLOBAL**  
**New insights about human health and behaviour from sewage**

Cities can make use of their wastewater system to conduct urban epidemiology studies and understand human health and behavior with a fine spatio-temporal resolution. The first application of Underworlds is contagious disease surveillance, and the prediction of outbreaks of infectious disease before symptoms arise. It could significantly reduce a community's medical costs, save lives and help prevent pandemics. In addition, it could change the way non-communicable diseases are studied, because biomarkers for diseases such as obesity and diabetes can be measured at unprecedented scale and temporal resolution. Mapping bacteria, viruses and chemicals, neighborhood by neighborhood, we are hoping to optimize real-time disease and anti-biotic resistance tracking and provide better health policy evaluation.

*MIT Senseable City Laboratory. (2019). The Underworlds Book. Massachusetts Institute of Technology.*



**GLOBAL**  
**Robotics for sanitation and health**

Our tests with robotic sampling technologies in sewer systems have shown that sampling nearest to the source, i.e the toilet, provides the best information in terms of biomarkers for health or the identification of bacteria and viruses circulating in communities for public health response.



**GLOBAL**  
**Smart sanitation for schools**

Online tracking and monitoring of school operations and maintenance of toilets has provided detailed data sets on the conditions of thousands of school toilets. Starting with the pilot in Vietnam and now expanding to 500 schools in South Africa and Turkey. Digitisation reduces human error on reporting and enable better maintenance over a sustained period of time. Hard data also proves to be a great motivator and when shown schools, parents and government cannot deny that more needs to be done. Opportunities to expand this technology and get into the hands of parents and directly to schools so they can regularly monitor is being explored and designed.



# DRIVERS FOR ACTION



**THE WORLD BANK**  
IBRD • IDA | WORLD BANK GROUP

## Circular Economy Initiative

The World Bank is giving their sanitation work a boost globally: in addition to a growing portfolio of engagements in both rural and urban sanitation, the Bank is launching a Circular Economy initiative building on its recent experiences from Latin America, in which it sees wastewater as a resource to be embraced rather than just a problem to be solved. The report calls for a radical paradigm shift from the linear model of treating wastewater and discharging it in a receiving water body to a circular one focused on reducing water use and consumption and promoting reuse, recycling, restoration and recovery – in the form of energy, nutrients, reusable water and biosolids. Such an approach provides economic and financial benefits that can contribute to the sustainability of the sanitation systems and of the utilities operating them. The approach also provides further benefits to related areas such as water supply, agriculture production, and greenhouse gas capture.

## City-wide Inclusive Sanitation Initiative

The World Bank is also fully engaged on a global initiative to rethink approaches to urban sanitation service provision through its 'Citywide Inclusive Sanitation' (CWIS) work. The CWIS approach challenges us to ensure that everyone has access to safely managed sanitation by promoting a range of technical solutions that are tailored to the realities of the world's burgeoning cities and which are flexible and adaptable so that, as cities grow and change, sanitation services adapt with them. In promoting this approach, the Bank encourages governments to focus on service provision rather than on building specific infrastructure, which means considering the financial, institutional, regulatory and social dimensions of the services.



**GOVERNMENT  
OF INDIA**

## Swachh Bharat Mission – Clean India Campaign

2014–2019 the Government of India has achieved 100% open dedication free status (from just 30% in 2014) by enforcing disruptive approaches to scale up sanitation access – by engaging young people, media, influencers and embracing corporate social responsibility. This creates a market for Sanitation Economy solutions estimated to be a growing \$62 billion market in India alone, which can create many new jobs, improve health, and environmental conditions and create savings for households.



**PUNE MUNICIPAL  
CORPORATION**

India's cities are embarking on a massive digital transformation. Pune as India's first Smart Sanitation City provides a blueprint for all Smart Cities to fully capitalise on the emerging technologies described in this report to enhance basic infrastructure and achieve optimised and aspirational smart sanitation at the same time.



**Ethical Tea  
Partnership**

Good sanitation is a win-win for everyone: workers, businesses and the environment. It is critical for the health and well-being of plantation workers and their families, so involving tea communities from the outset is crucial to ensure their needs are met. Collaborations between tea communities, government, tea producers and packers can drive transformational change. This can have positive benefits for tea workers and also makes commercial sense for businesses.

# CALL TO ACTION

*The Business & Impact Opportunity*

01 02 03 04 05

**1**  
Build support for the Sanitation Economy. Drive the economic transformation of sanitation to sustainable markets

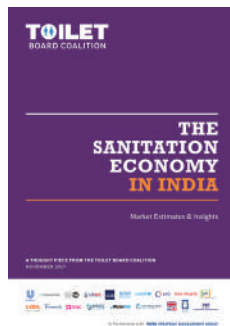
**2**  
Incorporate Sanitation Economy approaches into company strategy

**3**  
Work with the investment community to re-value sanitation and finance the Sanitation Economy

**4**  
Build trust and secure license to operate by working with governments

**5**  
Work with policy-makers to create enabling environments for the Sanitation Economy

## OTHER RESOURCES



LEARN MORE & DOWNLOAD AT

[www.toiletboard.org](http://www.toiletboard.org)



## ACKNOWLEDGEMENTS

We thank Toilet Board Coalition members, partners and staff for their contributions to this report.

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