

SHOWCASING THE SANITATION ECONOMY IN ACTION

KEY INSIGHTS FROM THE 1ST GLOBAL SANITATION ECONOMY SUMMIT

NOVEMBER 2019
PUNE, INDIA



The 1st Global Sanitation Economy Summit

Over **400** of the world's leaders in the Sanitation Economy came together November 18-21 2019 in **Pune, INDIA** to celebrate World Toilet Day, **showcase global best practice** in new Sanitation Economy approaches and **forge new collaborations for scale**.

The **Toilet Board Coalition members and partners** hosted innovators, multi-national corporations, investors and policy leaders who are taking sanitation from an unaffordable cost to a **revenue, resource and data generating business opportunity that will improve millions of lives**.

400 Attendees over **3 Days**
across **3 Venues**
with **240 Organisations** represented

Marketplace and **Sanitation Economy Pavilion**
featuring more than **150 Innovations**

SANITATION ECONOMY PAVILION & MARKETPLACE / PUNE SMART SANITATION CITY OPERATIONS CENTRE / 2020 ACCELERATOR COHORT ANNOUNCEMENT / TBC INDIA CHAPTER LAUNCH / SANITATION AS A SOLUTION PROVIDER WORKSHOPS / INNOVATOR, BUSINESS, AND INVESTMENT ENGAGEMENT PATHWAYS / SANITATION ECONOMY GALA EVENING



BUSINESS LEADERS

Naman Galhotra, **AGNII**; Myles Elledge, **Biomass Controls**;
Bérangère Magarinos-Ruchat, **Firminich**; Aseem Kumar, **Global Compact India**; Rishi Dhingra, **Kimberly-Clark**; Nazir Pandor, **Live Clean**; Erin McCusker, **LIXIL**; Priyanka Tanwar, **LIXIL**;
Yashwant Suthar, **Lootell**; David Auerbach, **Sanergy**;
Divyang Waghela, **TATA Trusts**; Ulka Sadalkar, **Ti Bus**;
Ajeet Oak, **Tiger Toilet**; Geetika Mehta, **Unilever**;
Madhusudan Rao, **Unilever**; Anand Rudra, **United States Agency for International Development**;
Eric Lesueur, **Veolia**

TOILET
BOARD COALITION

KEYNOTE ADDRESSES FROM

Eric Alm, **ALM Lab, MIT**; Sue Coates, **Water Supply and Sanitation Collaborative Council (WSSCC)**; Peter Harvey, **UNICEF**;
Parameswaran Iyer, **Government of India**;
Rajendra Jagtap, **Pune Smart City**; Amit Kalyani, **Kalyani Group**; Tom Kress, **USAID**; Erin McCusker, **LIXIL**; Dhesigen Naidoo, **Water Research Commission**; Prabhat Pani, **TATA Trusts**; Vineet Rai, **Aavishkaar Group**;
Madhusudhan Rao, **Unilever**; Maria Angelica Sotomayor, **World Bank**; Christian Walder, **Asian Development Bank**; Tom Williams, **World Business Council for Sustainable Development**



OUR VISION FOR THE SANITATION ECONOMY

GLOBAL LEADERS CONFIRM THE BUSINESS CASE FOR SCALING UP NEW INDUSTRIES AND NEW RESOURCES CREATED FROM SANITATION SYSTEMS.

In November 2019, the Toilet Board Coalition hosted the global network of business leaders and experts who are pioneering new business models for a new Sanitation Economy. The Global Sanitation Economy Summit has been the first global gathering uniquely bringing together business leaders focused on new solutions for sanitation systems of the future and revealed the emergence of new industries forming around circular and digital approaches to sanitation. The discussions on the role of business in providing solutions for sanitation was no longer centred around whether or not business models could be commercially viable, but rather on how business and societal actors can work together more closely to scale up Sanitation Economy approaches in the next decade to transform sanitation from an unaffordable public cost into sustainable and resilient business opportunities.

The business case for Sanitation Economy approaches has been established over the past 5 years, and the focus going forward will be on un-locking the multi-billion dollar opportunities of the Sanitation Economy operating at scale.

Leading businesses and societal influencers are not only asking what expertise they can bring to new solutions for sanitation, but what new solutions Sanitation Economy approaches can bring to broader business and societal challenges such as climate change, food security, health and human rights. We are pleased to share this report which highlights the conversations, insights, and commitments made at the Global Sanitation Economy Summit.

We would like to thank our members, and partners for their support of this event; Asian Development Bank, Firmenich, Kimberly-Clark, LIXIL, TATA Trusts, Unilever, USAID, DFID and Veolia – and our partners and sponsors of this event: the Pune Municipal Corporation, Pune Smart City, the Water Supply and Sanitation Collaborative Council, the Swiss Development Corporation, Kalyani Group, and USAID India.

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

LIXIL
Link to Good Living

Divyang Waghela
Head Tata Water Mission
Tata Trusts
Toilet Board Coalition India Chapter
Chair

TATA TRUSTS

Cheryl Hicks
Executive Director & CEO
Toilet Board Coalition

TOILET
BOARD COALITION



Erin McCusker, LIXIL, Toilet Board Coalition Chair



Cheryl Hicks, Toilet Board Coalition CEO



Vikram Singh, Amalgamated Plantations



THE TOILET BOARD COALITION JOURNEY 2016–2019

In 2015 businesses in sanitary ware and hygiene products sectors were asking, how can business provide solutions to the global sanitation crisis. We had two main questions: Are there commercially viable business models to provide access to sanitation to the world's most vulnerable and currently without? Is there new value in sanitation systems for business that would justify bigger investments in sanitation access? In 2019, our answers are, yes and yes.

In 2016 we created the Toilet Accelerator programme through which we have supported 19 new business models innovating and building Sanitation Economy solutions, which are commercially viable and ready for scale.

In the past four years, we have sought to re-imagine and re-value sanitation. In the Sanitation Economy the toilet will play a different role in society. Toilets that enable the capture of resources and data will create the value generation that will enable cost recovery and justify investments in more improved sanitation systems to achieve universal access that is sustainable, dynamic and resilient. This is the transformation and our theory of change.

TOILET BOARD COALITION STRATEGY FOR SCALE 2020–2025

At this Summit our new strategy 2020–2025 was launched, focused on scaling up the Sanitation Economy in the next 5 years.

We see 3 PATHWAYS TO SCALE:

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 and workers. 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.

A VISION FOR 2025

Knowing what we know now what would it take to change the global default of flush toilets, pit-latrines and costly treatment infrastructure into a global Sanitation Economy?

By 2025 what if, all cities and businesses no matter their size or location set the goal to provide 100% access to 5-star sanitation, re-use 100% of the toilet resources (formerly called human waste) generated and share monitoring data to global monitoring systems to ensure continuous improvements to the system - and that sanitation is globally accepted as a human right that helps to meet water positive, carbon positive and other sustainable business targets.

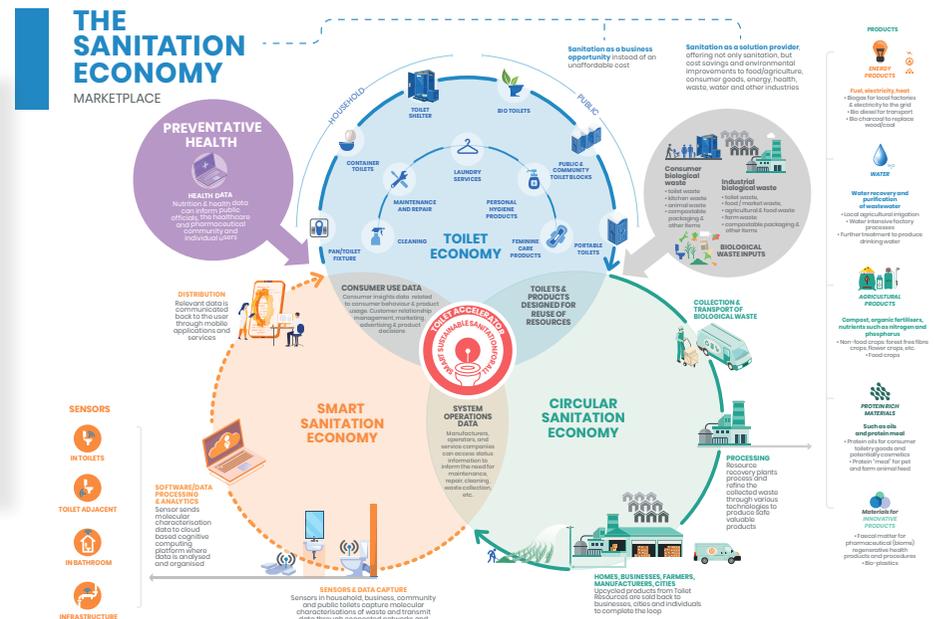
We can change the default.

The Toilet Board Coalition is a business platform dedicated to accelerating business solutions that build a sustainable and resilient Sanitation Economy. Global and local businesses have the opportunity to raise the bar and implement Sanitation Economy approaches across their business operations and supply chains. The global sanitation development sector has rightly focused on households. We believe that in addition, a focus on workers and new business value from Sanitation Economy approaches across global and local operations will encourage innovation and accelerate scale.

We are now challenging all of you, our partners, experts, fellow businesses, governments, investors to stop at nothing less than mainstreaming the Sanitation Economy 2020-2025. And in doing so transforming sanitation into significant benefits for business and society.



LEARN MORE AND DOWNLOAD AT WWW.TOILETBOARD.ORG



3 BIG IDEAS

**DAY 1: THE BUSINESS CASE
FOR TRANSFORMATION**

**DAY 2: SANITATION AS A
SOLUTION PROVIDER**

**DAY 3: PARTNERSHIPS &
INVESTMENTS FOR **SCALE****

WASH Pledge top three benefits as reported by companies - reduction in absenteeism, greater female participation in the workforce, improved productivity. Business is starting to understand the human rights context of SDG 6, more businesses are orientating themselves around the SDGs and starting to understand the human and social capital of sanitation and its impact.

TOM WILLIAMS
WBCSD



Eric Lesueur, Veolia

Our product is not just a toilet. Our product is an experience.

NAZIR PANDOR
LIVE CLEAN



Ravindra Nagarkar, Kalyani Technoforge



Vineet Rai, Aavishkaar Group



*Rishi Dhingra, Kimberly-Clark
Madhu Rao, Unilever*



Neeraj Jain, PATH



Rahul Sachdev, SAP



1. THE BUSINESS CASE FOR TRANSFORMATION

- The Sanitation Economy is a business vision for transformation. It has the potential to transform the economics of sanitation from unaffordable public costs into sustainable and resilient marketplaces of business innovation and opportunity.
- Sanitation could be one of the most exciting areas to work in today. Opportunities to address an urgent global challenge AND create new business opportunities at the same time don't come along very often. The culmination of the Coalition's work over the past four years points to an increasingly compelling business and economic case for this transformation.

Going into this new decade, we are not only asking how business can bring new solutions for sanitation, we are also asking how sanitation can bring new solutions across business operations and sectors – and be a net contributor to many critical sustainable development issues such as climate change, food security, health, human rights, and the empowerment of women and girls. Sanitation re-imagined as a Sanitation Economy is no longer an access and waste story. In 2019 sanitation is a human rights story, a resource story, a data story and a consumer story. All critical for addressing material business risks and critical for future business growth in tomorrow's markets, today.



*Bérangère Magarinos-Ruchat,
Firmenich*



*Cheryl Hicks, Toilet Board
Coalition & Eric Alm, ALM Lab, MIT*





THE HUMAN RIGHTS STORY – THE TOILET ECONOMY

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. Businesses in agricultural and manufacturing sectors are facing specific risks that can be turned into business opportunities with Sanitation Economy approaches.

THE RESOURCE STORY – THE CIRCULAR SANITATION ECONOMY

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 about 3.8 trillion litres of renewable resource per year.

THE POWER OF DATA STORY – THE SMART SANITATION ECONOMY

Digital technologies and data are opening up new ways to re-think new value streams that can be derived from sanitation. Mapping and monitoring toilets, treatment and health via Smart City control centres creates new Sanitation Intelligence to translate sanitation needs into targeted solutions and new value creation. New data on public and community toilet usage, wastewater and sewage quality and disease circulation can lead to significant savings in sanitation management and health costs in cities. Making this data transparent enables an open innovation platform for businesses and innovators to provide new solutions that will improve the lives of billions of citizens in cities.

THE CONSUMER STORY

New business models have uncovered a new consumer space in sanitation. Public toilets are becoming new sanitation centres, addressing many basic needs – including laundry, feminine hygiene, digital connectivity, and more.



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

WHAT ARE BUSINESSES DOING TO BUILD THE SANITATION ECONOMY?

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.

We need to create very strong social capital in the Sanitation Economy, we need to elevate those that are cleaning toilets. We need to attract more youth into the Sanitation Economy not just for a job but as an entrepreneurial opportunity – starting in schools to present it as an opportunity next to robotics or AI.



DIVYANG WAGHELA
TATA TRUSTS

Access is not enough. We as a collective group can further the conversation of the legitimisation of reuse products.

DAVID AUERBACH
SANERGY



Malodour is a stigma of poverty. We are here to be the software of the toilet experience, changing how they feel. First we scale up the cleaning portion of the Sanitation Economy. Making sure that our solutions are available in the products that are actually cleaning the public toilets. So it's about transforming the way we work in our company to ensure that across departments we have members of our team engaged in the Toilet Board Coalition's work on the Sanitation Economy.

BÉRANGÈRE MAGARINOS-RUCHAT
FIRMENICH

Given the economic return on sanitation spending, Sanitation represents one of the largest development dividends of any intervention.

SUE COATES
WSSCC

How do we create more talkability, more draw around sanitation? We must stay close to the consumer to understand how we solve these problems. How can we take these innovative new models that are working and integrate them into larger contexts? This will not be solved by one partnership or entrepreneur – we need to come together to achieve scale.



MADHU RAO
UNILEVER

The kind of impact this could have on an economy and country like ours. The 62B opportunity of the Sanitation Economy, each of those dollars generates \$4 of value add for India's Economy, this means the Sanitation Economy can add a 1/4 of a trillion dollars to India's GDP.

AMIT KALYANI
KALYANI GROUP

We're thrilled that the journey that began as a sanitation movement is now seamlessly including menstrual health management, because we all know the social and economical implications of women being empowered.

RISHI DHINGRA
KIMBERLY-CLARK

2. SANITATION AS A SOLUTION PROVIDER

Sanitation can create new economic value and becomes a solution provider for urgent business and societal issues that address many of the Sustainable Development Goals - from water security, to climate change, food security and human rights.

Sanitation Economy approaches equip businesses with ways to optimise flows of renewable energy, biological nutrients, water, related to facilities such as plantations, food processing plants, breweries, and mining communities.

The private sector has a unique ability through their supply chains and use of resources to accelerate the scaling of the Sanitation Economy. Business leaders and public sector actors have been working together to align, coordinate, and expand efforts towards the provision of sustainable sanitation across the world.

We're looking at a broader definition of sanitation, which is part of the ODF+ agenda, including solid and liquid waste management. There are 4 elements, organic waste management, plastics waste management, grey water, black water management.

Success factor for Sanitation #1: Political Leadership, #2 Public Financing, if you really want to grow the market you need to have an effective public financing system. Over 20million dollars was committed. #3 Partnerships, increasingly it is important to have local entrepreneurs keeping this sustainable and earning a living from it #4 People's participation - getting people to own the programme and take pride in it.

PARAMESWARAN IYER
GOVERNMENT OF INDIA



As one of the driest countries in the world, every investment we make must have a multiplier effect, and the Sanitation Economy has incredible potential for saving water, low energy/low carbon while providing sanitation. But even further it becomes a part of the energy solution for us.

DHESIGAN NAIDOO
WATER RESEARCH
COMMISSION
SOUTH AFRICA



Providing sanitation to people has the double plus, because it also provides a new resource to agriculture. Sanitation can be this source of this new water and new nutrients for agriculture to be reusing it in another phase of human activities. The source is sanitation.

MARLOS DE SOUZA
UN FOOD & AGRICULTURE
ORGANIZATION



Most conferences on sanitation talk about the problems, Toilet Board Coalition talks about solutions.

NEIL DHOT
AQUAFED

Water professionals view the next twenty years as the golden era for wastewater and sanitation, with the primary opportunities in non-sewered sanitation in SE Asia and sub-saharan Africa.

KALA VAIRAVAMOORTHY
INTERNATIONAL WATER ASSOCIATION



The waste resource has a ready captive market in the business. In Assam itself, we are talking about \$77million worth of coal that is used in the tea industry alone. There is a massive opportunity there for a better use of resources.

VIKRAM SINGH
ETHICAL TEA PARTNERSHIP

At Kimberly-Clark we're eliminating or reducing the amount plastics in our sanitation and hygiene products. We're developing naturally derived polymers to replace synthetic plastic. We're looking at how we make our polymers more degradable. And how do we make our products and their packaging more compatible for recycling and the circular economy. We see more value in a used product than in a new product.

PETE DULCAMARA
KIMBERLY-CLARK



Access to healthcare and basic sanitation need to go hand-in-hand in order to truly improve the lives of people in the underserved communities.

ANKUR KAUL
PHILIPS

We often think of water security in terms of water quantity but not water quality. But contamination can get so bad that treating it for future use becomes a major barrier. Looking at this through the lens of the Sanitation Economy puts this into stark focus, and creates the opportunity to make these services affordable for the poorest and most marginalised of society.

ERIK HARVEY
WATERAID

A CALL TO ACTION FOR CIRCULAR ECONOMY LEADERS

The Sanitation Economy has the potential to unlock 3.8 trillion litres of new resources every year regenerated from toilets and sanitation systems via the Circular Sanitation Economy.

Sanitation is becoming a material issue for businesses across sectors and no longer a development issue alone.

Businesses are responsible for providing access to safely managed sanitation for their employees, across supply chains and in communities where they operate.

Poorly managed sanitation has become a business risk that can no longer be ignored affecting the health of workers, their families and communities, well-being and productivity, environmental contamination of soil and water. There is also the missed opportunity to mitigate and adapt to climate change.

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.

Ensuring safely managed sanitation for workers wherever they are is the mounting human rights issue that is coming for all businesses everywhere.

As business leaders we have the opportunity now to raise the bar, setting new standards for our sectors with safely managed sanitation in our operations, supply chains and communities using sanitation business approaches that unlock new resources currently constrained, to ensure sustainable business growth and to end the global sanitation crisis.

15.6 million global tea workers and their families produce 33 billion litres of Toilet Resources every year.

With today's technologies and new business models, these Toilet Resources can be converted into one of the following:

7.6 billion MJ of bio fuel
12 billion MJ of Biogas (heat)
1.4 billion kWh (electricity)
2 million tonnes of co-compost at a 3:1 ratio, regenerating
16,000 tonnes of Phosphorus
17,000 tonnes of Potassium
23,000 tonnes of Nitrogen

THE RESOURCE STORY

There are over 15.6 million people living and working on tea plantations throughout the world. By implementing circular sanitation, a plantation has the opportunity to produce their own energy, nutrients or water – offsetting the need to purchase these resources. The numbers below are an estimate of what could be possible, based on academic studies of the characteristics of Toilet Resources. It’s a rough calibration of the opportunity, which should be a starting point for more detailed feasibility assessment in each location.

GLOBAL TEA PRODUCTION

The global tea sector employs an estimated **15.6 million tea plantation workers** that produce at least **8.3 billion litres** (220,000 tonnes of solid faeces) of Toilet Resources per year. Assuming each worker represents one household with an average of 4 members per household*, then **62.4 million people** reside on tea plantations producing **33 billion litres** (870,000 tonnes of solid faeces) of Toilet Resources per year. If all the Toilet Resources of those living on tea plantations were captured, treated and converted into one of the usable products below, this could produce:



Fuel

1.3 million tonnes of Briquettes mixed with ash at ratio of 45:55 resulting in **7.6 billion MJ**

510 million m3 of Methane Gas resulting in **12 billion MJ** of Biogas (heat) or **1.4 billion kWh** (electricity)



Fertiliser

2 million tonnes of 3:1 co-compost using additional bio-waste from the surrounding communities
16,000 tonnes of Phosphorus,
17,000 tonnes of Potassium
23,000 tonnes of Nitrogen



Feed

840,000 tonnes of Black Soldier Larvae



Water

Low Flush System (additional 65 billion L of water) with 75 % recovery
73 billion litres of water

*Household averages calculated based on the United Nation's Household Size and Composition Around the World 2017 Report



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.

– Ethical Tea Partnership





Erin McCusker, LIXIL



Pascale Guiffant, Vetea



John Moyer, WaterEquity



David Auerbach, Sanergy



Eric Alm, ALM Lab MIT

DRIVERS FOR ACTION

A Sanitation Economy approach offers solutions to a range of global development issues while accelerating the provision of sanitation, and creating value for multiple business sectors. The Sanitation Economy places sanitation at the centre of a 'new grid' which fundamentally realigns and harnesses flows of nutrients, water, energy, data, and capital. In India alone these markets have been estimated at \$62 billion in 2021 (*Toilet Board Coalition, 2017*). Uniquely, these resources are available in proportion to the population, rather than being depleted as population grows.

SANITATION CAN CREATE NEW ECONOMIC VALUE AND BECOMES SOLUTION PROVIDER FOR URGENT BUSINESS AND SOCIETAL ISSUES THAT ADDRESS MANY OF THE SUSTAINABLE DEVELOPMENT GOALS - FROM WATER SECURITY, TO CLIMATE CHANGE, FOOD SECURITY AND HUMAN RIGHTS.



Contributions to slow climate change by producing renewable energy and reducing carbon and methane emissions, helping businesses meet low carbon targets, while also helping agricultural systems adapt to changing rainfall patterns.



Providing water security through new sources of clean water for agricultural and industrial use, reduced contamination of existing water sources, lower water use in sanitation, and reduced need for irrigation.

Enabling innovation, sales, marketing and consumer research opportunities with consumers in developing markets.



Providing food security by improving soil health, agricultural productivity, climate change resilience, and reducing plantation operating costs through organic fertilisers and soil conditioners.

Enabling female empowerment and health benefits.



Improving the health of workers, both with sanitation's traditional function of preventing disease transmission, and also by providing real-time data for preventative and reactive healthcare for employees.

Creating a waste pathway for all forms of compostable (biological) waste, preserving nutrients and energy in the process, and enabling the replacement of plastic items with compostable alternatives.





पुणे
स्मार्ट सिटी
डेव्हलपमेंट
कॉर्पोरेशन लिमिटेड



PUNE
SMART CITY
DEVELOPMENT
CORPORATION LTD.



THE FUTURE OF SANITATION IS

SMART

HOW SANITATION GETS SMART

SMART TOILETS

Toilet Economy

Smart public and community toilets optimised by environmental, usage and health sensors enable valuable Sanitation Intelligence for city decision-makers, operators, businesses, and users.

SMART TREATMENT

Circular Sanitation Economy

Circular sanitation models, applied to Toilet Resource collection and treatment, offset cost of operations with monetisation of the re-use of resources. Metering of Toilet Resource flows enables efficient recovery and conversion to reuse products (i.e. energy, compost and water).

SMART HEALTH

Smart Sanitation Economy

Real-time surveillance for infectious disease circulation via sensors and sampling in public toilets that provide early warning of potential public health outbreaks.

SMART SANITATION CITY ROADMAP

Digitising the System

Mapping the System

Impact -

Improving services for citizens: what are the sanitation and health priorities of the city and what data can help the city improve services for citizens

All public and community toilets, wastewater and sewage treatment centres, circular sanitation centres (sewage to energy plants, sewage to compost plants) digitally identified on the city map at the Smart City Control Centre

Technology Enablers -

Applying Smart City approaches: what available smart city technologies and approaches could also be applied to the sanitation system?

Geolocating technologies placed in public and community toilets, wastewater and sewage treatment centres, circular sanitation centres (sewage to energy plants, sewage to compost plants)

Processes Change Map -

Policy and governance: what new norms, rules or standards can be set to optimise opportunities created by digitising sanitation

Integrate sanitation into city data policy
Identify baseline sanitation system data available (i.e. toilet usage, amount of sewage treated and up-cycled, operational costs)
Identify baseline health data available related to sanitation
Create data architecture for all data points that will be captured from the smart sanitation system

Private Sector Partnerships Solutions -

Rethinking sources of value: how can data from the sanitation system enhance the way your company creates or finds new sources of value for customers and the city

Identify current business solutions providing sanitation and hygiene services for the city
Identify new revenue stream possibilities, new sources of value (products, services, and resources) enabled by digitisation and data of the sanitation system

Monitoring the System

Public and community toilet usage
 Toilet operations and maintenance needs
 Disease circulation
 Quality of wastewater and sewage for up-cycling
 User feedback - cleanliness, experience, needs

Sensors to track daily:

Public and community toilet usage
 Volumes of wastewater and sewage collected and up-cycled
 Quality of wastewater and sewage collected and up-cycled
 Quality of waterways (rivers, lakes) to detect sewage contamination
 Bacteria, viruses and chemicals - biomarkers for disease - from toilets and sewage
 Ambient environmental indicators such as light, heat, moisture, from toilet blocks
 User / customer feedback

Economic: costs and revenues

Social: toilet usage, health and hygiene, user satisfaction, ODF status

Environmental: safely managed wastewater and sewage; resources enabled (energy, fertiliser, reusable water)

Governance: regulatory oversight

Toilets - insights on user behaviour and operational needs

Treatment - insights on volume and quality fluctuations; market demand for up-cycled resources

Health - insights on disease circulation and response needs

Benefits

SMART TOILETS

- Improved provision of sanitation facilities (aspirational toilets) leading to an increase in usage
- Better decision making with access to accurate timely data leading to cost reduction in operations
- Employment opportunities

SMART TREATMENT

- Promotes the circular economy principles through resource recovery resulting in overall cost reduction
- Increased environmental sustainability through reduction in pollution levels
- Improved monitoring of treatment facilities performance through digital monitoring

SMART HEALTH

- Monitoring of community health indicators
- Identify early warning of disease outbreaks through geo-tagged data to empower appropriate interventions
- Overall reduction on community health expenditure through more effective preventative measures

NEW MARKETS

- Opportunities for Sanitation Economy entrepreneurs to operate and maintain toilets
- Opportunities for tech companies to introduce digital technologies and data services
- Opportunity for development of medical product and service needs of a community
- Increasing access to primary care facilities

• Vision

All data from various devices monitoring the sanitation system are integrated with the Smart City's Command and Control Centre.

Dashboards for the decision makers lead to efficient provision of sanitation services, resource recovery, and preventative action on community health, thereby saving costs for the city in the long run and providing improved sanitation services to citizens.

SMART SANITATION CITY PUNE

Participants toured Pune's Smart City Operations Centre, experienced the city's sanitation dashboards and connected with entrepreneurs innovating in the Smart Sanitation Economy.



We are the first company to commercialise wastewater analysis for the purpose of public health. This information aggregated is sitting untapped in public sewers and community septic tanks. Our mission is to transform public waste water systems into public health laboratories.

We must ensure that our data is meaningful and actionable to communities.

NORIKO ENDO
BIOBOT



How can we empower health workers and the screening of the population to happen through digital technologies. We're currently using AI and mobile technologies to screen for tuberculosis, weight management, wearable technologies for mothers and newborns.

NEERAJ JAIN
PATH



We need to be bolder and move much faster than we have been. We need to be bold enough to operate at scale.

PETER HARVEY
UNICEF



THE ECONOMICS OF SMART SANITATION IN PUNE

SAVINGS OPPORTUNITIES

GENERATING ELECTRICITY FROM SEWAGE CAN BRING 50% REDUCTIONS IN COSTS OF ELECTRICITY FOR THE CITY

GENERATING COMPOST FROM SEWAGE CUTS EMISSIONS TO ZERO AND POTENTIAL EMISSION REDUCTIONS ARE 1.16 Gg CO₂Eq / Gg MSW
(World Bank, 2006)

MARKET DEVELOPMENT ASSISTANCE FOR THE PROMOTION OF CITY COMPOSTING CAN BRING CITIES \$21.9 USD PER TONNE OF ORGANIC FERTILISER PRODUCED FROM SEWAGE

Use of treated wastewater and sludge for agriculture has the potential to reduce reliance on fertiliser by about 40% in areas irrigated with treated wastewater due to its inherent nutrient content. Based on current wastewater generation, irrigation potential estimated for wastewater in India and the associated potential to reduce fertiliser consumption in wastewater irrigated areas, it can be estimated that the annual fertiliser subsidy could be reduced by about INR 1.3 billion (USD \$243 million).

More than two thirds of Pune's hospital visits in 2018 were attributed to diseases that could be diagnosed through smart sanitation. Real-time health information from sanitation systems could increase efficiencies and more targeted response to outbreaks.

(Ecofys & Toilet Board Coalition, 2019)

REVENUE OPPORTUNITIES

\$46 MILLION / YEAR
750 SMART COMMUNITY TOILETS

\$12 MILLION / YEAR
750 SMART PUBLIC TOILETS

\$41 MILLION / YEAR
MARKET FOR TREATED WATER

\$1.39 MILLION / YEAR
MARKET FOR BIOGAS

\$0.3 MILLION / YEAR
MARKET FOR COMPOST

(Ecofys, Borda & Toilet Board Coalition, 2019)

New markets for digital health applications via smart sanitation still to be fully understood.

Since a lot of physical infrastructure was being invested in, we wanted to make the sanitation environment of the city different. Integrating and coordinating the toilets, getting the feedback of citizens, mapping on the dashboard, assessing this data and understanding the pulse of the city was something that was quite useful, based on which we could in fact understand what the city required and needed in the future.

RAJENDRA JAGTAP
FORMER CEO OF THE PUNE SMART CITY, ON PUNE & THE TOILET BOARD COALITION'S SMART SANITATION CITY PROJECT



TECHNOLOGY ENABLERS

Digital technologies available today, when applied to sanitation systems, open up vast new opportunities for innovative approaches to safely managed sanitation delivery. Using data captured throughout the system, stakeholders can monitor, manage and respond in real-time.

As the world embarks on a massive digital transformation our ability to fully capitalise on emerging digital technologies and data for sanitation will be one of the leading drivers of sustainable and resilient sanitation systems for the future.



DATA COLLABORATION *Sustainable Development Goals*

There is now abundant evidence that public-private data collaboration can deliver a measurable impact. The results can be seen in faster decision-making during natural disasters and disease outbreaks, better insights on addressing the complex challenges related to poverty, health and employment and more precise indicators to measure the achievement of the Sustainable Development Goals (SDGs).

Data Collaboration for the Common Good Enabling Trust and Innovation Through Public-Private Partnerships World Economic Forum Produced in Collaboration with McKinsey & Company April 2019
http://www3.weforum.org/docs/WEF_Data_Collaboration_for_the_Common_Good.pdf



ENVIRONMENTAL & USAGE SENSORS *TerMITes*

Wireless environmental sensors capture data that informs a greater understanding of our environments and how human behavior impacts these environments. Data is time-stamped, place-tagged, obeys common protocols and automatically uploads to a centralised database via low-power Wi-Fi.

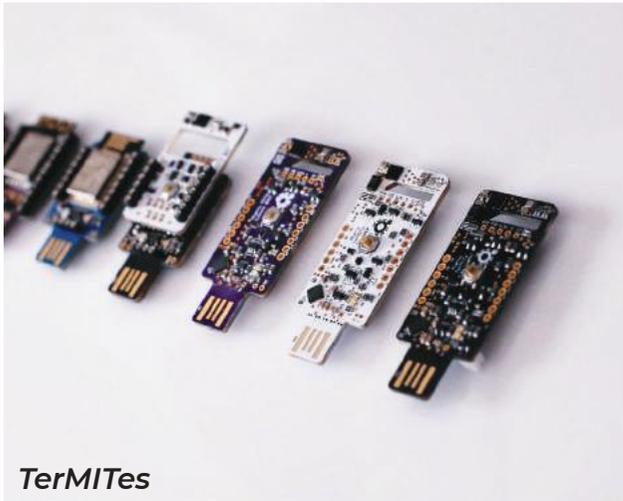
TerMITes underpin qualitative environmental observations with ongoing quantitative measurement, gathering real time data on presence and motion detection, humidity, pressure, ambient light levels, motion, carbon dioxide, and temperature. We're trialling them in Pune to better understand their potential for sanitation.

DATA VISUALISATION – STAKEHOLDER DASHBOARDS *CERN Collaboration Spotting*

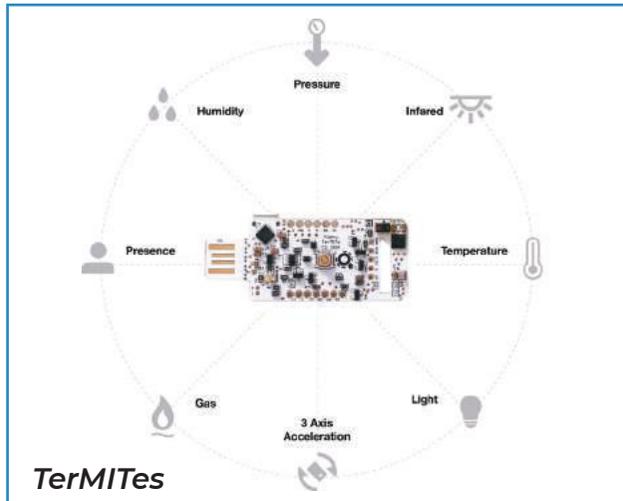
A dashboard-based visualisation and navigation platform for large and complex datasets, that uses graphs and data abstraction techniques to help experts in converting big data into knowledge and actionable insights.

The Toilet Board is exploring the potential of Collaboration Spotting, a technology developed at CERN, to map the Sanitation Economy Network of stakeholders and beginning to aggregate Sanitation Economy data in an open platform for carefully controlled use by businesses, investors, and governments.

THESE TECHNOLOGIES ARE AVAILABLE TODAY TO BE DEPLOYED IN SANITATION SYSTEMS IN CITIES AROUND THE WORLD TO FULLY LEVERAGE THE BENEFITS OF SMART SANITATION APPROACHES.



TerMITes



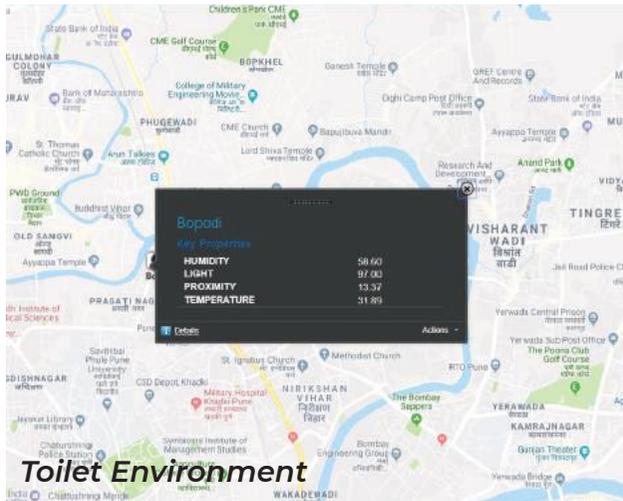
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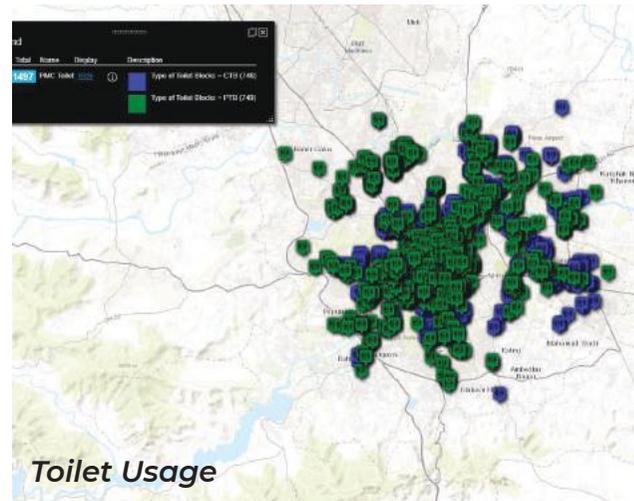
Luigi



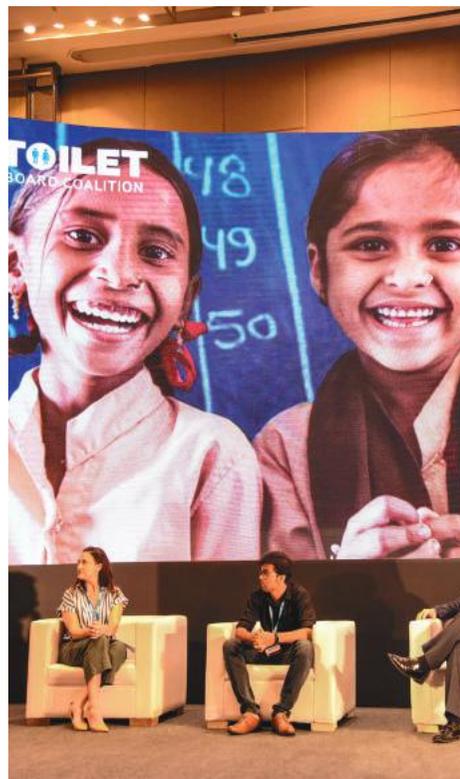
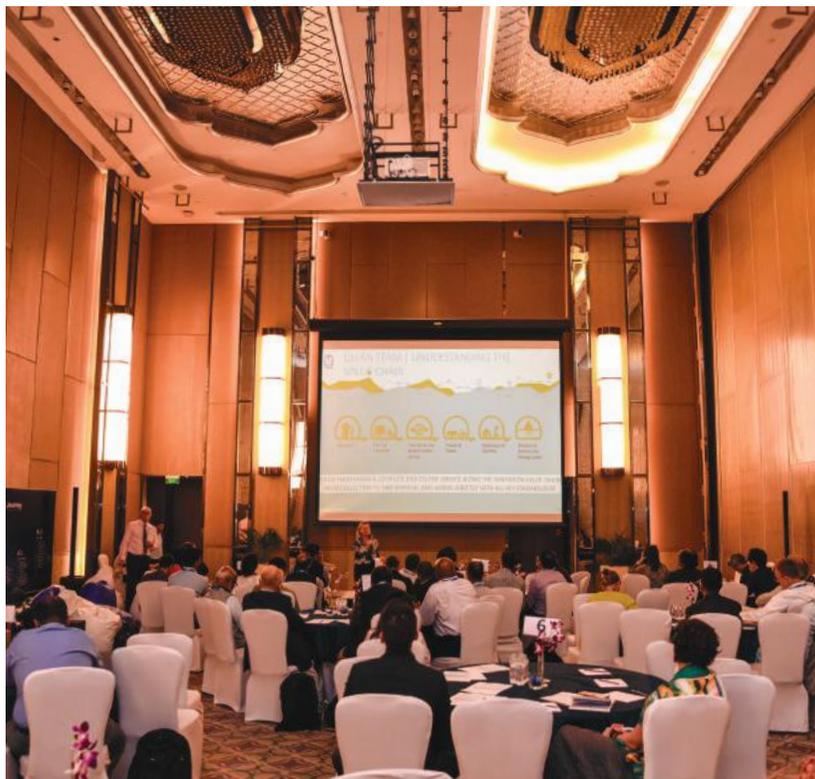
Yoshi



Toilet Environment



Toilet Usage



SOLUTION PROVIDER WORKSHOPS

GOVERNMENT AS A CATALYST FOR PRIVATE SECTOR ENGAGEMENT IN THE SANITATION ECONOMY / Public Private Alignment

Government and private sector leaders came together to discuss how governments can create enabling environments for sustainable sanitation and innovation to thrive.

TOP TAKEAWAYS:

- Government could engage with the private sector to co-create enabling policy environments for Sanitation Economy innovation and business approaches.
- Government can help all private sector parties within their jurisdiction to have WASH and the Sanitation Economy at the forefront of their strategies
- Government can be a powerful tool for broadcasting success and helping to achieve scale
- Government can promote and support entrepreneurship to attract more talent to grow Sanitation Economy sectors
- Government can support local financial sector strengthening with blended finance approaches to finance the Sanitation Economy in local markets

CITY-SCALE SANITATION / How the Sanitation Economy can serve 1m people without building traditional infrastructure

The Toilet Board Coalition's 2019 work presents three distinct avenues to scale; cities, sectors and standards. This workshop explored the city avenue to scale by focusing on how the Sanitation Economy could be scaled to serve populations of 1M inhabitants. This session was a two-way information exchange - sharing the thinking of one potential project, in Nairobi, Kenya, while putting this into multiple contexts - the industrialisation of the supply of toilets and treatments plants, experiences from Bangladesh, Zambia and Kenya, and the World Bank's work on Citywide Inclusive Sanitation.

TOP TAKEAWAYS:

- There is a history of large PPPs which have not always been welcomed by all actors - we need to build a strong mandate for new PPPs embracing such topics as regulation and cost management
- Willingness to pay is a key factor - an affordable user fee remains a key part of the business model. Entrepreneurs can develop advertising skills and be able to sustain information/education campaigns to change behaviour for users and other stakeholders
- To optimise quantity and quality of resulting products - consider multiple biological waste streams to co-process with Toilet Resources.

SOLUTIONS PROVIDER WORKSHOPS

THE SANITATION ECONOMY AND CLIMATE CHANGE /

Sanitation solutions for a resource constrained world

- Experts from Stockholm Environment Institute, Container Based Sanitation Alliance and the Coalition's network of entrepreneurs and investors discussed how the Sanitation Economy narrative can better integrate with the climate change movement.

TOP TAKEAWAYS:

- Sanitation is a game changer for climate change, but we need to strengthen the knowledge gap between sanitation and climate change with evidence, key messages and the right narratives.
- This could also unlock funding from climate change organizations for sanitation entrepreneurs.
- As sanitation and climate change are both broad fields, key discussions emerged around the tools needed to measure sanitation's impact on climate change and better utilising the energy and nutrients in Toilet Resources.

CLOSING THE LOOP / Exploring Renewable Resources for Agricultural Systems

With 60+ attendees representing entrepreneurs, enabling organizations, private sector and academic institutions, this session focused on understanding current sanitation entrepreneurs working within agriculture and how these models could be further replicated as best practice in sustainable agriculture.

TOP TAKEAWAYS:

- Sanitation for agricultural systems, goes beyond being good for the environment and health of the workers, but can enhance the nutrient recycling of waste streams, add to the recycling of water and provide a new source of decentralised energy.
- For this to be true, there needs to be more evidence in the form of data on soil and crop quality before and after using co-compost from Toilet Resources.
- We need science based evidence on safety and quality and standards to ensure that quality and safety are consistently achieved.

THE 5-STAR TOILET / A new standard to change the perception and reality of public toilets

Experts from the International Standards Organisation, the Alliance for Water Stewardship and entrepreneurs at the forefront of innovation came together to discuss business model optimisation across the Sanitation Economy and the potential of a new standard in sanitation to raise the bar for the reality and the perception of these vital facilities, and the people who work in them.

TOP TAKEAWAYS:

- How can a public toilet standard open up opportunities for new and scaled-up products and services?
- Transparency will enhance competition between providers – raising standards
- Opportunity to promote products based on rising reputation of sanitation
- Certification could be a route to income generation and to demonstrate competency

FOR WOMEN x BY WOMEN /

How will women leaders shape the Sanitation Economy for the future?

Following a panel touching on topics such as women in leadership in sanitation corporations from Firmenich, the concept of 'Leave No One Behind' from WSSCC, women entrepreneurs in the Sanitation Economy, and increasing the pipeline of dignified work for women in the Sanitation Economy, participants discussed 'How do women design sanitation systems differently?' and how might more engagement by women be enabled in the Sanitation Economy.

TOP TAKEAWAYS:

- A need for the reframing of the idea of standards for social inclusion to encouraging more evidence, research, advocacy and awareness about the dimensions of social inclusion.
- A call for accelerator programmes focused on the following themes: Women entrepreneurs, Women's health related products/services, and Companies that have a % of employees that are women and or have a commitment to supporting women.
- More partnerships among organisations like the Women in WASH network and sanitation focused organisations could help develop a database of women that could be used for women's health related biological research as well as a database of WASH speakers for conferences to increase gender representation in global wash convenings.

HER FUTURE /

Current use cases of product & service innovation for feminine hygiene & MHM

In this session, led by TATA Trusts Head of Water Mission, participants delved into the topic: Vision of how the Sanitation Economy can support and improve Menstrual Health (MH) products/services/communications. Following a panel touching on topics such as UNICEF's first ever Menstrual Health and Hygiene (MHH) accelerator programme launching in 2020, Kimberly Clark's 3 prong approach as it relates to MHH product and service provision, and innovative educational methods by WASH United.

TOP TAKEAWAYS:

- We can encourage companies to revisit brands/brand identities in the MHH space so not to reinforce negative stereotypes/existing social norms.
- A call for increased encouragement for big corporations in the MHH space to move towards plant derived polymer products to replace plastic in their products and packaging (aligning with the #plasticfreeperiods movement).
- There is need to move away from solely 'commercial solutions' to give users options and not prescriptions for their MHH products/services.

HACKING COMMUNITY & TRADES ENGAGEMENT

/ Rethinking age-old models for the Sanitation Economy

A workshop exploring how innovative approaches to community engagement, consumer insights and training can unlock behavior change. Sanitation is interconnected, on a personal level, to every human on the planet. It's an intrinsic part of our daily routine, and has cultural significance. In order to implement successful sanitation systems and innovations, multi-tiered community engagement and consumer insights are needed within every aspect of a project.

TOP TAKEAWAYS:

- Children are powerful agents for change. Empower them to lead community engagement and behavior change.
- Community engagement is an area of continuous learning for entrepreneurs, communities can act as a sales force for entrepreneurs
- Work with and build trust with caretakers, building their image as leaders of the community.

3. INVESTMENT & PARTNERSHIPS FOR SCALE

It's exciting to see this investment into the treatment side of sanitation, as many people want to invest in access.

MYLES ELLEDGE
BIOMASS CONTROLS

Sustainable sanitation cannot be an either/or, it isn't either the governments responsibility or the private sector. It must be a joint effort, private sector, donors and the public sector working together and we at USAID are proud to be a part of scaling the Sanitation Economy with the TBC.

ANAND RUDRA
USAID

Over the past nine months we have launched three SDG impact bonds focused on different goals. Along those same lines we are focused on the Sanitation Economy.

ANKIT BHATIA
GRAMEEN CAPITAL

We need to create hype around the opportunities of sanitation.

RAJEEV KHER
SARAPLAST

ADB has a clear goal to increase private sector operations. We understand that infrastructure investment needs cannot be met by public financing alone, the private sector has to be crowded in. Our private sector operations will reach 1/3rd of ADB operations and numbers by 2024.

CHRISTIAN WALDER
ASIAN DEVELOPMENT BANK

We've been able to provide a loan to Biomass Controls to support commercial sales of their biogenic refineries for faecal sludge treatment here in India and in other areas.

JOHN MOYER
WATEREQUITY

We need to re-visit the narrative around sanitation. There is a lot of money to be made in sanitation.

DHESIGAN NAIDOO
WATER RESEARCH COMMISSION

We're shifting towards innovative financing and working with the private sector. We're also working to provide technical support to banks and to entrepreneurs working in the WASH space.

TOM KRESS
USAID



Good people investing in good people is bad business. When you are trying to bring about a change, focus not on the poor but on the activity that will bring about change in their lives. So good business became our focus.

VINEET RAI
AAVISHKAAR GROUP

ENGAGEMENT PATHWAYS

HOW WE SCALE THE SANITATION ECONOMY TOGETHER

Participants mapped their organisations and noted needs and offers to the group on sticky notes shared to three large 'Journeys' - the Investor Journey, the Entrepreneur Journey and the Corporate Engagement Journey.

We need a revolution, we need to change the way we think and act about sanitation. We shouldn't focus only on the building of infrastructure as this leaves out the most important part to achieving the SDG, which is the sustainable delivery of these services - the right business models, policies and financing.

MARIA ANGELICA SOTOMOYER
WORLD BANK





Julie McDowell, Grand Challenges Canada



Ankit Bhatia, Grameen Capital



NEW COLLABORATIVE OPPORTUNITIES

No one person and no one country can do this alone.

ANKUR KAUL
PHILIPS

Water accounts for most of the mass moving in and out of our cities. The sewage hosts a trace of all the human activity occurring in a city. How would you want to use that information if it could be delivered to you? When we think into the future, there will be entire industries built around the insights of this data. We're looking for people who want to partner with us. We need to know what information is valuable to you, and we need the material to test - you're collecting precisely the stuff we need.

ERIC ALM
MIT



There is a huge opportunity of converting this resource into a profit part of our sustainability. The biggest challenge we see is connecting with entrepreneurs to come and work with us - to prove this - so that we can put our money where our mouth is. Any conversation from waste into a product, we are sitting with a market for that. Visit us and see for yourselves what is possible. There is a huge business opportunity waiting for you there.

JAGJEET KANDAL
AMALGAMATED
PLANTATIONS

Sanitation is a team sport. Our single outcome needs to be scale.

RISHI DHINGRA
KIMBERLY-CLARK

During the MHM session on Wednesday, we talked about what defines a 'female friendly' or 'female accessible' toilet. We discussed the importance of disposal on site, and how waterless sanitation makes MHM more complicated. We discussed ways that we could link MHM providers with CBSA and other toilet provider networks to make sure that public sanitation is the best it can be.

JOHN PETER ARCHER
GATHER

Great to know that there is now technology available to bring benefits out of the Sanitation Economy and the need for addressing the issue now. Also great to learn that there are Funders and Investors out there, who are willing to support Entrepreneurs, out there. Also that only behavior change is not the only way to change to attitude of the Public towards Sanitation rather making it a memorable experience is what will also motivate the Public into considering the benefits of the Circular Sanitation Economy.

ANSHU SHUCKLA
AMALGAMATED
PLANTATIONS

The private healthcare sector has been largely excluded from sanitation's focus, and it is a huge opportunity. 70% of healthcare delivery in India is done via private players.

ASHWIN NAIK
HEALTHCARE
GAMECHANGERS



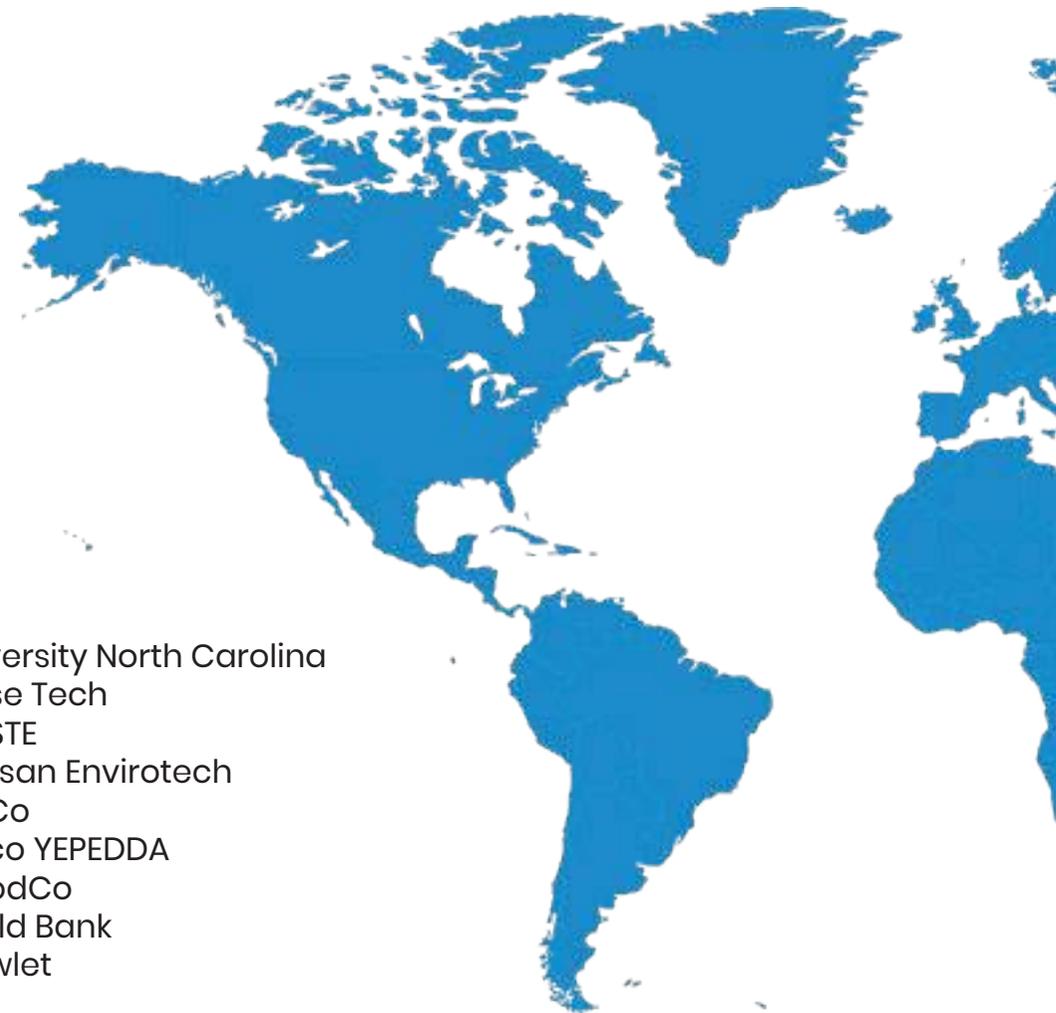
SANITATION ECONOMY MARKETPLACE

BUSINESS IN ACTION

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

EXHIBITORS

Aerosantoilets	Home Biogas	
AKYAS	Kimberly-Clark Corporation	
ARREBOL	Live Clean Initiative	
BHUMIJO	LIXIL	
Biobot	Loowatt	
Biomass Controls	Nilkamal	
CERN	PeeHub	University North Carolina
Change: Water Labs	Pennine Energy Innovation	Wase Tech
CubeX SAL	Plataforma Verde	WASTE
EnviroSan	ROCA Bathrooms	Watsan Envirotech
Eram Scientific Solutions	Sanivation	WeCo
Fluid Robotics	SatSense	Weco YEPEDDA
Gather	TBF Environmental	WoodCo
H2O Sanitation Services	The Biocycle	World Bank
Hindustan Unilever	Tide Technocrats	Wowlet









INTRODUCING THE 2020 ACCELERATOR COHORT



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Learn more and apply at: www.toiletboard.org

TOILET BOARD COALITION INDIA CHAPTER

TOILET BOARD COALITION LAUNCHES THE FIRST LOCAL MARKET CHAPTER IN INDIA



TATA TRUSTS



USAID
FROM THE AMERICAN PEOPLE



SANITATION ECONOMY GALA

CELEBRATING THE PIONEERS BUILDING THE GLOBAL SANITATION ECONOMY



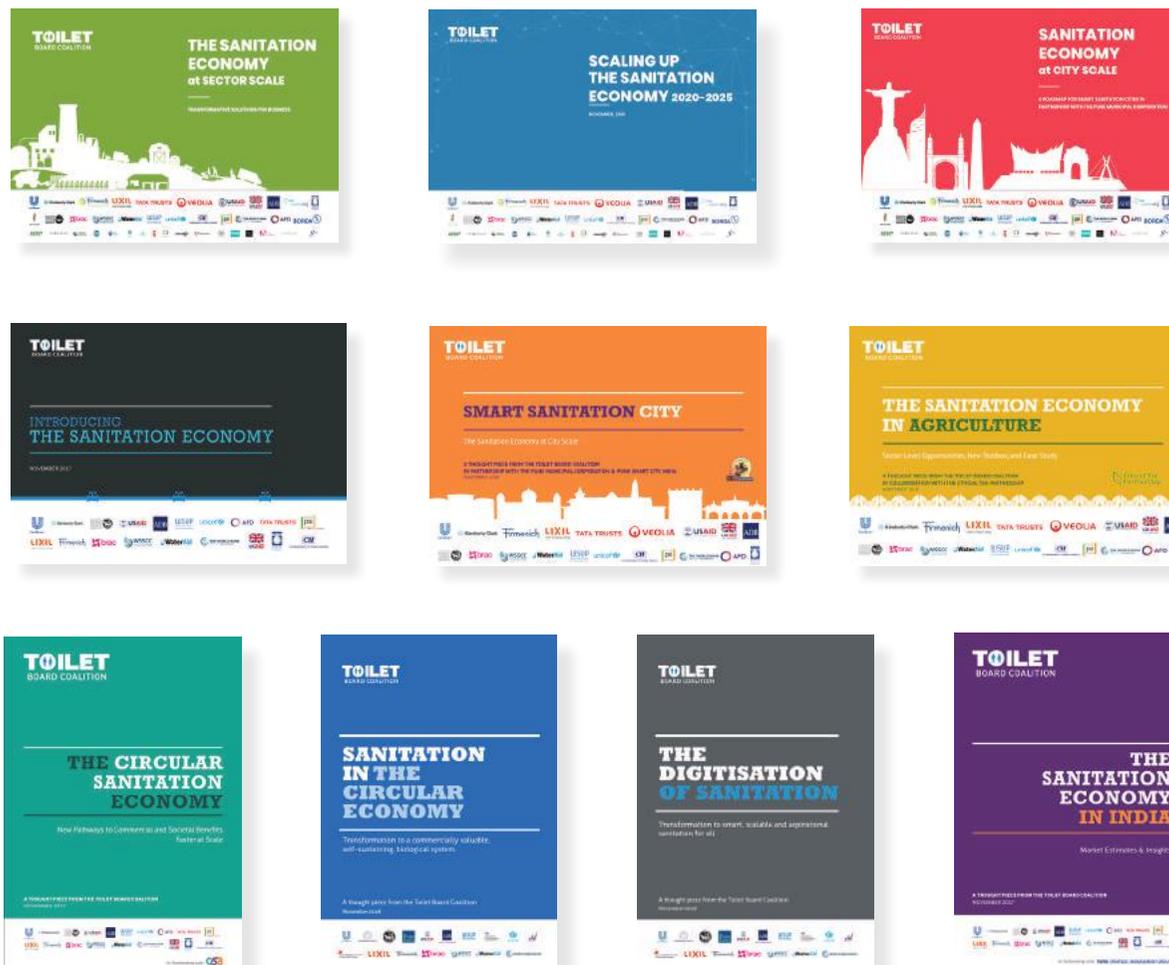
About the TOILET BOARD COALITION

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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WWW.TOILETBOARD.ORG**

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