# ALL LIVES HAVE EQUAL VALUE

An introduction to the Bill & Melinda Gates Foundation - Reinventing the Toilet

**2022 Emerging Water Technology Symposium**

10-11May2022

Sun Kim - Senior Program Officer

BILL & MELINDA GATES *foundation*

# TOPICS

- **Quick Introduction – Bill & Melinda Gates foundation**
- **Sanitation Crisis and Why Reinvent the Toilet**
- **RT Technologies, Development Status and Next Steps**
- **Role of ANSI/CAN/IAPMO/ISO 30500**
- **Questions / Discussion**


At the Bill & Melinda Gates Foundation, we believe that all lives have equal value.

# PURPOSE AND FOCUS

WE ARE IMPATIENT
OPTIMISTS WORKING
**TO REDUCE INEQUITY**
AROUND THE WORLD

FOCUSING ON
THE AREAS OF
**GREATEST NEED**

**TAKING RISKS**
THAT OTHERS
CAN'T OR WON'T

MAKING MARKETS
**WORK FOR THE POOR**

# WHAT WE DO

**The foundation has four missions that help us achieve our vision of a world where every person has the opportunity to live a healthy, productive life:**

**Ensure more children and young people survive and thrive**

**Empower the poorest,** especially women and girls, to transform their lives

**Combat infectious diseases** that particularly affect the poorest

**Inspire people to take action** to change the world

**IF YOU WANT TO GO FAST,**
**GO ALONE.**
**IF YOU WANT TO GO FAR,**
**GO TOGETHER.**

— African proverb

# OUR VALUES

**Optimism**

**Collaboration**

**Rigor**

**Innovation**

# FOUNDATION EXECUTIVE LEADERSHIP

**Bill Gates**
Co-Chair and Trustee

**Melinda French Gates**
Co-Chair and Trustee

**Mark Suzman**
Chief Executive Officer

**Carolyn Ainslie**
Chief Financial Officer

**Susan Byrnes**
Chief Communications Officer

**Lisa Alvarez-Calderón**
Chief Human Resources Officer

**Connie Collingsworth**
Chief Operations Officer

**Christopher Elias**
President, Global Development

**Gargee Ghosh**
President, Global Policy & Advocacy

**Allan Golston**
President, U.S.Program

**Leslie Mays**
Chief Diversity, Equity & Inclusion Officer

**Trevor Mundel**
President, Global Health

**Rodger Voorhies**
President, Global Growth & Opportunity

**Ankur Vora**
Chief Strategy Officer

**Anita Zaidi**
President, Gender Equality

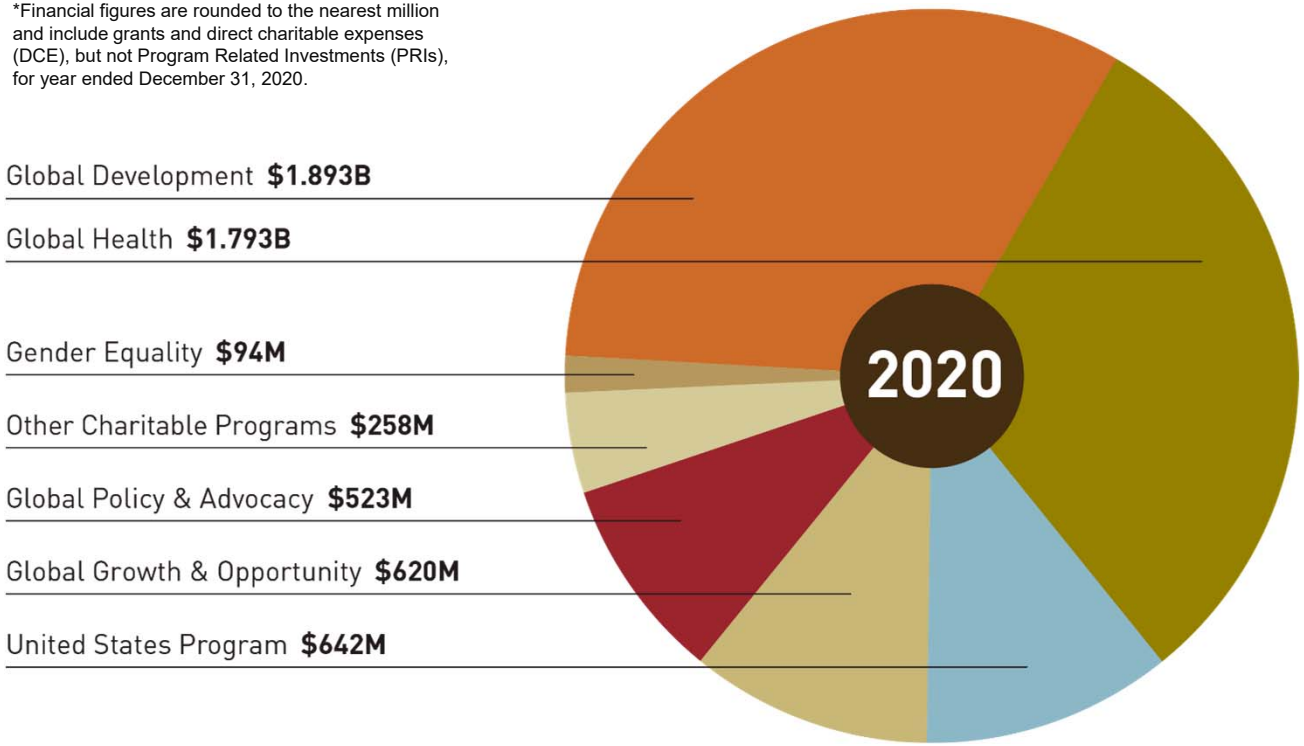
# WHERE WE WORK

From our headquarters in Seattle to our teams based in regional offices across four continents, we work with partners around the globe to improve people's lives.

# FOUNDATION FUNDING SUMMARY

**In 2020, the foundation invested US $5.822 billion* in these areas**

*Financial figures are rounded to the nearest million and include grants and direct charitable expenses (DCE), but not Program Related Investments (PRIs), for year ended December 31, 2020.



# OUR CAMPUS

# IMPROVING PEOPLE'S LIVES: AN INTEGRATED APPROACH

IMPROVING SANITATION

HELPING FARMERS

ACCESS TO VACCINES

FAMILY PLANNING

STOPPING MALARIA

BETTER NUTRITION

# THE SANITATION SERVICE CHAIN


## Sewerage


## Fecal Sludge Management for on site systems

# TODAY'S TOILETS?

$$$


$$$?


$$$??

# THE SANITATION CRISIS

- **~2.0 billion** people lack safely managed services for water*
- **~3.6 billion** people lack safely managed sanitation*
- **494 million** people still open defecate*
- Diarrheal disease kills **>350,000** children under the age of 5, every year

## Women and Young Girls

- **Imprisonment by daylight**
  - In many cultures, the only time available for women or girls to defecate is after dark.
- **Reduced school enrollment and attendance**
  - The lack of safe, separate and private sanitation and washing facilities particularly during menstruation.
- **Burden of caring for the sick**
  - Caring for sick children adds to the already heavy workload.
- **Impact on pregnant women**
  - About 44 million pregnant women have sanitation-related hookworm infections that pose a considerable health burden in developing societies.

* WHO & UNICEF Joint Monitoring Programme (JMP) "Progress on household drinking water, sanitation and hygiene | 2000-2020 | five years into the SDGs" – (2021)

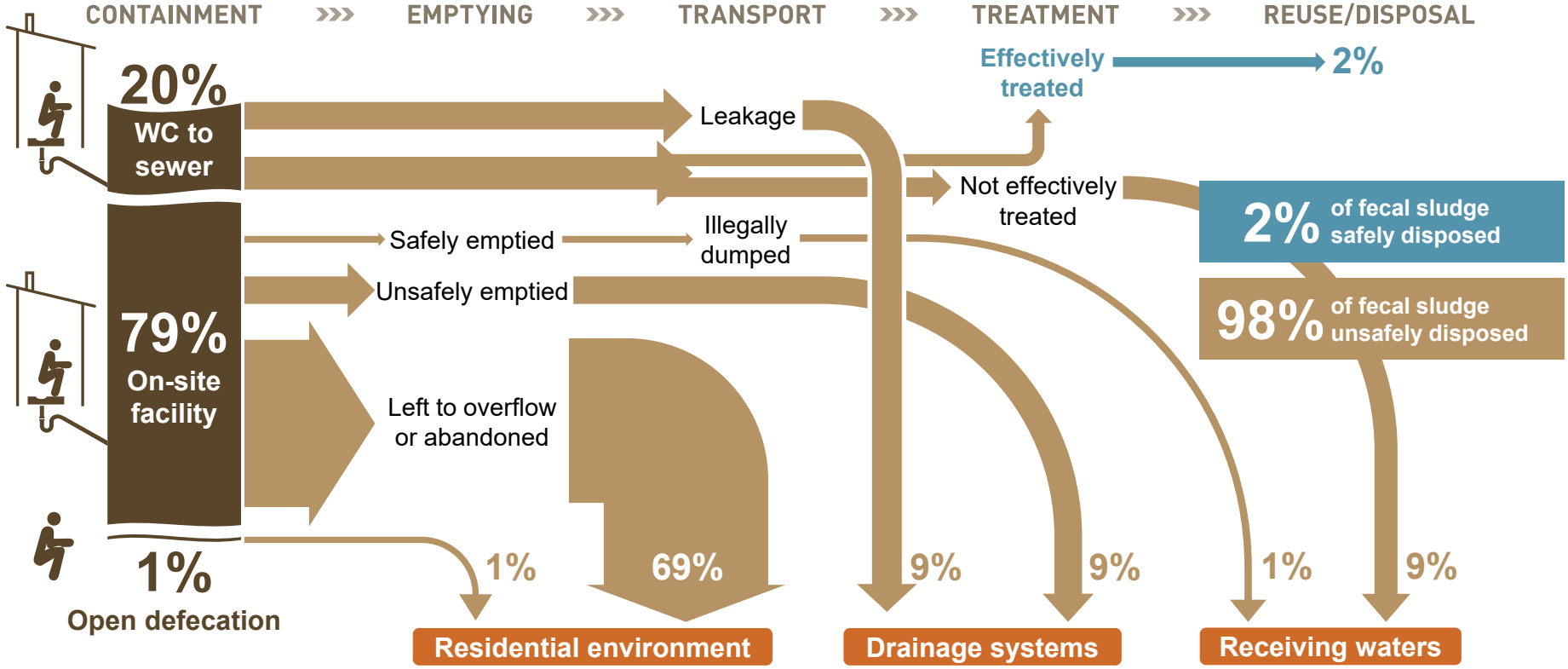
# DISEASES AND ORGANISMS TRANSMITTED VIA FECES

- Cholera
- Typhoid
- Hepatitis A
- Polio
- Cryptosporidiosis
- Ascariasis
- Tape worm
- Giardia
- Rotavirus
- Salmonella
- Protozoan cysts
- E. coli
- Shigella
- and many others

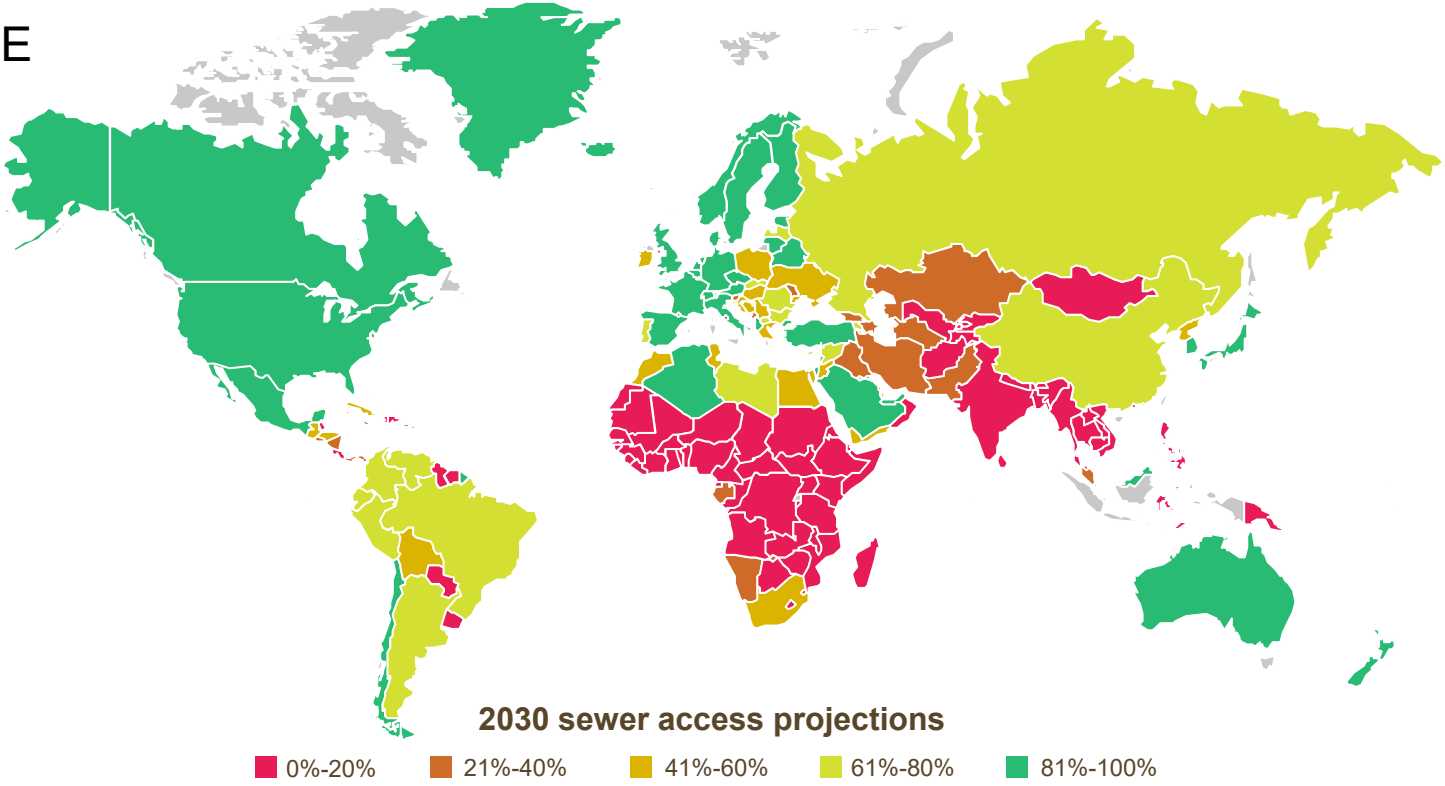
# POOR FECAL SLUDGE MANAGEMENT IS AKIN TO INSTITUTIONAL OPEN DEFECATION

**Sludge direct to the environment when no service chain**



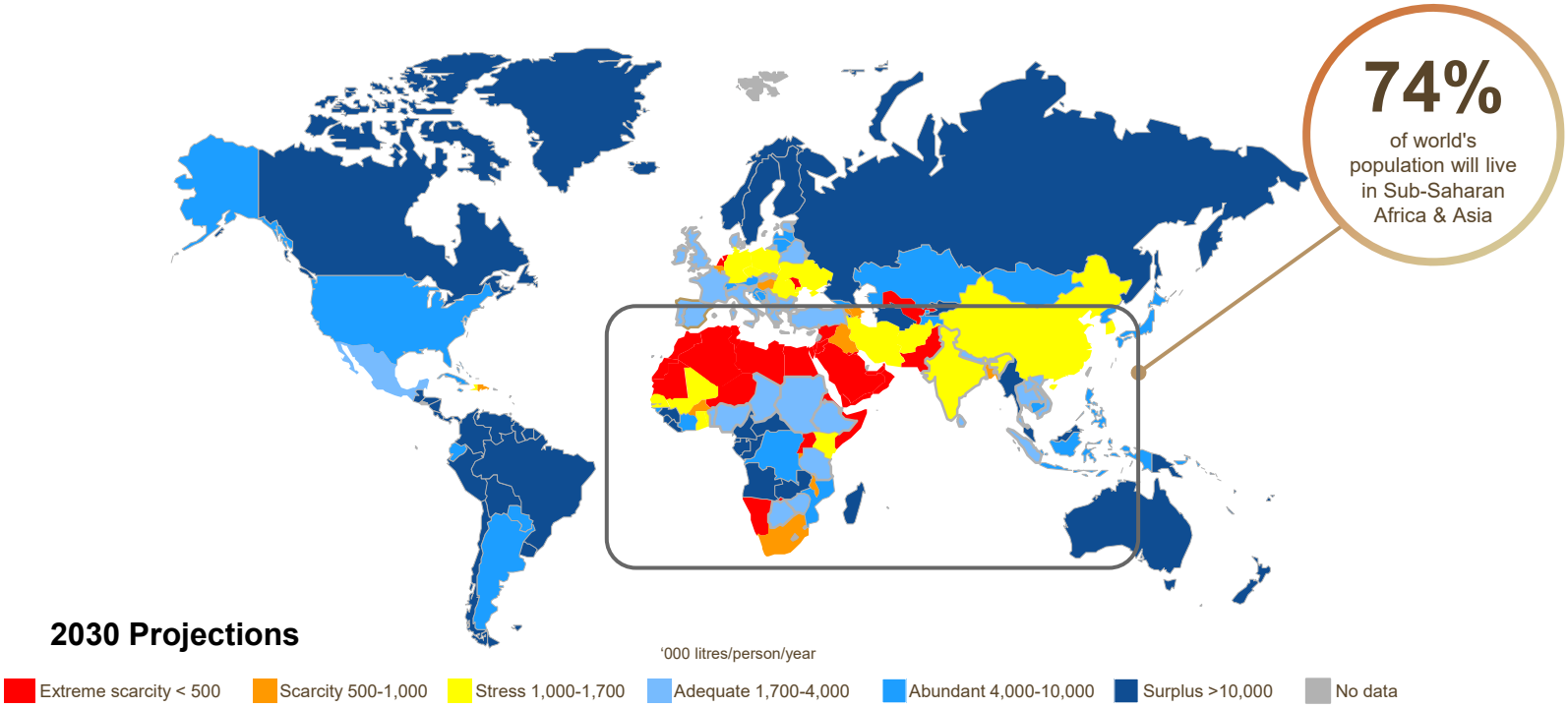

Source: WSP analysis, using BMGF funded research

## *GROWING POPULATION WITH URBANIZATION:* MANY PARTS OF DEVELOPING WORLD WILL CONTINUE TO LACK ACCESS TO SEWERS IN FUTURE



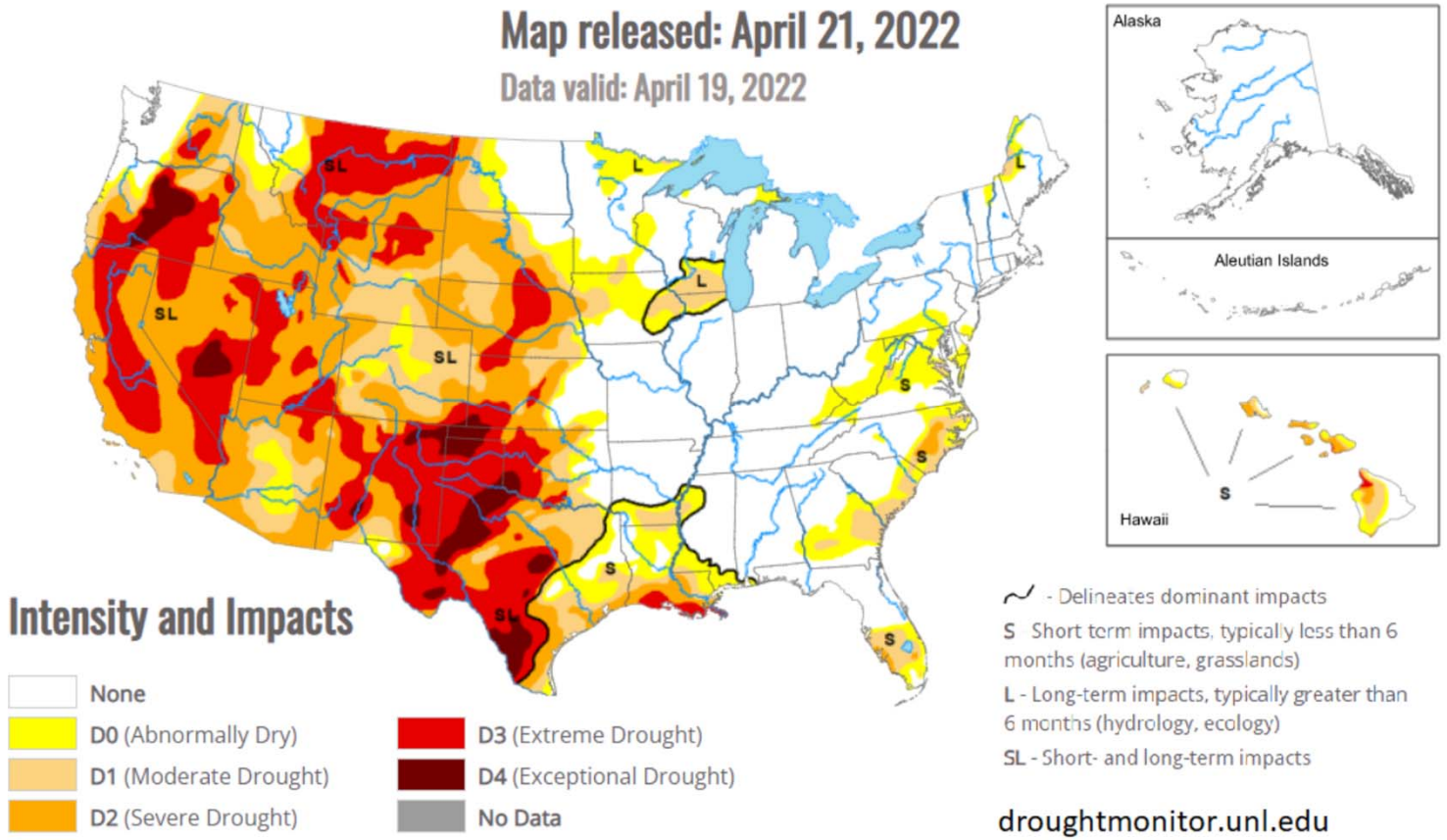

Note: countries in gray do not have data reported
Source: JMP 2017 Report; BCG analysis

# *WATER SCARCITY:* WILL FURTHER INCREASE NEED FOR SANITATION TECHNOLOGY THAT DOES NOT RELY ON WATER INPUTS




Source: Global Water Initiative' (June 2005), GEF International Waters Conference, The Coca-Cola Company, Grail Research, BCG Analysis

# U.S. DROUGHT MONITOR



# CURRENT SANITATION SOLUTIONS HAVE SIGNIFICANT LIMITATIONS THAT JEOPARDIZE HEALTH, SAFETY AND IN MANY CASES PERPETUATE OPEN DEFECATION PRACTICES

## Hanging toilets

*User*

- Foul odors
- Poor user experience

*Municipality*

- Safety hazards
- Environmental contamination

## Pit latrines

## Septic tanks

- Frequent maintenance
- Difficult to retrofit
- Risk of leakage
- Poor waste disposal

## Sewerage

- Expensive to install, maintain
- Requires infrastructure
- Requires water
- Treatment not assured

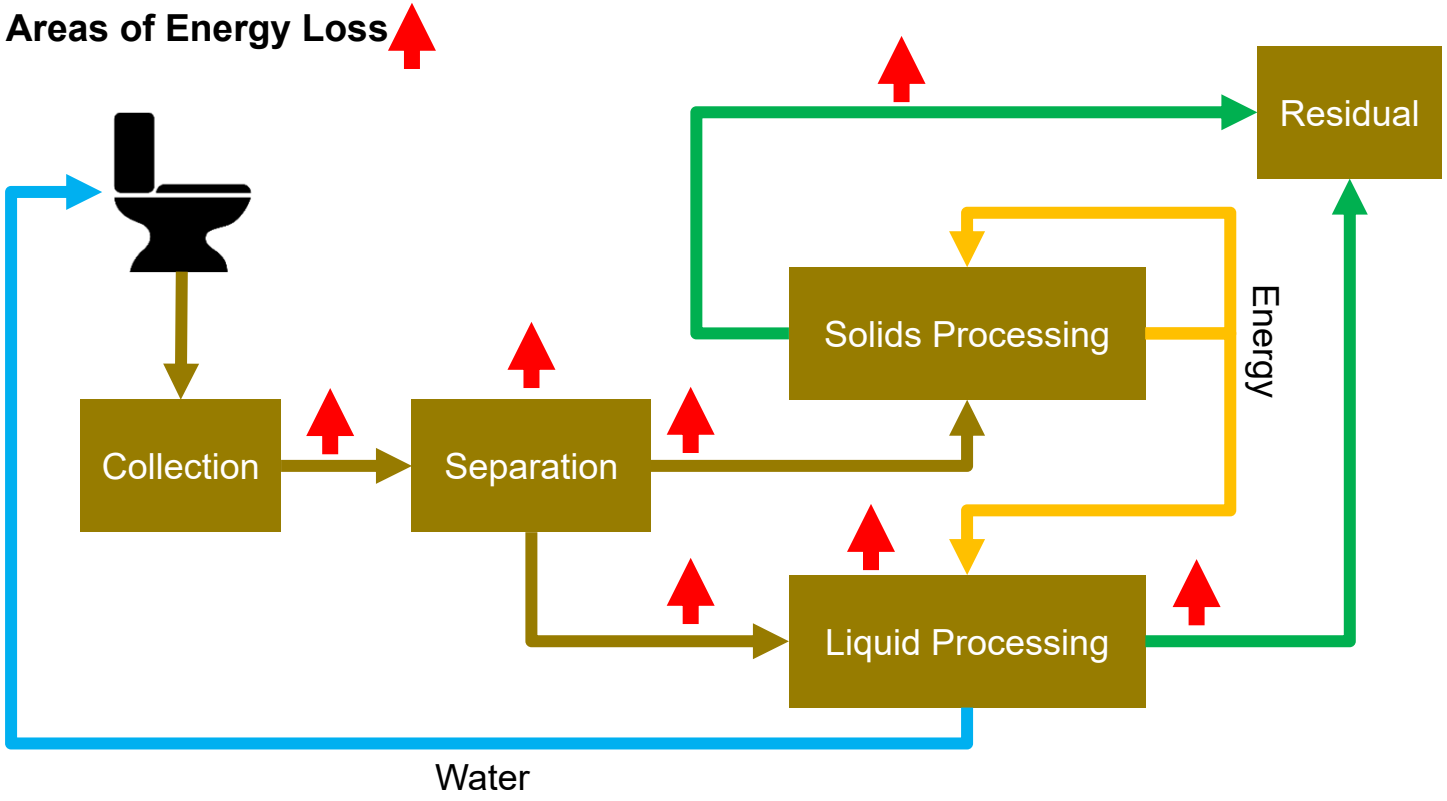
# Why Reinvent the Toilet

Fix an important market failure by delivering services and product that meet customers needs and aspiration, compatible with 21st century technologies

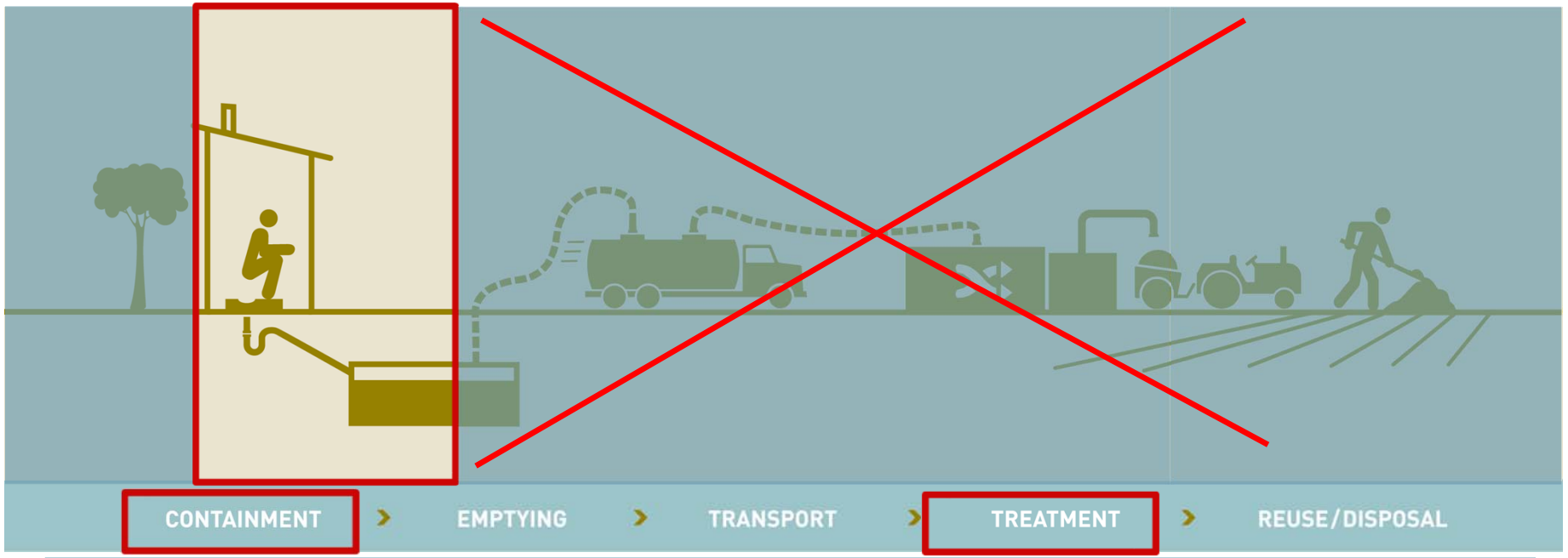
# GENERAL CONCEPT OF OFF-GRID TOILET

**Potential Areas of Energy Loss**



# NON-SEWERED SANITATION

**Reinvent the Toilet Challenge**



# REINVENT THE TOILET CHALLENGE

Our Mission:

## Enable universal access to sustainable sanitation

by supporting the development of radically new sanitation technologies as well as markets for new sanitation products and services

Water, Sanitation & Hygiene areas of focus:

- Transformative Technologies Commercialization
- Urban Sanitation Markets
- Measurement Evidence Dissemination for Scale
- Policy Advocacy and Communication

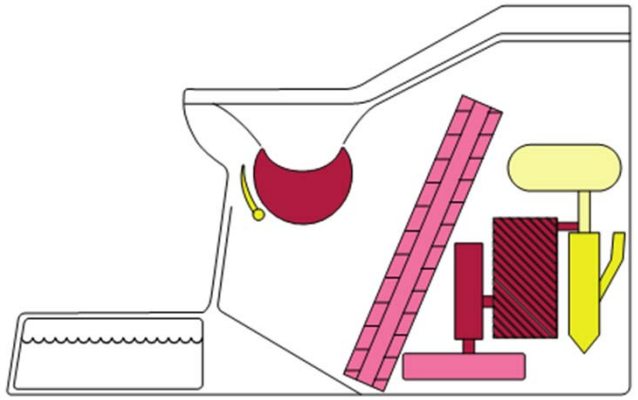
# THE REINVENTED TOILET PROGRAM IS DESIGNED TO ADDRESS EACH OF TODAY'S LIMITATIONS

## Eliminate pathogens

- Eliminate safety concerns via handling
- Reduce disease burden
- Improve environmental safety

## Convey low life-cycle costs

- Reduce need for pit emptying
- Ensure a sustainable business model, including maintenance via service providers



## Operate off grid

- Eliminate need for external inputs such as water and energy
- Make portable and easy to install

## Present modular, attractive interface

- Reduce / eliminate construction costs
- Provide clean and dignified product
- Eliminate odors and waste

# REINVENT THE TOILET CHALLENGE GRANTEES

## Grants (& contracts) to universities, organizations, and companies:

- California Institute of Technology
- Eawag, Swiss Federal Institute of Aquatic Science and Technology
- Eram Scientific
- University of Science and Technology Beijing
- Loughborough University
- RTI international
- University of Toronto
- Cranfield University
- Duke University
- Asian Institute of Technology
- Crane Engineering
- Water Research Commission
- JASTECH
- North Carolina State University
- Cascade Design – MSR
- National Sanitation Office of Senegal
- Helbling
- University of South Florida
- University of KwaZulu-Natal
- TÜV SÜD
- ANSI & ISO
- Georgia Institute of Technology
- Columbia / Stanford

# CORE PROCESSING TECHNOLOGIES

## ELECTROCHEMICAL

Caltech

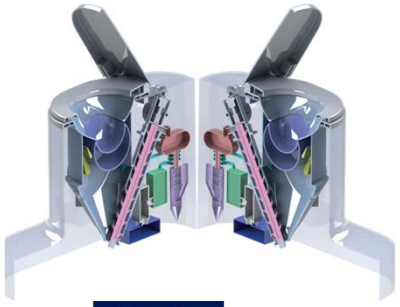
## WET OXIDATION

helbling

eawag aquatic research

Duke University

## DRY COMBUSTION



Georgia Tech

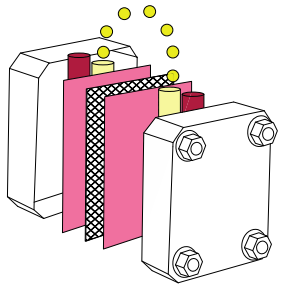
Duke University

Cranfield University

University of Toronto

SEDRON Technologies

## BIOLOGICAL



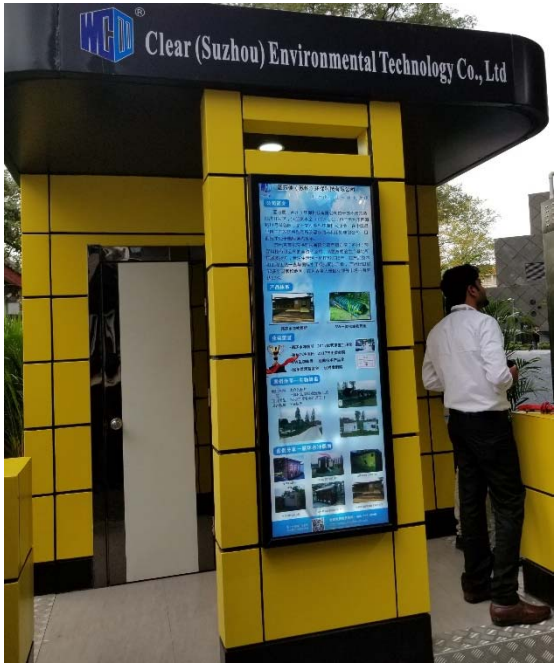
USF University of South Florida

UWE Bristol

Stanford University

Columbia University in the City of New York

# COMMUNITY REINVENTED TOILETS

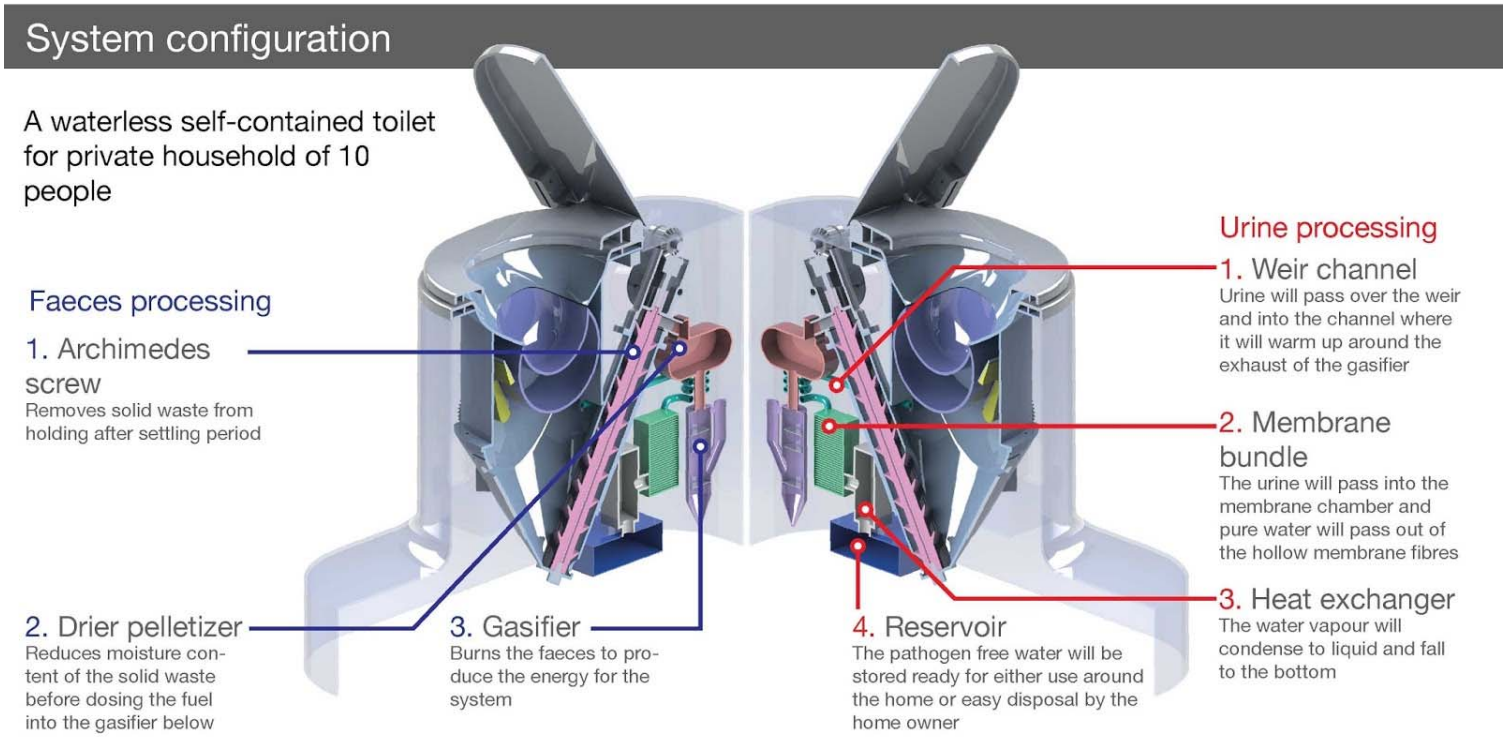





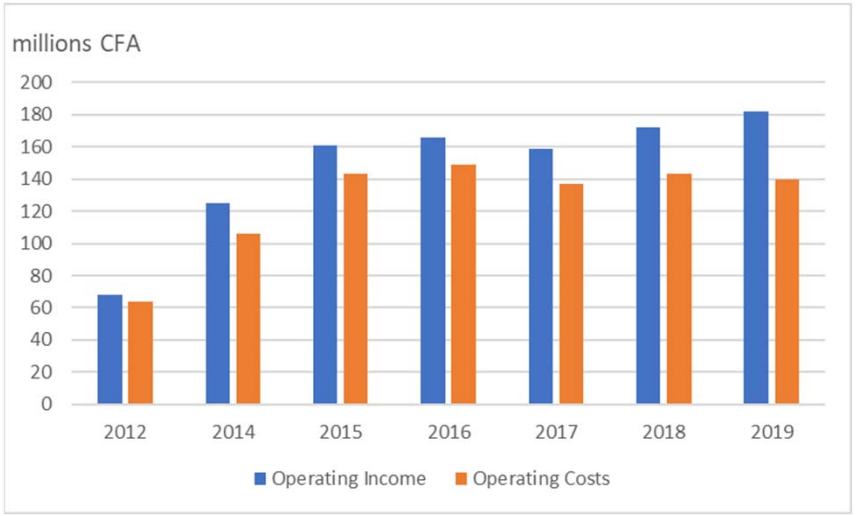
# HOUSEHOLD REINVENTED TOILETS


# HOUSEHOLD REINVENTED TOILETS



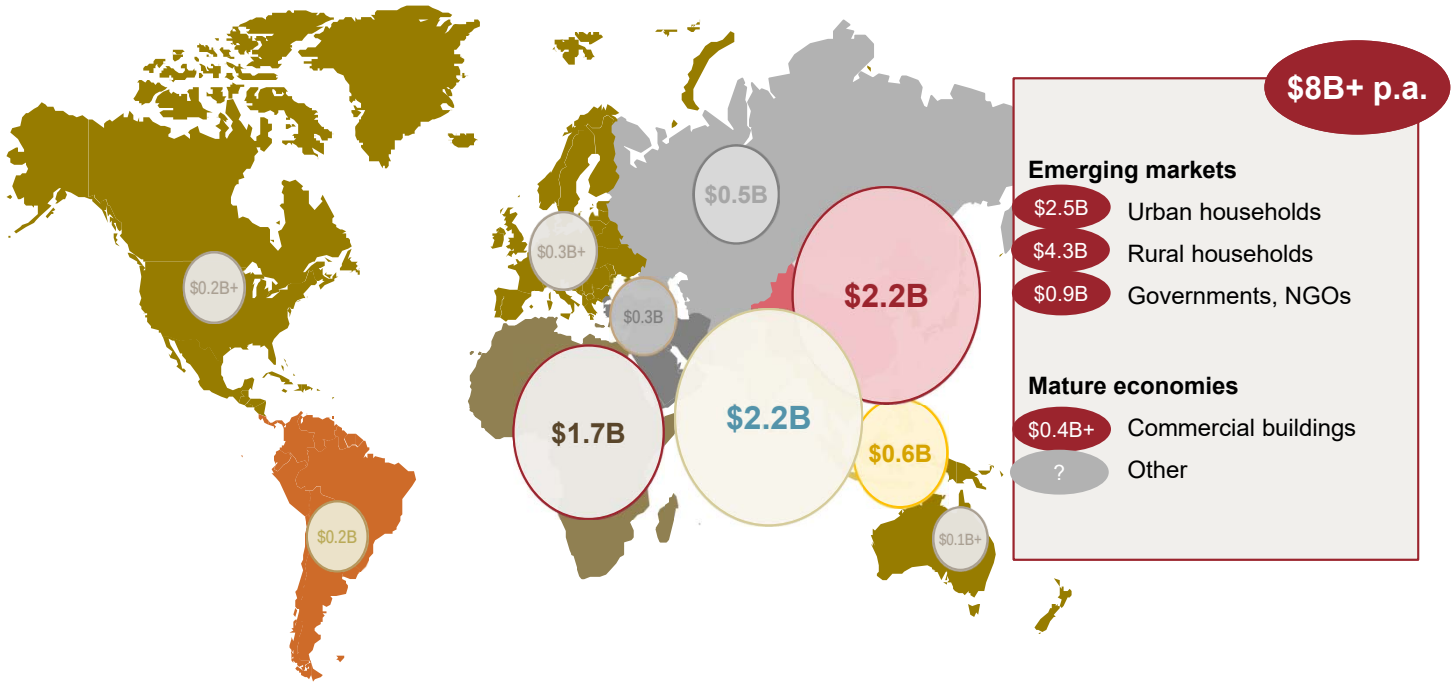
BIRTHING THE NON-SEWERED SANITATION INDUSTRY :

# MAKE SANITATION A PROFITABLE UTILITY SERVICE


- PPP contracts for a private utility service
- Innovative local financing (with commercial banks)
- Innovative technology adoption and business creating jobs

# A POTENTIAL $8B+ GLOBAL ANNUAL OPPORTUNITY TO HELP MEET SANITATION NEEDS...



# NON-SEWER-BASED SANITATION TECHNOLOGY

| Technology Category | Commercial Supplier | Product Status |
|---|---|---|
| Omni Processor | Ankur (India) | Ready for market |
| | CRRC (China) | Ready for market |
| | Biomass (USA) | Ready for market |
| | Kalyani (India) | Technology licensed |
| Public RT | Clear (China) | Ready for market |
| | SCG (Thailand) | Ready for market (liquid) |
| | EnvironLoo (South Africa) | Technology licensed |
| | Eram (India) | Technology licensed |
| Household RT | Huatie (China) | Technology licensed |
| | Rossi (South Africa) | Technology licensed |
| Peripheral Technology | Firmenich (malodor blocker) | Ready for market |
| | EOOS (urine trap FE) | Ready for market |
| | Envirosystem (EnviVac air flush FE) | Ready for market |
| | Laufen/Roca (water saving interface) | Ready for market |

# CASE STUDY – SOUTH AFRICA

SASTEP
South African Sanitation Technology Enterprise Programme

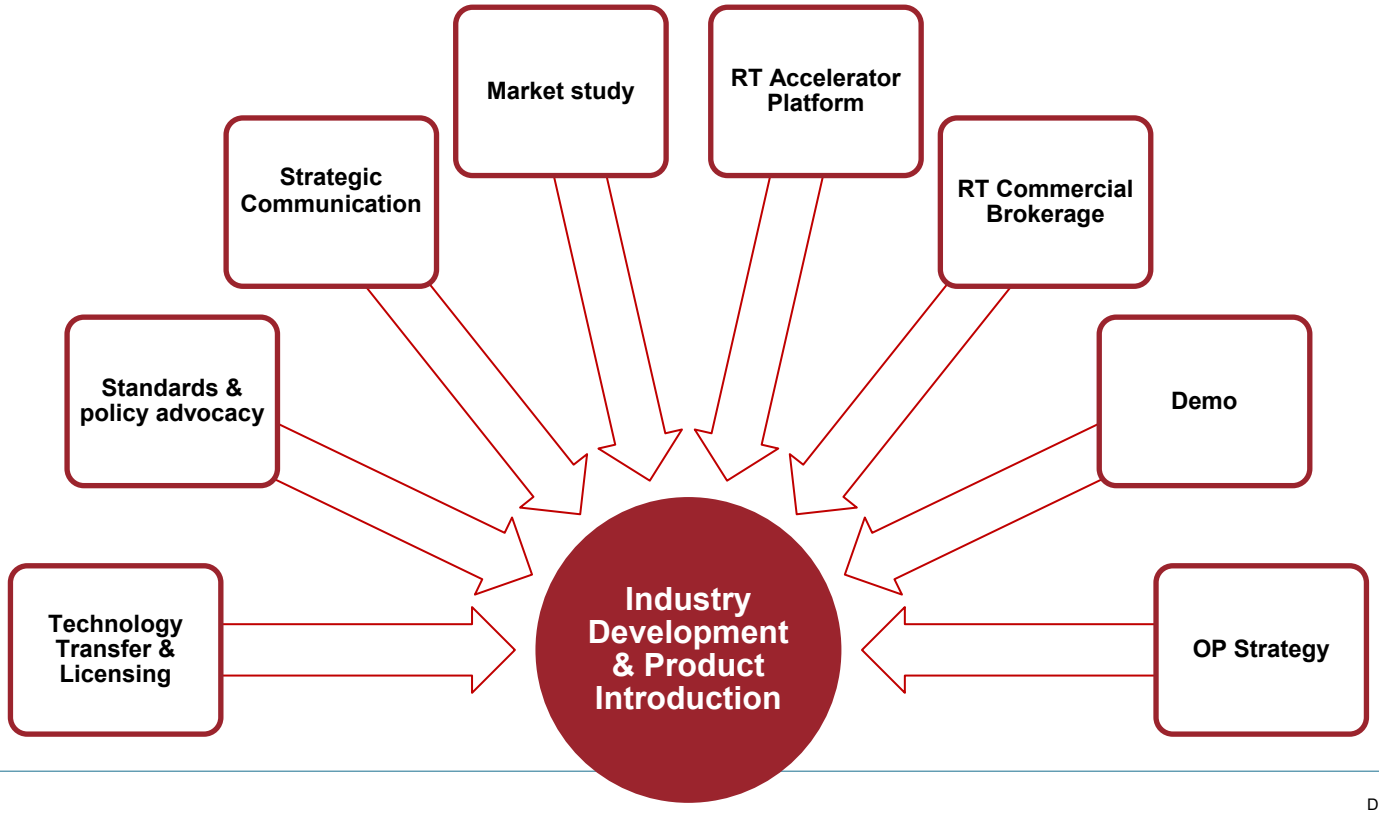






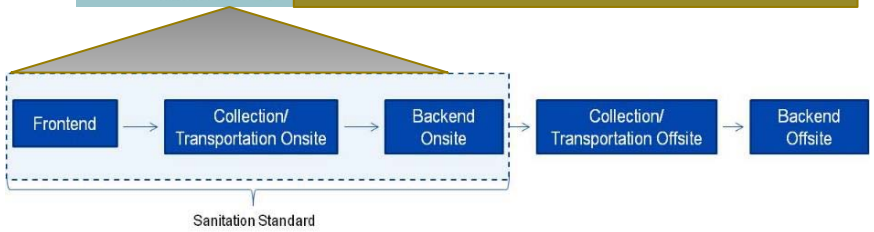
| Technology | Technology partner | Local Commercial Partner | Licence Agreement | Demonstration | Localization | Local Manufacture |
|---|---|---|---|---|---|---|
| Recycling Toilet | Clear (Suzhou) | Enviroloo | √ | √ | √ | * |
| Urine D-T | EOOS | Envirosan | √ | √ | √ | ** |
| Biogenic Refinery | Biomass Controls | b-Engineering | √ | | | *** |
| HTCLEAN | Helbling Technik AG | Rossi | √ | | | **** |
| NEWgenerator | University of South Florida | WEC-Projects | √ | | | |
| Zyclone Cube | SCG Chemicals co., LTD | | | | | |
| Envivac | Enviro Systems | LTM | | | | |
| | AIT | | | | | |
| | Biomass Controls | | | | | |
| ECOSAN-CALTECH | Yixing | | | | | |

# WHAT NEEDS TO BE DONE?



# SCOPE OF THE NON-SEWERED SANITATION SYSTEMS STANDARD





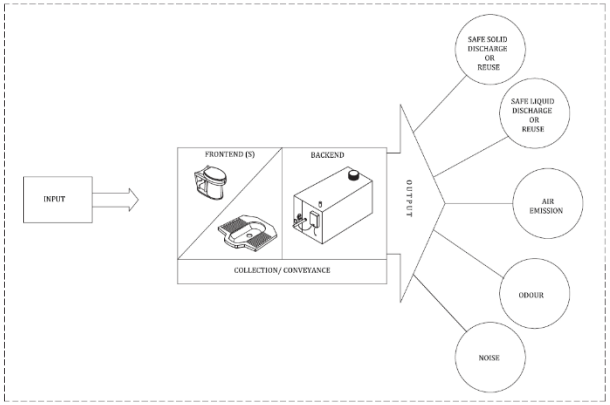




Figure 1 — Concept of a non-sewered sanitation system

# **NEXT GENERATION OF SANITATION TECHNOLOGIES** - THE SCOPE OF THE ISO/PC305 IS TO ADDRESS EACH OF TODAY'S LIMITATIONS

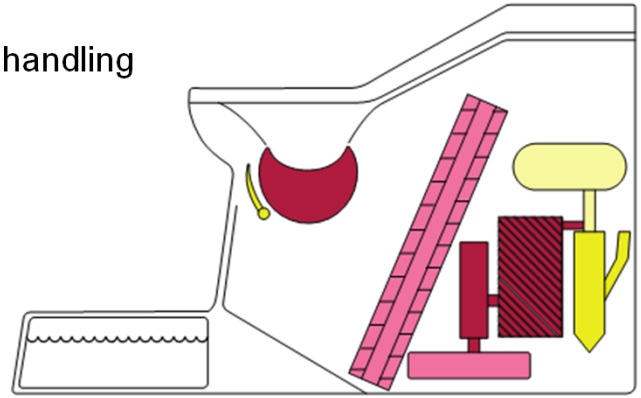
- The Next Generation of Toilet is a modular, transformative technology that offers a non-sewered sanitation solution, eliminating the need for a piped collection system. The focus of the standard is to help develop technologies that: destroy all pathogens onsite and recover valuable resources, operate without sewer, water or electricity connections and promote sustainable business model.

## ELIMINATE PATHOGENS

- Eliminate safety concerns via handling
- Reduce disease burden
- Improve environmental safety

## OPERATE OFF GRID

- Eliminate need for external inputs such as water and energy
- Make portable and easy to install



## CONVEY LOW LIFE-CYCLE COSTS

- Reduce need for pit emptying
- Ensure a sustainable business model, including maintenance via service providers

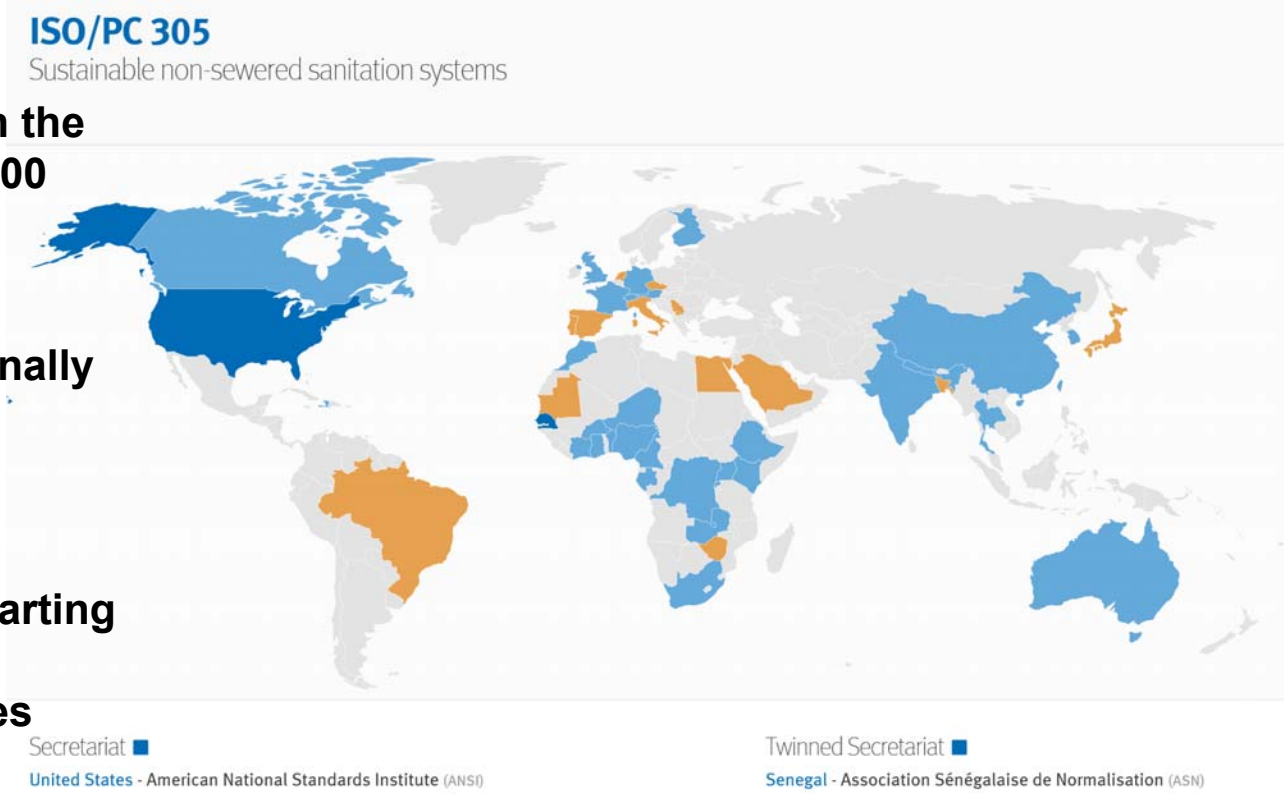
## PRESENT MODULAR, ATTRACTIVE INTERFACE

- Reduce / eliminate construction costs
- Provide clean and dignified product
- Eliminate odors and waste

# NON-SEWERED SANITATION SYSTEM STANDARD: COUNTRY PARTICIPATION

- 46 Countries involved in the development of ISO 30500
  - 32 participating
  - 14 observing
- 29 Countries have nationally adopted ISO 30500
  - ECOWAS (W. Africa)
  - ARSO (AU)
- Several countries are starting to implement through plumbing and bldg codes



MEANS OF IMPLEMENTATION FOR SDG 6:

# LAUNCH AND EXPAND THE NON-SEWERED SANITATION INDUSTRY

## Enabling environment

**Collaborate with local Governments to enhance demand for sanitation**

**Support implementation of quality standards**

## Marketplace readiness

**Foster a supportive regulatory environment**

**Leverage relationships with development banks to facilitate access to financing**

# TOGETHER WE CAN MAKE A GREATER IMPACT

- **“*Every person deserves the chance to live a healthy, productive life*.”**

- ***“A life is not important except in the impact it has on other lives.”* – Jackie Robinson**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WORLD WHERE
EVERY
PERSON
HAS THE OPPORTUNITY
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PRODUCTIVE LIFE

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