

CITYWIDE INCLUSIVE SANITATION (CWIS): A PUBLIC SERVICE APPROACH FOR EQUITABLE SANITATION SERVICE DELIVERY

JCCI Seminar 2023

Roshan Shrestha, PhD
Deputy Director
Water, Sanitation Hygiene, Global Growth & Opportunity



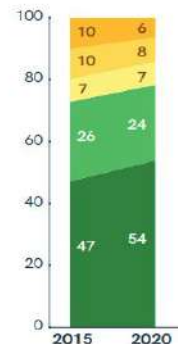
3.6B

people globally lack access to
safely managed sanitation

7%

Increase in proportion of global
population using safely managed
services since 2015

Nearly half the world's population
lacked safely managed sanitation
services in 2020



Global sanitation coverage, 2015-2020
(%)

Safely Managed

Improved and not shared - excreta
safely disposed in situ or off-site¹

Basic

Improved and not shared - excreta
not safely disposed

Limited

Improved (e.g. sewer, septic, VIP
latrines) and shared facilities

Unimproved

Use of pit latrines without a slab or
platform, hanging and bucket latrines

Open Defecation

Disposal of human faeces in fields, or
other open spaces or with solid waste

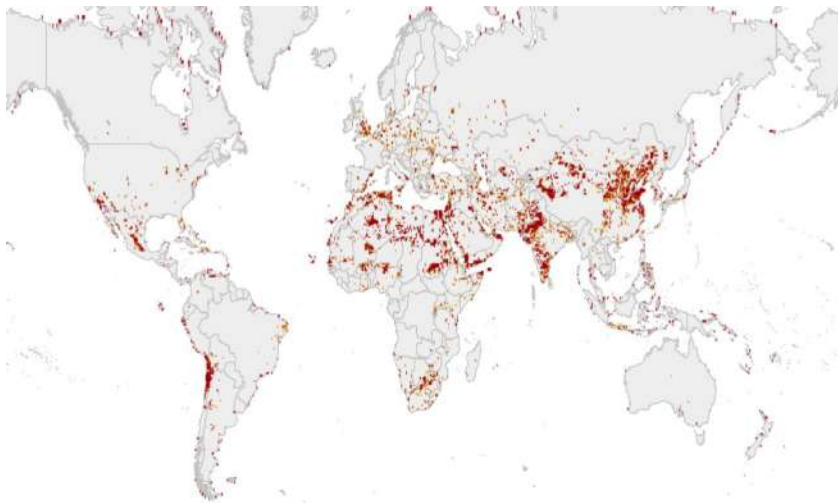
**Faster progress required to achieve the SDG goal of
safely managed sanitation by 2030**

1. Transported and treated offsite



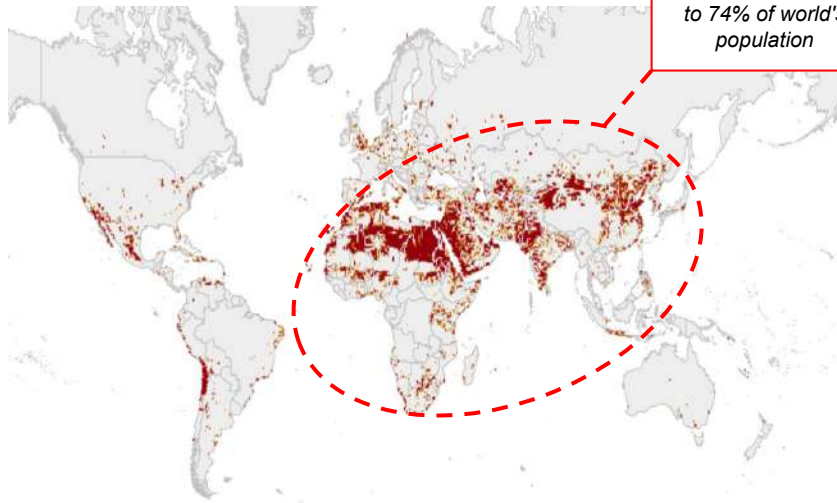
SUSTAINABLE HUMAN WASTE MANAGEMENT WILL BE REQUIRED TO ADDRESS INCREASING WATER SCARCITY

Baseline: 2000



In 2000, ~1.7B people were living in water scarce areas

Future: 2030



Sub-Saharan Africa
& Asia will be home
to 74% of world's
population

By 2030, ~2.7B people will be living in water scarce areas

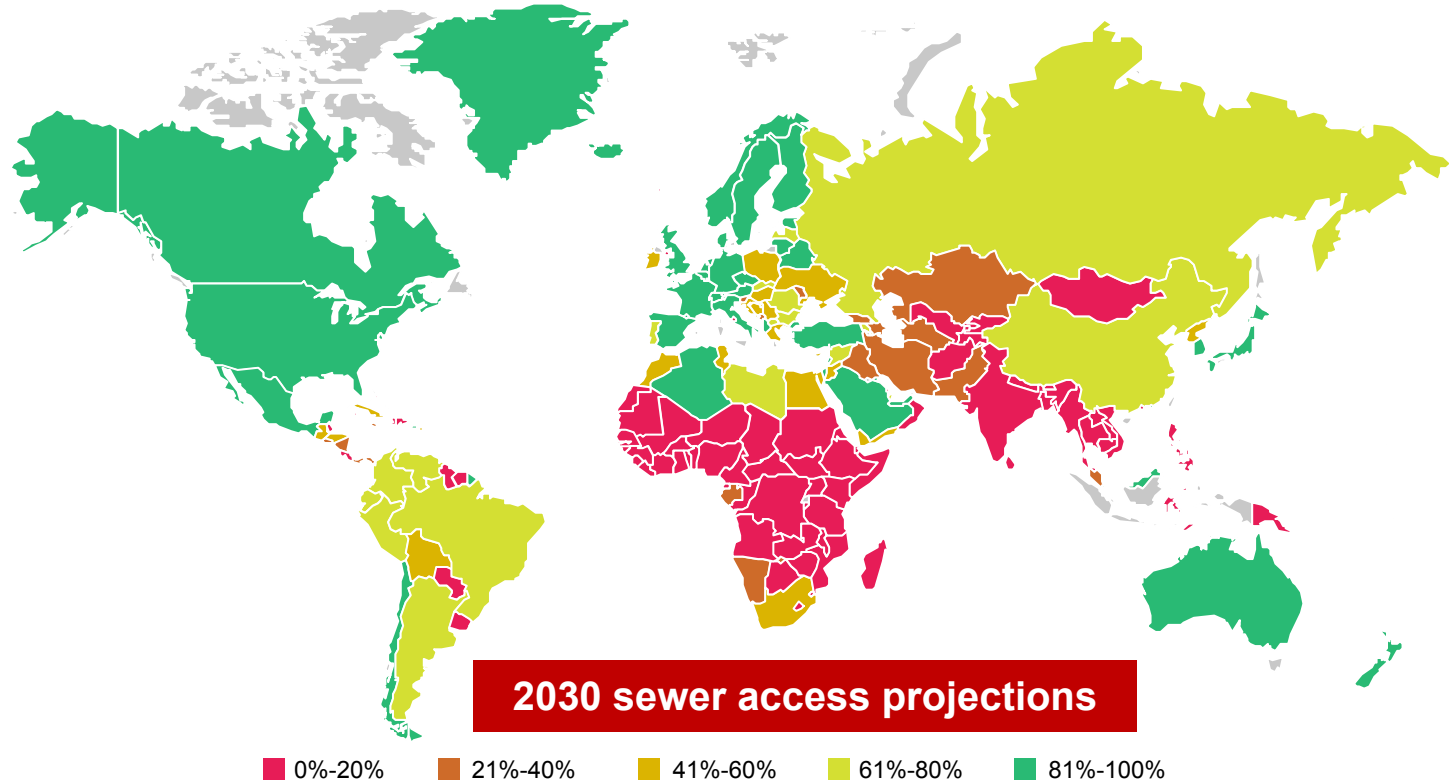
AVERAGE WATER AVAILABILITY PER PERSON

● <500m³ ● 500-1,000m³ ● 1000-1,700m³ ● >1,700m³

Source: "Water Scarcity Clock" (June 2022), World Data Lab



MANY PARTS OF THE WORLD WILL CONTINUE TO LACK ACCESS TO SEWERS



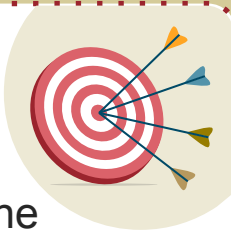
Note: countries in gray do not have data reported
Source: JMP 2017 Report; BCG analysis



BILL & MELINDA GATES FOUNDATION WSH TEAM STRATEGY

WSH VISION

Through diverse and equitable partnerships, fundamentally transform the sanitation sector to reach universal use of sustainable sanitation, contributing to better health, economic, and gender equality outcomes for the world's underserved



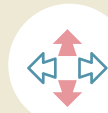
INITIATIVES



**CITY WIDE INCLUSIVE
SANITATION**



**TRANSFORMATIVE
TECHNOLOGIES &
COMMERCIALIZATION**



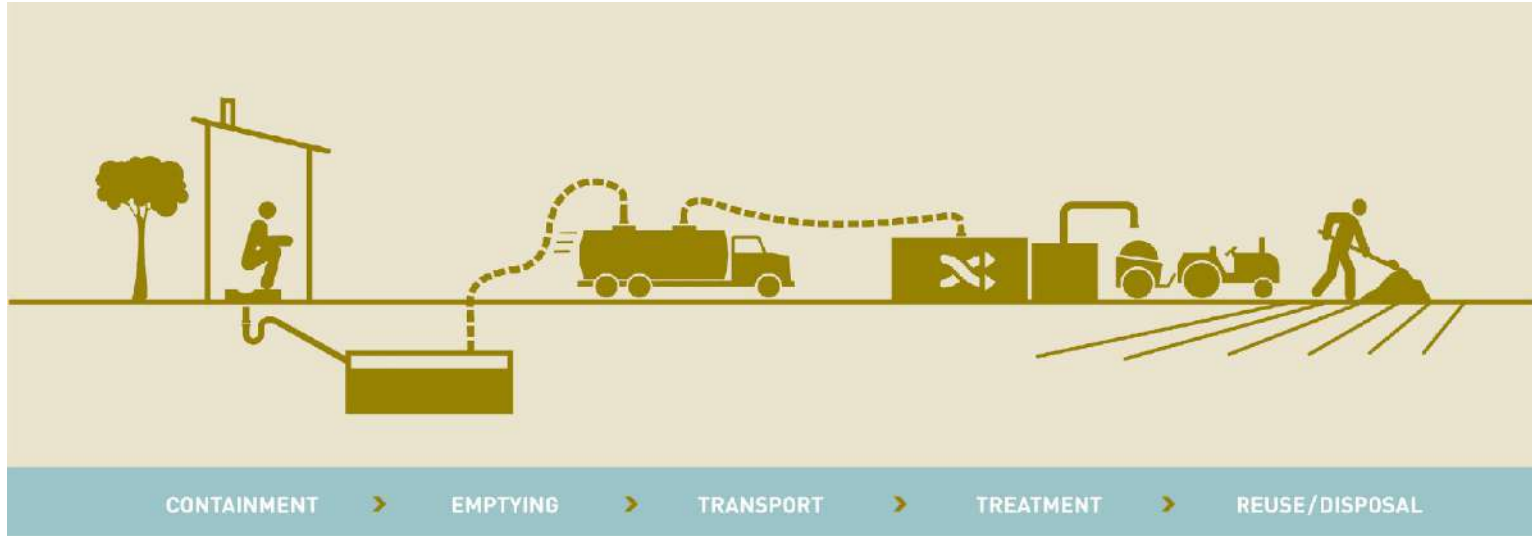
**GENDER & STRATEGIC
LEARNING**



**POLICY &
ADVOCACY**



WE FOCUS ACROSS THE SANITATION SERVICE CHAIN

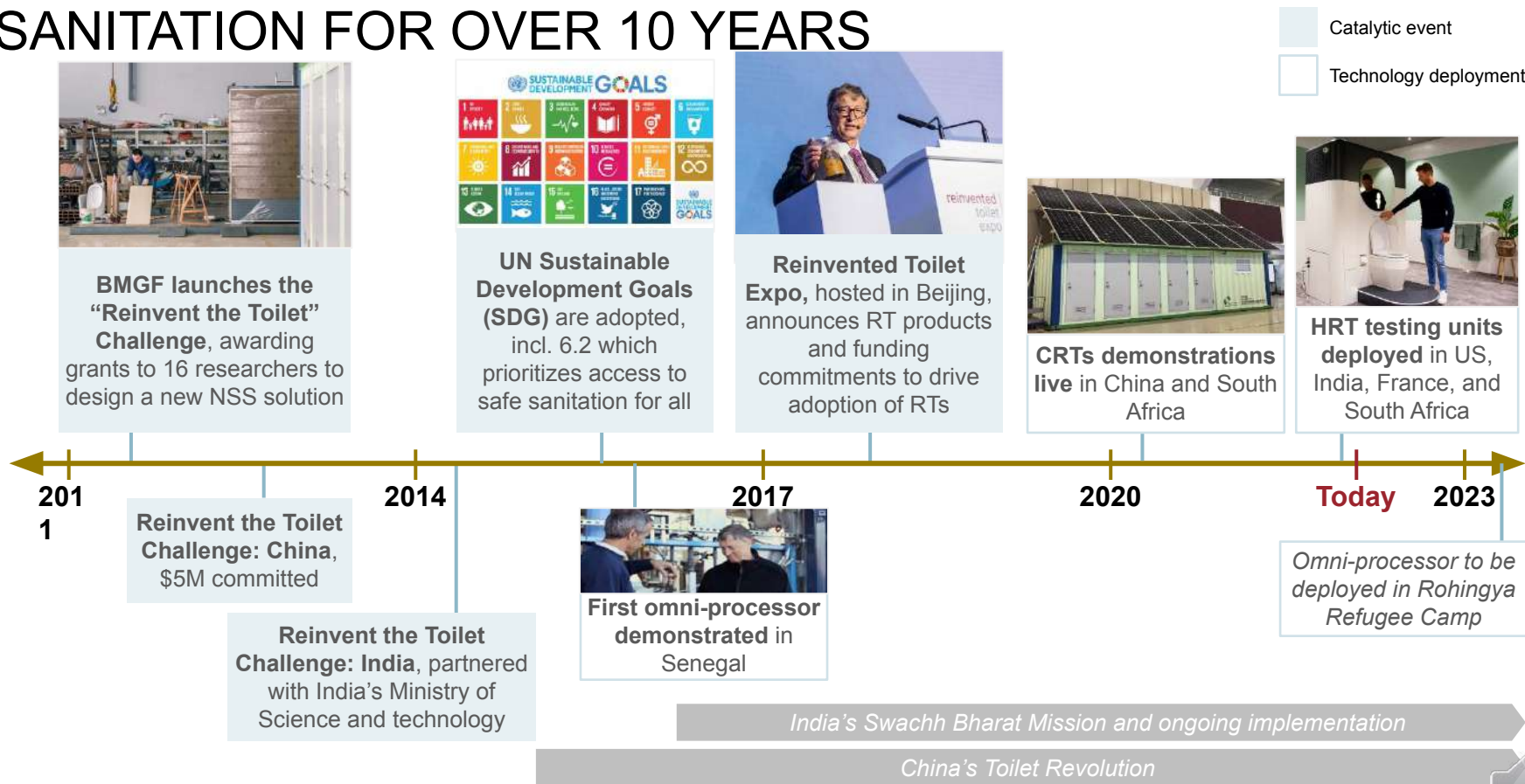


We focus on two fundamental sanitation challenges:

1. Expanding and improving sanitation without central sewers, because this is – and will be – by far the most common type of sanitation service used by the poor
2. Making sanitation services safe and sustainable by addressing the failure to effectively transport, treat, and reuse waste captured in on-site facilities



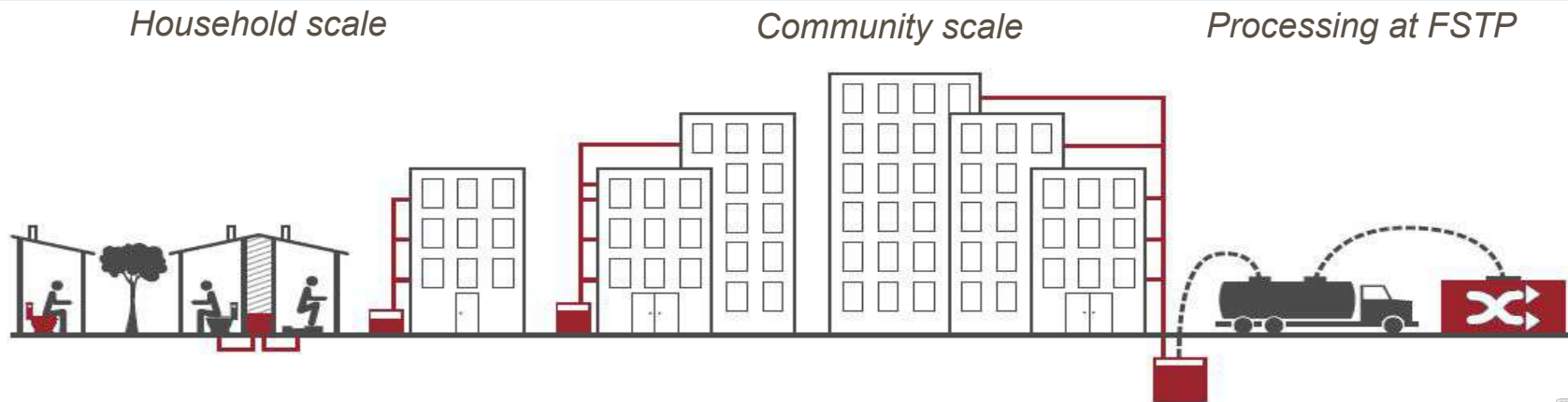
BMGF HAS PRIORITIZED THE TRANSFORMATION OF SANITATION FOR OVER 10 YEARS



OUR TRANSFORMATIVE TECHNOLOGY PORTFOLIO

REINVENTED TOILET

OMNI PROCESSOR



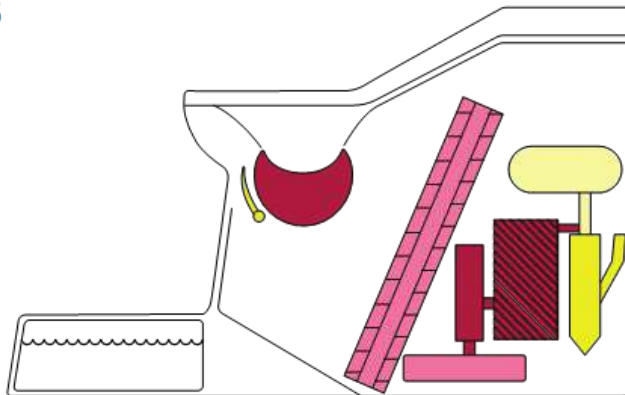
THE TRANSFORMATIVE TECHNOLOGY & COMMERCIALIZATION (TTC) INITIATIVE IS DESIGNED TO ADDRESS TODAY'S LIMITATIONS

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



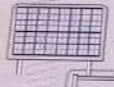
ELECTROCHEMICAL 电气化学技术

REQUIRES
需要

MAKES
成为



SOLAR PANELS
太阳能板



TOILETS
洗手间



LIQUID PROCESSING
液体处理

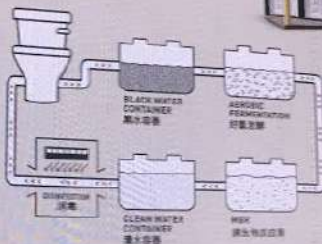
SOLID PROCESSING
固体处理

ANAEROBIC
TANK
厌氧罐



BIOLOGICAL 生物学技术

REQUIRES
需要



DRY COMBUSTION 干式燃烧

REQUIRES
需要



WET OXIDATION 湿法氧化

REQUIRES
需要





Cranfield Blackwater Household Reinvented Toilet S-500 (b-HRT)

Ultra-low Water Pre-wetting Frontend
Membrane Distillation Liquid Treatment
Pyrolyzer Solid Treatment

By Cranfield University

b - H R T

CRANFIELD S-500 (b-HRT)

This Reinvented Toilet is a combination of three modules:

Frontend: Users encounter a pedestal toilet with a rotating odor barrier and bowl cleaning mechanism. System includes a novel pre-wetting system that injects a small amount of water into the bowl to reduce smearing. The toilet includes a unique waste management system that efficiently separates the solid waste from the liquid waste.

Liquid Treatment: Water vapor is produced by heating the liquid waste using an electrical heater and/or combustor waste heat. A hydrophobic membrane presents a barrier for the liquid waste but allows for water vapor to directly pass through the membrane pores. The processed water can be reused as toilet flush water or safely discharged to the environment.

Solids Treatment: Solid waste from the frontend enters an electrically heated dryer to reduce the water content of the wet waste. The dried waste then enters the pyrolyzer, where the fecal solids are thermally decomposed in an oxygen-free environment to create a pathogen-free biochar.

KEY FEATURES & ADVANTAGES

- Designed to treat the waste created by a 5-person household
- Visually attractive, robust pedestal toilet that blocks the user's view of the waste
- Operation requires no behavioral change for users (flush and forget)
- Membrane distillation produces a liquid effluent that complies with ISO 30500
- Sterilized biochar, a fertilizer, is the only solid waste product created
- Waste treatment process has a minimal footprint due to the compact form factor of the pyrolyzer

USE CASES & POTENTIAL

CAPACITY: Designed to treat liquid and solid waste of a 5-person household

RANGE OF USERS: All components can treat liquid and solid waste for a household of 10 or more people

APPLICATION: Designed for single-family households that do not have access to safely managed sanitation. It is a suitable sanitation solution for locations where offsite fecal sludge processing is not possible or is too expensive.



BMGF Project – Vadodara – Fecal Sludge + MSW to Energy + Water



Input

- Fecal Sludge of 200 KLD
- Dry Solid in the Boiler – 10 TPD
- MSW – 30 TPD

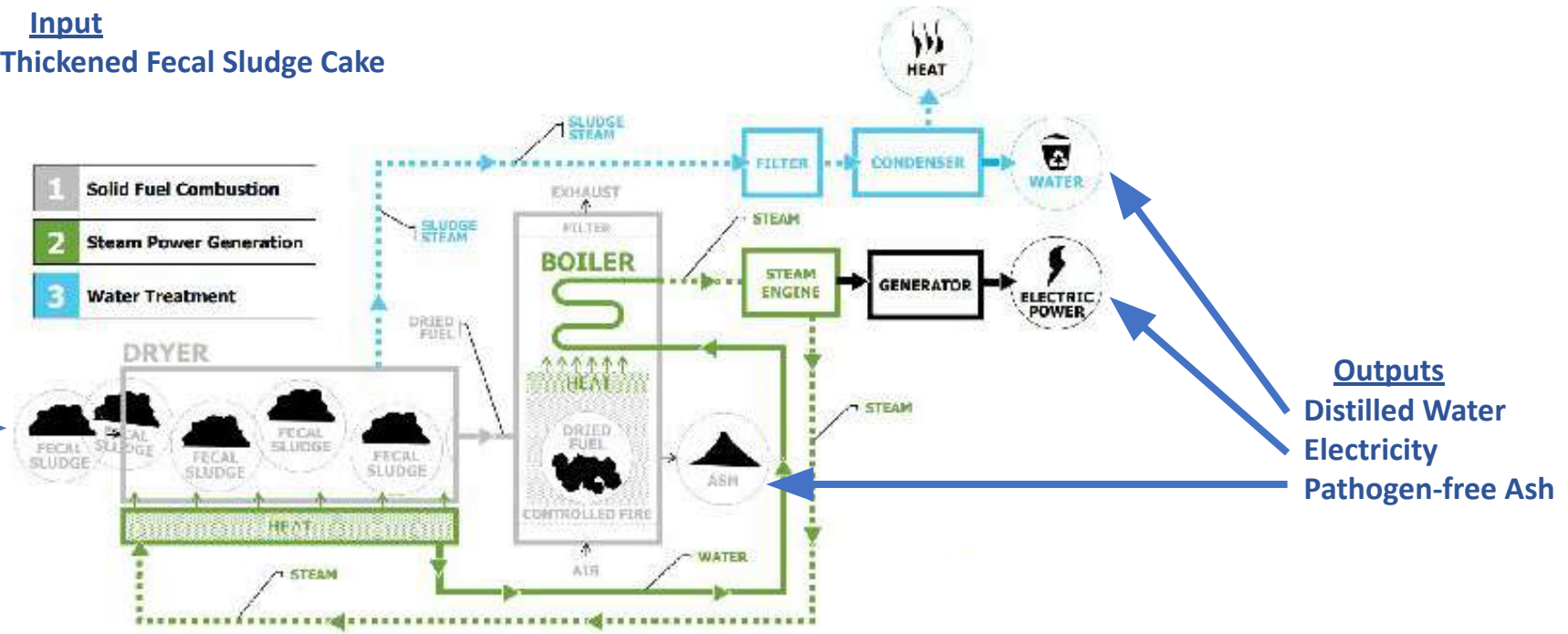
Output

- Industrial Grade Water – 180 KLD
- Distilled Grade Water – 20 KLD
- Power – 170-kW/hr



Input

Thickened Fecal Sludge Cake



Combustion Omni Processor (C-OP)



BMGF-SUPPORTED REINVENTED TOILET ACCELERATOR PROGRAMS TO ACCELERATE MARKET DEVELOPMENT



R&D to overcome technical challenges and de-risk product and component innovation



Marketplace Readiness

- Government engagement to enhance demand for sanitation, focus on pathogen removal and water reuse
- Support implementation of international product standards (ISO 30500)
- Engage DFIs to facilitate access to financing



Early Adoption

- Identify early adopter opportunities & early market entry requirements
- Develop RT value proposition and economic positioning



Awareness & Perception

- Build awareness and change perception of the decentralized sanitation



Technical & GTM Assistance

- Develop product requirements for identified customer segments
- Assist in pilot and demonstration projects
- Guide GTM strategy and tactics



THE NEED FOR CWIS

PAST

TRADITIONAL APPROACHES

- Master planning/ investment only for **centralized systems**
- Financed by **central gov't/loans**
- **Wealthy/business districts** prioritized
- **Limited coverage**
- **Sustainability challenges** for O&M
- **Resource recovery not considered**
- No **performance management**
- **On-site, small network not considered**



PRESENT

NSS / FSM APPROACHES

- **Often standalone pilots**, not mainstream
- **NGO / pilot financed**
- FSM value chain/fecal sludge treatment plants
- Poor communities targeted but often missed
- **Informal businesses, NGOs independent from service authorities**
- Business models often **unable to scale**
- Limited **professional capacity**



THE FUTURE



CITY-WIDE INCLUSIVE SANITATION

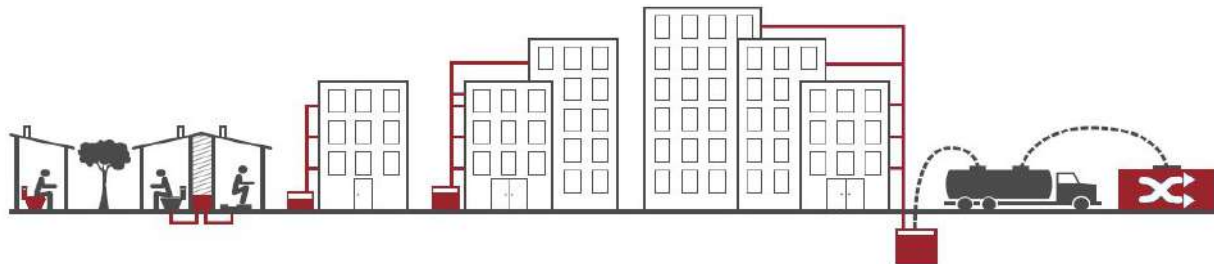


CWIS focuses on promoting approaches to ensuring everyone in an urban area is served by **safe, equitable, and financially viable sanitation service systems**. This means systems are designed to **reach the poor and to ensure human waste is safely managed** along the whole sanitation service chain.



THE FUTURE: CITY WIDE INCLUSIVE SANITATION

We aim to achieve the following outcomes for sustainable changes in sanitation management:



EVERYONE BENEFITS

from safe services and public investment equitably, with a focus on reaching the poorest



GENDER & SOCIAL EQUITY

are designed into planning, management, monitoring



Human waste is **SAFELY MANAGED ALONG THE SANITATION CHAIN**, starting with containment



Authorities operate with a **CLEAR, INCLUSIVE MANDATE, PERFORMANCE TARGETS**, resources, and accountability



Authorities deploy **RANGE OF HARDWARE, FUNDING & BUSINESS MODELS** to meet goals



Comprehensive long-term planning **FOSTERS INNOVATION, PRO-POOR FINANCING**; informed by analysis of needs, resources



POLITICAL WILL & accountability incentivizes improvements in capacity, leadership, outcomes



GATES FOUNDATION CWIS FRAMEWORK:

Promoting a Public Service Approach

[List of indicators](#) [Measurement approaches](#)

[Learning documents](#) [sanitation dashboard](#)



**CORE CWIS
OUTCOMES**



EQUITY

Services reflect fairness in distribution and prioritization of service quality, prices, deployment of public finance/ subsidies



SAFETY

Services safeguard customers, workers and communities from safety and health risks by reaching *everyone* with safe sanitation



SUSTAINABILITY

Services are reliably and continually delivered based on effective management of human, financial and natural resources



**CORE CWIS
FUNCTIONS**

RESPONSIBILITY

Authority(s) execute a clear public mandate to ensure safe, equitable and sustainable, sanitation services for all

ACCOUNTABILITY

Authority's(ies') performance against mandate is monitored and managed with data, transparency, and incentives

RESOURCE PLANNING & MANAGEMENT

Resources—human, financial, natural, assets—are effectively managed to support execution of mandate across time/space





MARKET UPTAKE OF
TRANSFORMATIVE
TECHNOLOGIES

CITYWIDE INCLUSIVE



AT SCALE

SANITATION (CWIS)



POLICY &
ADVOCACY



FINANCING:
MULTI-, BI-LAT,
DOMESTIC

PLATFORMS FOR REPLICATION; INSTITUTIONAL & REGULATORY ENVIRONMENT

REPLICATE & SCALE CWIS IN SUB-SAHARAN AFRICA & ASIA

Implementation of CWIS programs and policies in focus countries and moderate engagement countries, and scaling through regional platforms



City examples &
guidance

Country
implementation

DEMONSTRATE, ENABLE &
STRENGTHEN
CWIS APPROACHES

Proof points, **examples**, tools &
normative guidance developed



DEVELOP MARKETS FOR
INNOVATIVE SANITATION TECH

Create **markets** for transformative
sanitation technologies



Institutional change in key
partners

INFLUENCE DEV & FINANCING
PARTNERS

Institutional change in critical
financing and dev partners for scale



INCLUSIVITY



DATA MEASUREMENT



GENDER

WHAT WE'RE LEARNING SO FAR: **CWIS CITIES**



FUNCTIONS

- **Urban Sanitation Mandates** are sewer-limited, unclear, or decoupled from performance expectations & finance
- **Municipalities are rarely financed or incentivized** to improve service levels, coverage; may not have sufficient autonomy to hire, generate revenue to organize inclusive public sector service
- **Municipal governance reform** may determine limits & opportunities for sanitation system-strengthening
- **Performance Accountability** systems, generally, do not exist for municipalities, are not applied to NSS for utilities, and not backed by measurement systems when applied
- **Civic engagement needs to be built into institutions** to support behavior change, comm engagement, and reinforce transparency
- **Financing** decisions and outcomes still political, opaque, unaligned, inequitable; decision process transparency & clarity requires clear mandates and performance data
- **State/National Systems** that clarify mandates, establish accountability systems, and tie finance to policy priorities, are required if city-level project gains are to be sustained or replicated



OUTCOMES

- **On-site upgrading does not scale or reach the poor** with behavior change and marketing alone. Subsidies are required for safe, inclusive containment & connections
- **Services do not reach LICs** without meaningful and enforced incentives; different private sector engagement approaches are required to reach LICs
- **Formalizing emptying services does not guarantee safe emptying jobs.** Inappropriate/missing PPE gear, manual emptying, manual trash, broken/poorly designed mechanized equipment prevail if workers' labor rights are not actively protected
- **Integrated NSS/SS planning**, service coordination, finances can improve efficiency and accountability
- **Measurement & monitoring approaches** are unharmonized, but often expensive project-based monitoring fills data gaps in lieu of investing in monitoring systems for improved governance
- **Private sector finance** is available if gov't actively structures demand and addresses payment risk; this is required at all stages of 'value chain'



INNOVATIONS

- **City/Utility IMIS** can improve city services; requires training, software integration, time. Success greater if integrated into national accountability/planning requirements (NWASCO/Lusaka, DPHE/Jhenaïdah)
- **Decanting stations** for fecal sludge/septage reduce travel, costs, infrastructure redundancies; ease private sector engagement, safety (Trichy/Lusaka)
- **City-scale revenue** using "payment commitment" devices like levies, property taxes, bundled tariffs are necessary for inclusive services, but insufficient for on-site upgrades or services; strengthens municipal incentives but difficult to tie to performance (Wai, Lusaka, Khulna)
- **Hardware is costly** for dense, unplanned, highwater areas, SS or NSS; no escaping long term gov't investment (Kampala, Warangal, Khulna, Dakar)
- **Revenue from reuse** possible but no breakeven opex outside orchestrated projects (all cities)
- **Gender training** req'd across city/utility departments; gender mainstreaming in all service engagements (Khulna, Warangal, Trichy)



WHAT WE ARE LEARNING SO FAR WITH DFI INVESTMENT



DFI INVESTMENTS

- Upstream work supported through TF (awareness raising and capacity building, client demand creation, knowledge focus) is crucial but not sufficient; country gov't enabling environment is key
- Operational engagement is essential for success at country level – but Gates team spread thin!
- Our optimism can get the better of us; important to openly discuss and agree on realistic timelines, especially for systems change goals
- The desire to shift ways of working is real; Figuring out how to accomplish this is harder than we thought
- We can't change everything! FOCUS on the items we care about most: e.g. '% poor reached with safely managed'
- We must work from within to change the sector: Build trust and internal allies; show practical 'islands of success' and examples of what works
- Change management is all about PEOPLE! Continue to focus on internal training/exposure, identifying & nurturing champions.
- There is appetite for more Cross-bank Collaboration: Q2 cross-bank learning retreat; quarterly teleconferences; Gates-convened moments to share and push one another



WHAT WE ARE LEARNING SO FAR FROM COUNTRY WORK

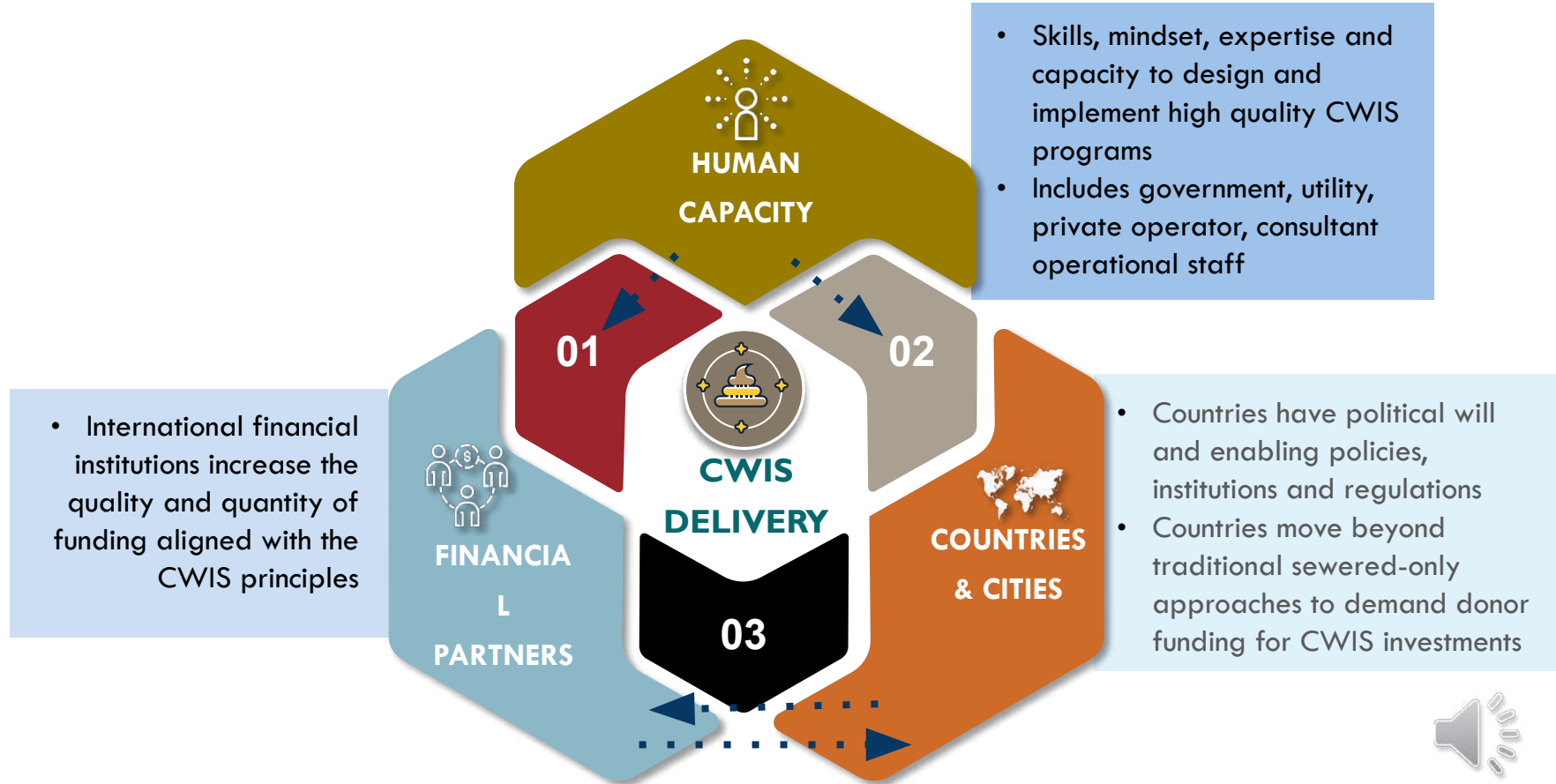


COUNTRY WORK

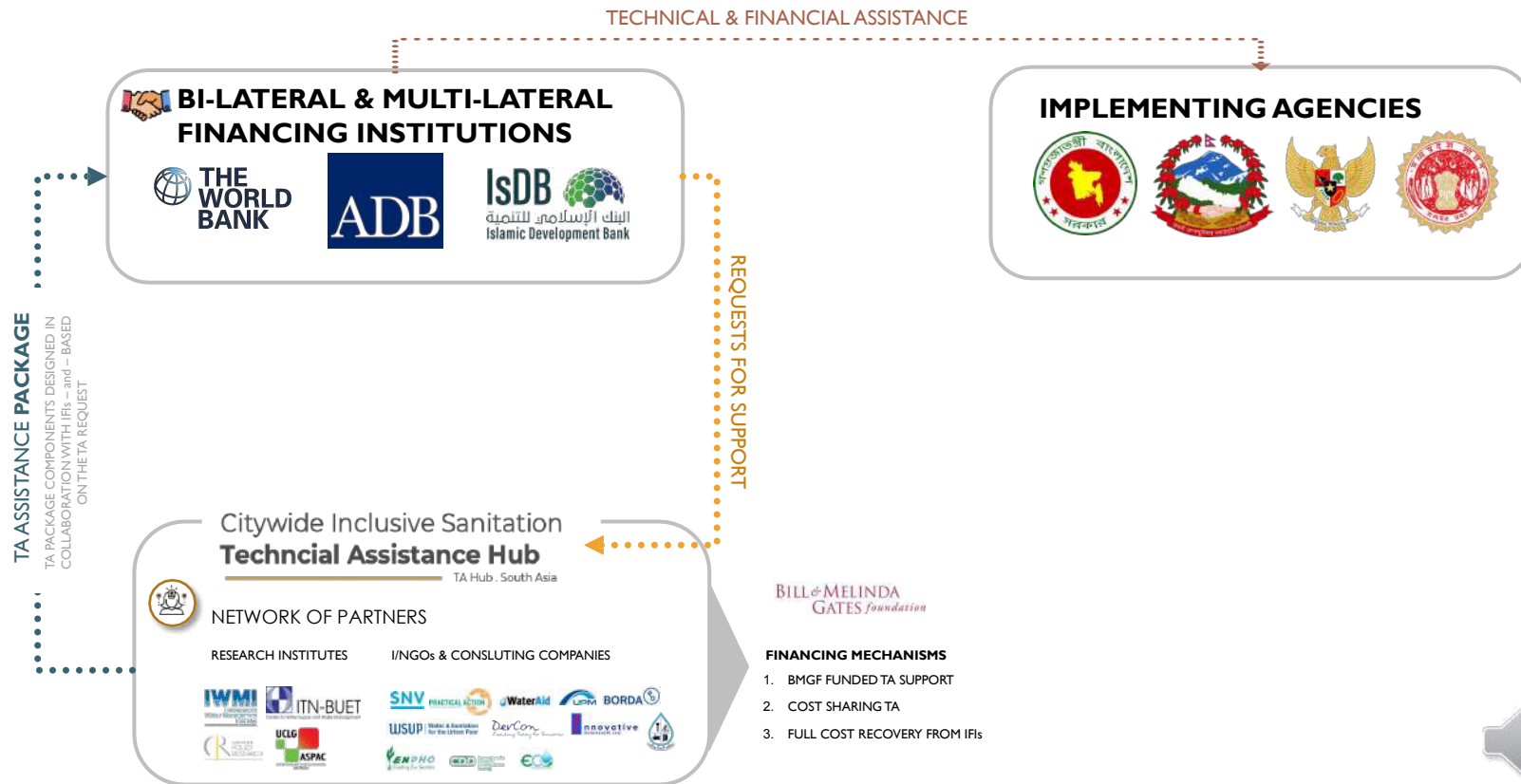
- Policy change does not drive change alone
- Financing and infrastructure also required to focus on service delivery
- Few countries have the institutional framework to incentivize provision of inclusive sustainable services
- Capacity gaps at country level are real and pervasive; progress will be difficult without addressing this – and capacity building takes time
- Investments in national-level soft infrastructure is needed for projects results to sustain and scale: eg e-governance, integrated MIS systems and capacity building of implementers
- Utility change management takes time – human resource capacity & internal structure and financing are huge endeavors that can involve ‘pain’



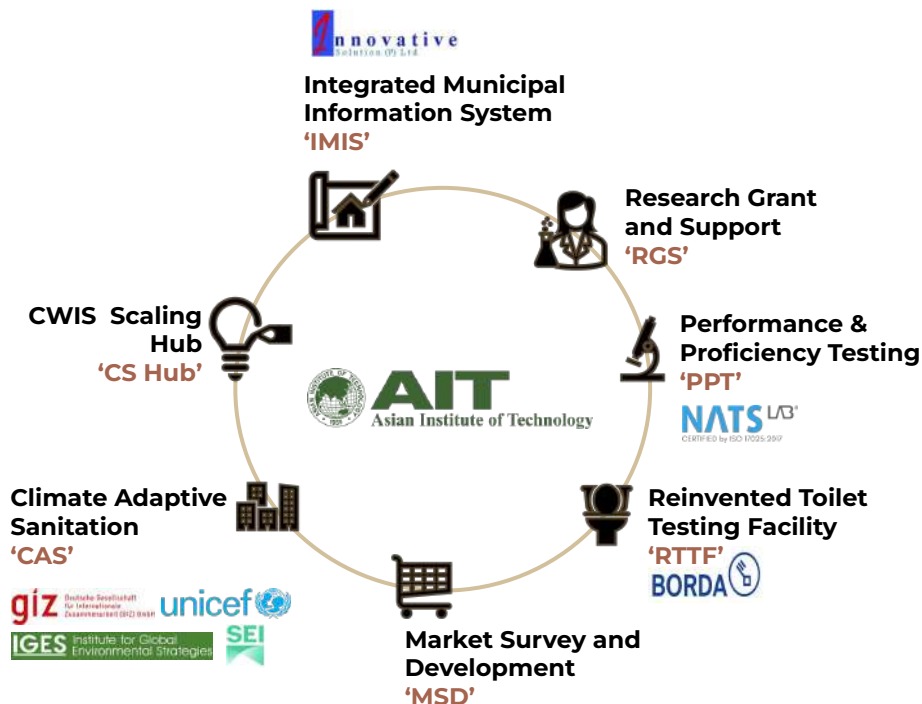
WHAT WILL IT TAKE TO SCALE CWIS?



TECHNICAL ASSISTANCE HUB FOR SCALING



Global Water and Sanitation Center at AIT



TARGETED GEOGRAPHY



Bangladesh

Nepal

Thailand

Indonesia

STRATEGIC PARTNERS

BI-LATERAL & MULTI-LATERAL FINANCING INSTITUTIONS



AIIB ASIAN INFRASTRUCTURE INVESTMENT BANK



IsDB

NETWORK OF EXPERTS



RESOURCES AT AIT

- CC ASIA
- CWCA
- AI CENTER
- GIC
- AIT EC
- AIT SOLUTIONS
- AIT EXTENSION
- CSIM
- EEM
- RS & GIS
- UIS
- WEM



Ambition 2019-2030:

10,000⁺

sanitation professionals educated by

100⁺ academic institutions.

GLOBAL
SANITATION
GRADUATE
SCHOOL

BILL & MELINDA
GATES foundation

FSMA



unicef



UNITY KNOWLEDGE LLP

UTEC

TU Delft

eawag

aquatic research

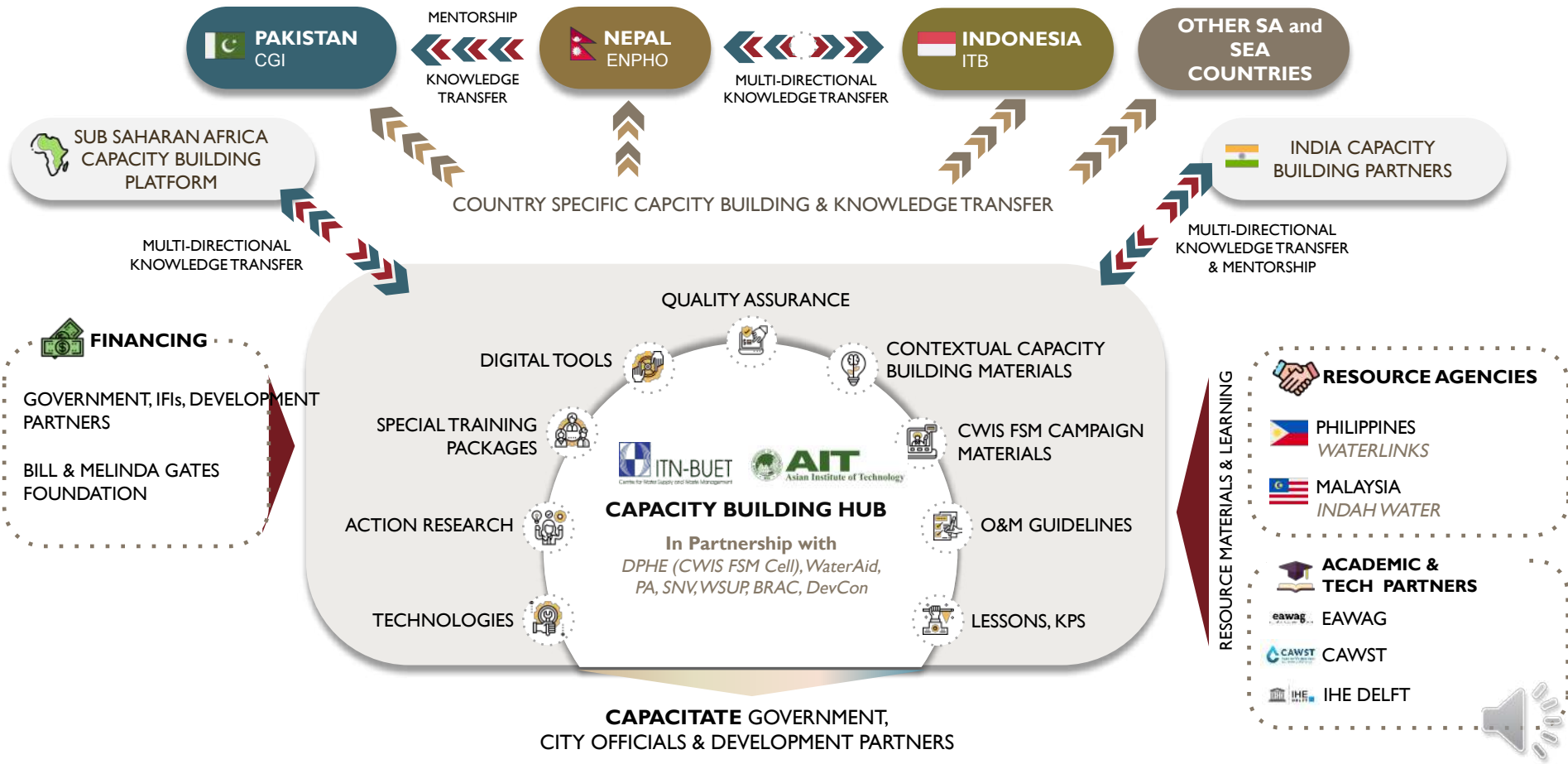
香港科技大學
THE HONG KONG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY



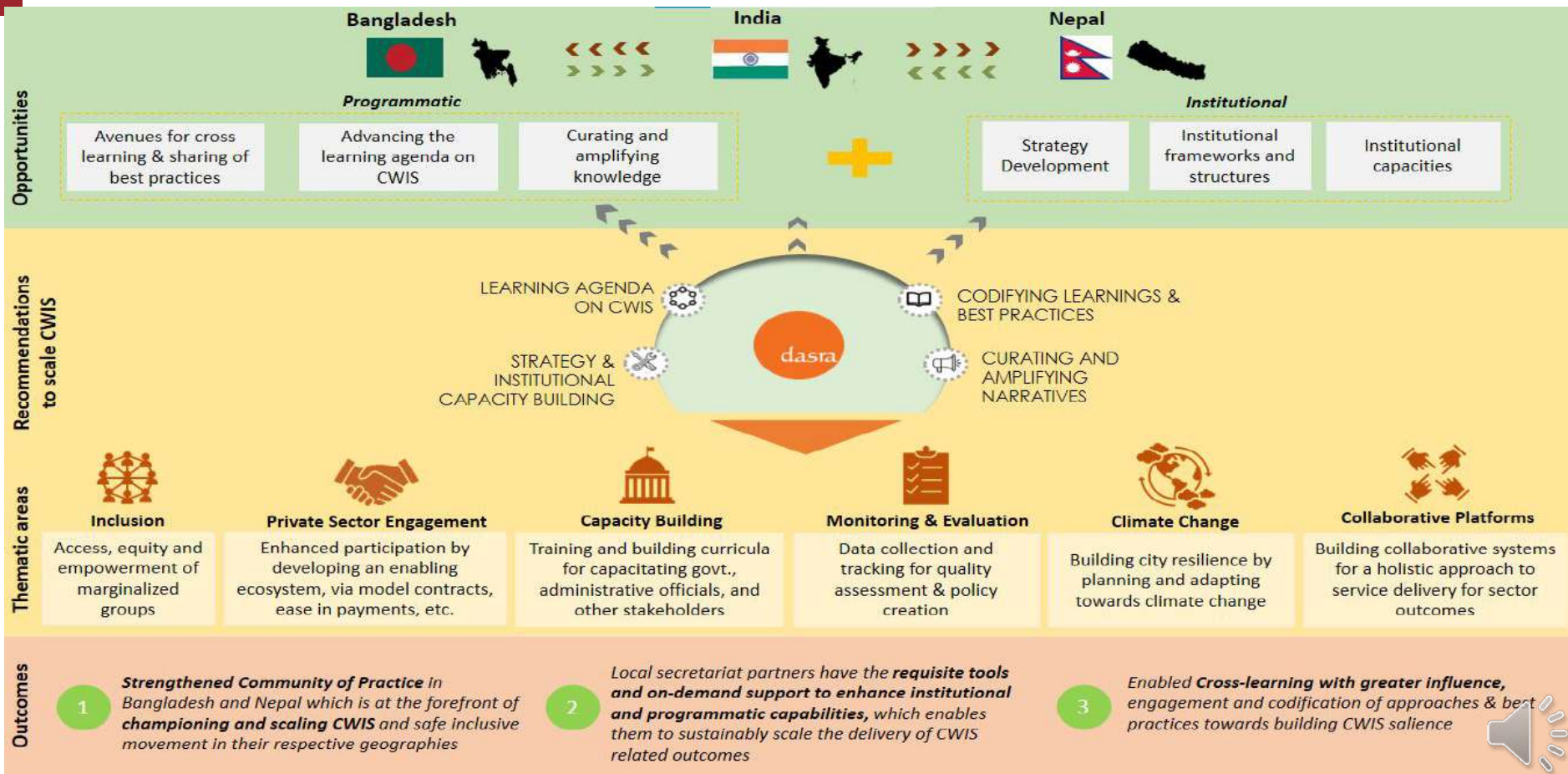
CEPT
UNIVERSITY



SCALING CWIS: REGIONAL CAPACITY BUILDING HUB



COUNTRY TO COUNTRY COLLABORATION



INTEGRATED MUNICIPAL INFORMATION SYSTEM (IMIS) & CWIS

IMIS Landscape

- Municipal GIS-based database and CWIS baseline of the town
- Strategic sanitation planning and decision-making tools for authorities
- Service delivery management
- Municipality's 'regular business process mapping
- Real time monitoring and evaluation – tax payments, service delivery, KPIs
- Link to external databases – health, emergency response
- Plan infrastructure investment



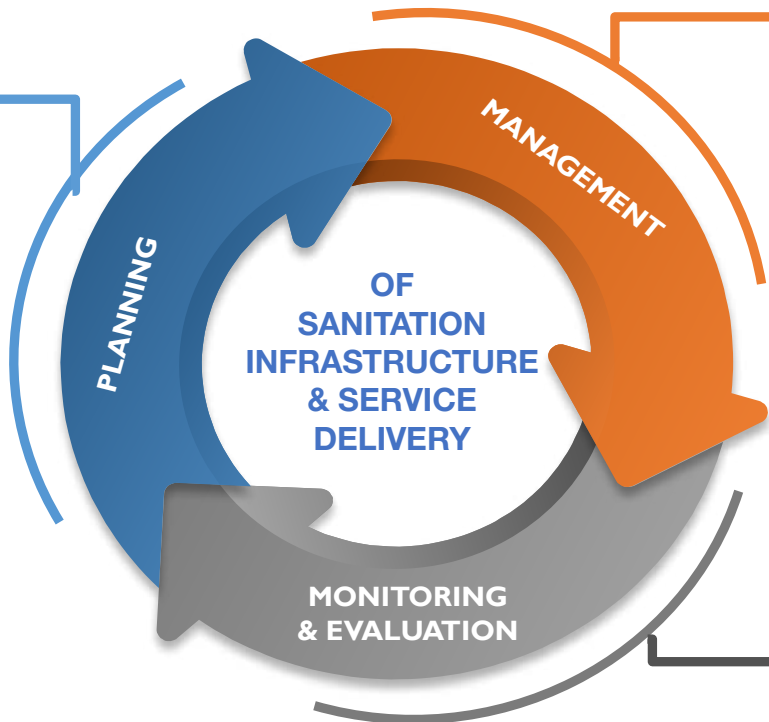
ACCURACY, RELIABILITY, RELEVANCE AND TIMELINESS OF DATA FACILITATED



WHAT WILL IMIS FACILITATE?

PLANNING

- a) **equitable** access to safe, adequate & efficient infrastructure
- b) **sustainable** infrastructure, assets and services
- c) **gender** intentional and socially **inclusive** services and infrastructure
- d) fair and strategic **pricing** of services
- e) the use of **public finances** for the expansion of infrastructure and services and
- f) sanitation **workers' rights**, protections and safety nets



MANAGEMENT

- a) **safe** management of sanitation infrastructure and services
- b) the fair distribution of **public finances** for the expansion of infrastructure and services;
- c) implementation of equitable costs and efficient cost recovery
- d) implementation of pro-poor, gender intentional and socially inclusive mandate;
- e) institutionalization of **key performance indicators** (KPIs)
- f) implement **accountability** measures as well as enforce **regulations** including incentives and penalties.

MLE

- a) the **quality** and **distribution** of services and infrastructure,
- b) service **authority performance** vis-à-vis the KPIs and targets;
- c) **financial sustainability** of service delivery and infrastructure,
- d) public health and environmental **outcomes** and
- e) pro-poor, **gender** intentional and socially **inclusive** targets.

ADB and WB Publications

1. Asian Development Bank CWIS Knowledge Hub:
<https://adb.eventsair.com/online-adb-sanitation-dialogue-2021/cwis-knowledge-hub>
2. World Bank CWIS resources: <https://www.worldbank.org/en/topic/sanitation/brief/citywide-inclusive-sanitation>

1. What Is Citywide Inclusive Sanitation and Why Is it Needed?

<https://www.adb.org/publications/citywide-inclusive-sanitation-needed>

2. Addressing Gender Equality and Social Inclusion in Urban Sanitation Projects

<https://www.adb.org/publications/gender-equality-social-inclusion-urban-sanitation-projects>

3. Inclusive Financial Mechanisms: Improving Access to Sanitation Services for Poor Households

<https://www.adb.org/publications/inclusive-financial-mechanisms-access-sanitation-poor>



CAPACITY BUILDING COURSES AND TOOLS

Education & Training

IHE Delft offers a wide range of flexible, high quality, specialized educational programmes to respond to the needs of diverse clients from the water sector.

- MSc programmes
- Short courses
- Online courses
- Tailor-made training



ConCaD

consulting capacity development
for urban sanitation services



Capacity training in the BOP in India, Bangalore. Participants mapping different size operational sanitation systems for urban town centre context, using the ConCaD service chart.

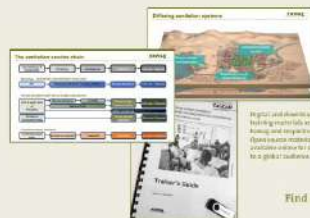
The ConCaD capacity development initiative is a global programme to improve consulting capacity for improved urban sanitation services.



ConCaD training in Kampala, Uganda. Participants preparing a sanitation investment bid to upgrade a local wastewater system.

Target audiences are consulting firm staff and freelance consultants working or bidding for 'at scale sanitation investment projects' anywhere in the world and especially in the ConCaD target or nearby countries (India, Nepal, Bangladesh, Uganda, Ivory Coast and Zambia).

Course delivery is through face-to-face short courses at selected partner training institutes (PTIs). Additionally, a three-week on-line course will be delivered on the Coursera learning platform and made available on YouTube for a global audience.



Find out more: www.sandec.ch/concad



This initiative is funded by the DfW & Mercedes Gates Foundation.

Multi-Country Twinning Program FSM Knowledge Exchange

Facilitating sustainable FSM programs through collaborative, knowledge-sharing, and action-oriented partnerships.



Our Mission

Advance the knowledge and expertise of FSM professionals and their organizations through exposure visits to successful FSM programs and lessons learned in other countries. Develop a platform and initiate actions to encourage knowledge-sharing within and among countries. Create opportunities for FSM professionals to network and foster development of long-term twinning relationships between organizations and utilities.

Learn more about CWIS:
www.worldbank.org/cwis



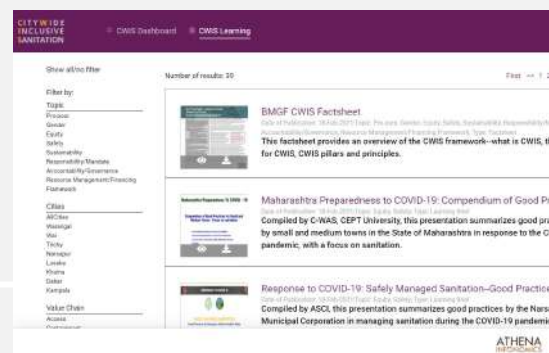
CAPACITY BUILDING PARTNERS AND KNOWLEDGE PRODUCTS



CWIS SERVICES ASSESSMENT & PLANNING TOOL



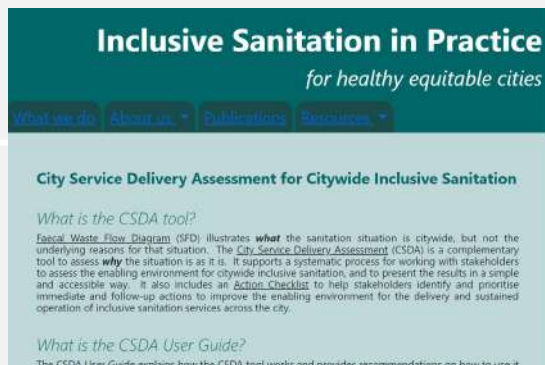
AFRICAN WATER ASSOCIATION



ATHENA CWIS DASHBOARD



ESAWAS



CITY SERVICE DELIVERY ASSESSMENT





[Home](#) [KNOWLEDGE RESOURCES](#) [Case studies](#)

Case studies



Scaling up of FSM in Odisha



Odisha FSM



FSM Bhudaneswar, Odisha



FSM Puri, Odisha



India for the World

How does India manage its faecal waste?

We trace the journey of a few states in India, which have shown tremendous improvement in treating waste from on-site sanitation systems by putting in place the right policies, regulations and infrastructure.

[VIEW THE STORY](#)

TNUSP

Empowering stakeholders and communities to drive transformational change

[Read More](#)

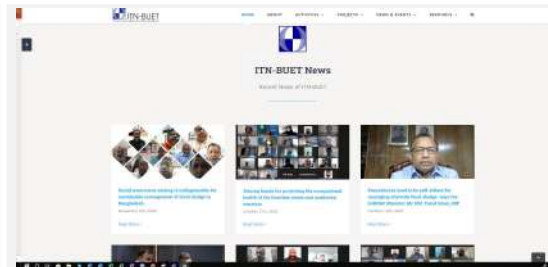
CAPACITY BUILDING PARTNERS AND KNOWLEDGE PRODUCTS



CENTER FOR WATER & SANITATION



FSM ALLIANCE



ITN BUET



CENTER FOR SCIENCE & ENVIRONMENT



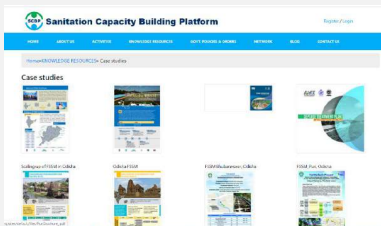
CDD SOCIETY - INDIA



CENTER FOR POLICY RESEARCH



SUSTAINABLE SANITATION ALLIANCE



NIUA



ASIAN DEVELOPMENT BANK INSTITUTE



SNV



ENPHO

CAPACITY BUILDING PARTNERS AND KNOWLEDGE PRODUCTS



NEW PUBLICATIONS Citywide Inclusive Sanitation as a Public Service

Please download our new reports which review the CWIS functions
- Responsibility, Accountability and Resource Planning & Management

RESPONSIBILITIES



Full Report

Brief Report

ACCOUNTABILITY



Full Report

Brief Report

RESOURCING



Full Report

Brief Report

Framework for Addressing Occupational Safety of De-sludging Operators: A Study in Two Indian Cities

Mamta Gautam, Kavita Wankhade, Gayathri Sarangan, Srinitha Suchakar



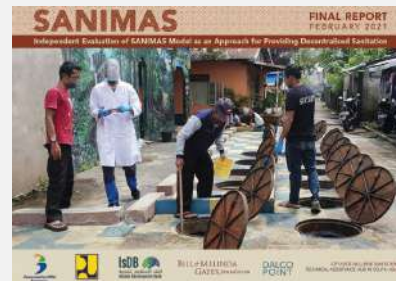
Heart-felt thanks to the entire field team,
and all sanitation workers who participated in this study



Integrated decentralized water and sanitation for unserved areas in small Indian towns



Public Health and Engineering (PHE) Department
Union Territory of Ladakh



1. CWIS cities program – BMGF: <https://www.cwiscities.com/> - there are numerous city-level resources and cases here - <https://www.cwiscities.com/home/learndocuments>
2. CWIS measurement approach: <https://s3.amazonaws.com/resources.cwis.com/learning/201/CWISMeasurementNote2021Julyv3.pdf>
3. CWIS indicators – full list: https://s3.amazonaws.com/resources.cwis.com/assets/documents/Full+List+of+CWIS+Indicators_July2021_v2.pdf
4. Asian Development Bank CWIS Knowledge Hub: <https://adb.eventsair.com/online-adb-sanitation-dialogue-2021/cwis-knowledge-hub>
5. World Bank CWIS resources: <https://www.worldbank.org/en/topic/sanitation/brief/citywide-inclusive-sanitation>
6. City-level Resources: <https://www.cwiscities.com/home/learndocuments>
7. CWIS Measurement Approach: <https://s3.amazonaws.com/resources.cwis.com/learning/201/CWISMeasurementNote2021Julyv3.pdf>
8. CWIS Indicators: https://s3.amazonaws.com/resources.cwis.com/assets/documents/Full+List+of+CWIS+Indicators_July2021_v2.pdf
9. [ESAWAS Briefs & Guidelines](#)
 - *Who has Responsibility?*
 - *Ensuring Accountability*
 - *Resources Planning & Management*
 - *Guidelines for CWIS Planning*
 - AMCOW [African Sanitation Policy Guidelines](#)
10. EAWAG-Sandec [Sanitation 21: A Planning Framework for Improving City-wide Sanitation](#)

Tools

1. [Shit Flow Diagram](#) (SFD)
2. [FSM Toolbox](#) Tools
 - a. *Stakeholder Engagement Planning*
 - b. *City Service Delivery Assessment (CSDA)*
3. [SaniPath](#)
4. [CWIS Service Assessment & Planning \(CWIS-SAP\)](#)

THANK YOU!

Roshan.shrestha@gatesfoundation.org

