

# Sustainable wastewater management in developing countries

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3<sup>rd</sup> December 2018

Water Security  
and Climate Change  
Conference



RESEARCH  
PROGRAM ON  
Water, Land and  
Ecosystems



# The Challenge we face

- POOR SANITATION COST THE WORLD US\$222.9 BILLION IN 2015

LIXIL, WaterAid, Oxford Economics, 2016

Photo credit: Sharada Prasad



# The targets we set

- Current levels of financing (annually 0.1% of GDP) can cover the capital costs of achieving universal basic WASH services by 2030.
- To achieve the full WASH SDGs 6.1 and 6.2 about three times the current investment levels are required.
- **However, sustained universal coverage requires more than capital inflows:**
  - **Financial and institutional strengthening will be needed for effective service delivery.**

Guy Hutton and Mili Varughese, 2016

Photo credit: Water Aid report



# The multiplier effect of sustainable service delivery on different SDGs



## Multiplier Effect

**GOAL 6**



ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

SUSTAINABLE DEVELOPMENT GOALS  
More at [sustainabledevelopment.un.org/sdgsproposal](https://sustainabledevelopment.un.org/sdgsproposal)

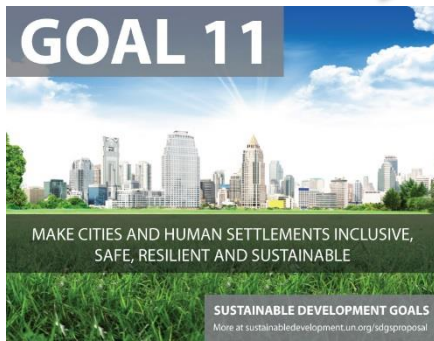
**GOAL 15**



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

SUSTAINABLE DEVELOPMENT GOALS  
More at [sustainabledevelopment.un.org/sdgsproposal](https://sustainabledevelopment.un.org/sdgsproposal)

**GOAL 11**



MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

SUSTAINABLE DEVELOPMENT GOALS  
More at [sustainabledevelopment.un.org/sdgsproposal](https://sustainabledevelopment.un.org/sdgsproposal)

**GOAL 12**



ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

SUSTAINABLE DEVELOPMENT GOALS

**GOAL 13**



TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS\*

Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

SUSTAINABLE DEVELOPMENT GOALS  
More at [sustainabledevelopment.un.org/sdgsproposal](https://sustainabledevelopment.un.org/sdgsproposal)



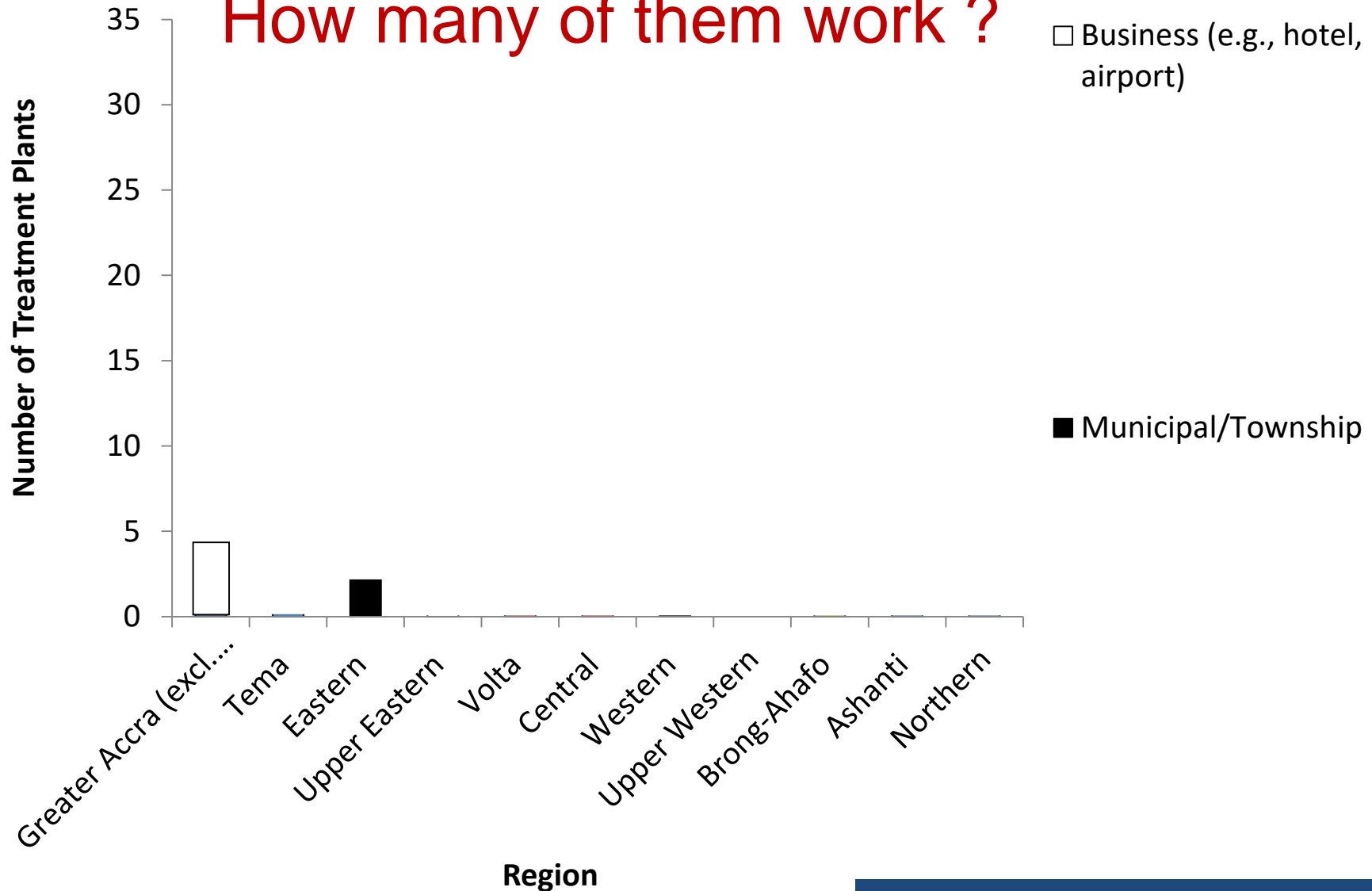


- **We are still struggling with getting treatment plants to work.**
- **Across the developing world, around 10% of wastewater gets treated.**
- **Approx. 80% of all water pollution has been associated with poor fecal sludge management.**
- **There are hardly any treatment plants for the more than 100 million septic tanks and pit latrines in India (example).**



# Operational Status

How many of them work ?

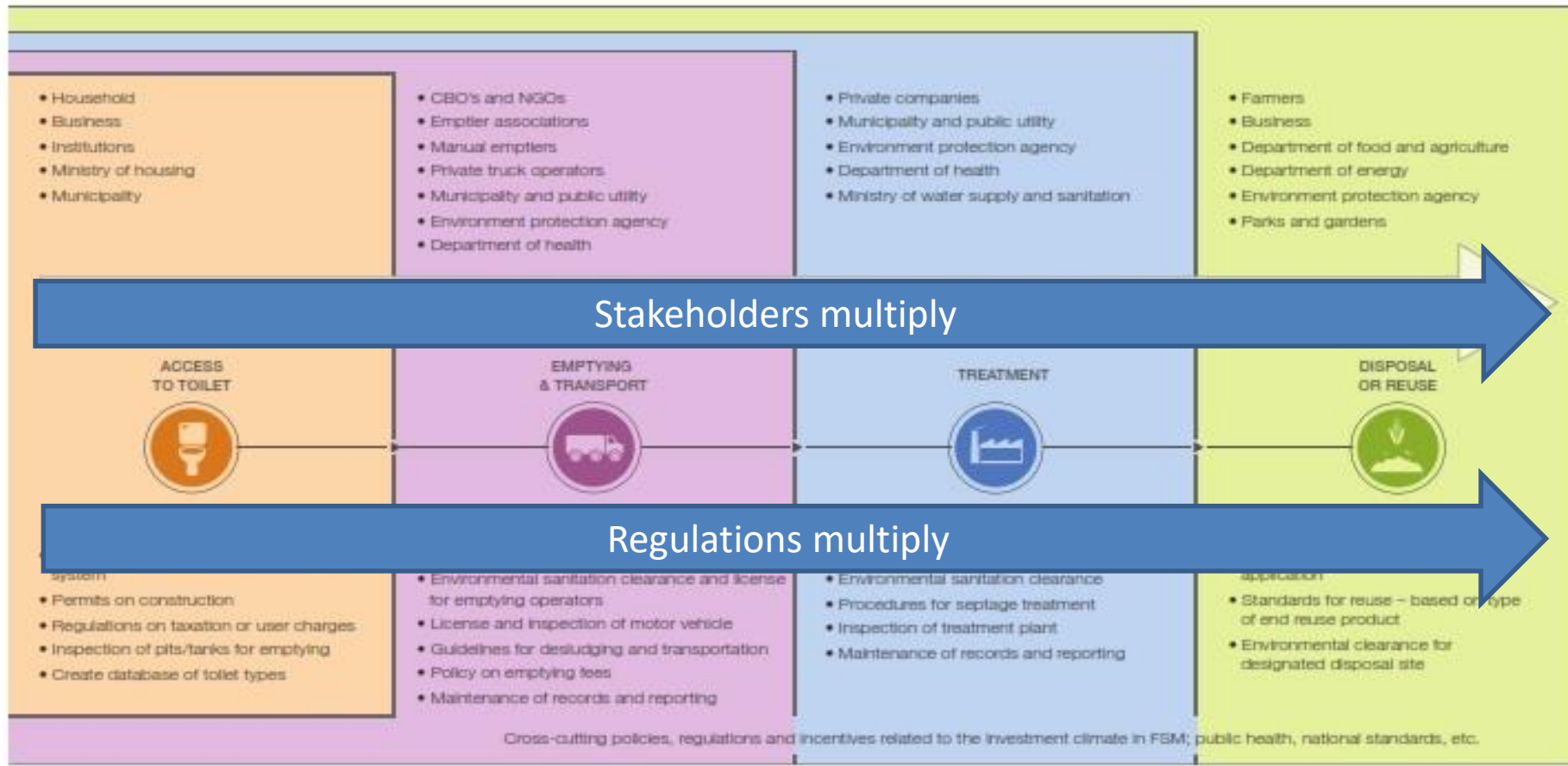






# Effective (e.g. FSM) Service Delivery requires:

- Strong **local capacities** across the whole sanitation service chain;
- Effective **regulations** and **supportive policies**;
- Institutional linkages across P&P sectors supported by **viable business models**;
- Safe disposal and/or **resource recovery and reuse**



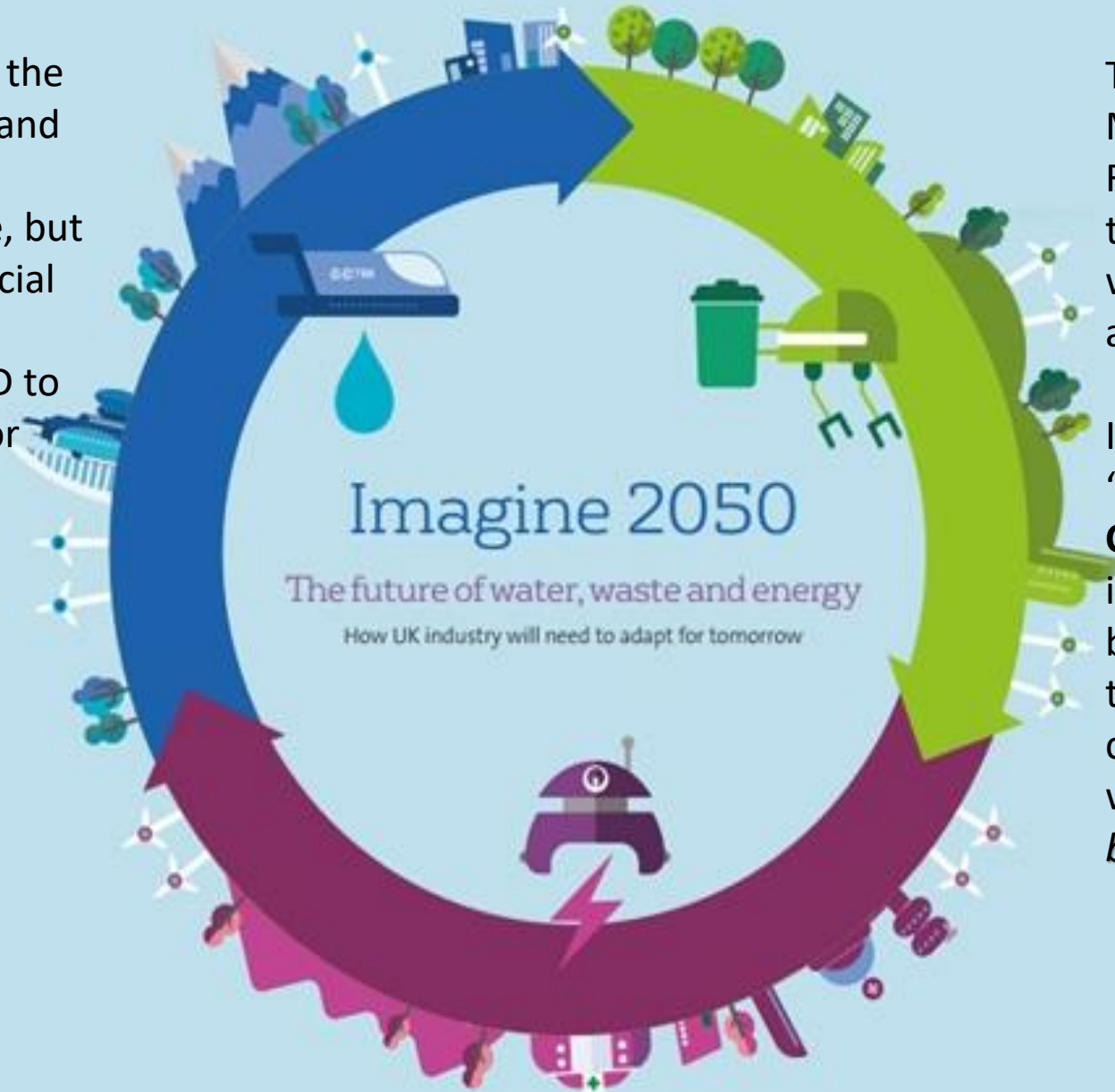


# Challenges for business development in sanitation service delivery

- Most initiatives in low-income countries characterized:
  - High dependence on **subsidies**;
  - **Limited up-scaling** potential.
- **Challenges:**
  - Limited access to financing;
  - Fundamental gaps in business capacity :
    - Business planning and management strategies
- More **“failed”** initiatives than **successes**.

# Circular Economy

Important for the environment and our natural resource base, but also the financial outlook with billions of USD to be unlocked or saved.



The Ellen MacArthur Foundation helped to give the concept wide exposure and appeal.

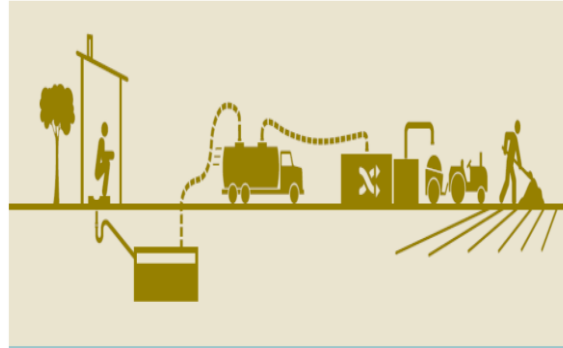
Its report **'Towards the Circular Economy'** identified the key building blocks for the transition to a circular economy, which include new *business models*.



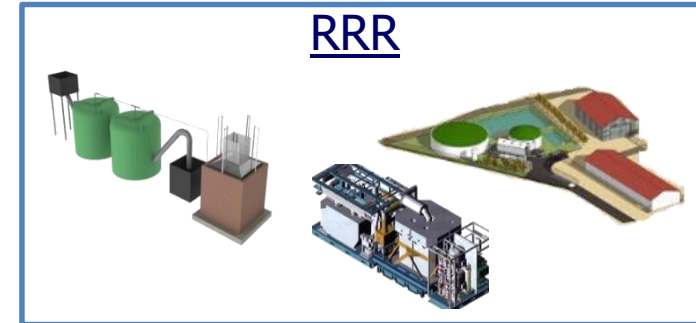
# Changing our perspective creates opportunity to do things differently



**Struvite**



**LaDePa Machine**



**CHP + Ash + Water**



**Algae/Biofuel**

# Cape Town's Day Zero

- There are many 'Cape Towns' and risks of a 'Day Zero' across the globe.
- The Cape Town story has helped to rethink 'water security', which we can no longer take for granted, even in developed country like South Africa.





# Cape Town's Day Zero II

- Cape Town visualized the emerging urban water challenge, also in view of climate change adaptation.
- Water saving models, desalinization, further groundwater exploitation, and wastewater reuse are commonly discussed options.
- With the agricultural sector usually having the highest water allocation, **rural-urban water swaps** or loops of freshwater for wastewater might offer **interesting business models**.
- Every transfer, trade or exchange requires a business model with **clear contractual gains** and **obligations**.





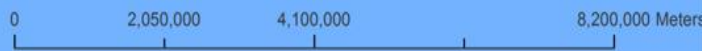
# RRR business model development



- 180 RRR projects
- 60+ case studies
- 23 RRR business models
- Feasibility studies in 15 cities and towns across 10 countries
- Supported the development of commercial PPP

analysis  
developed  
15 cities and  
commercial PPP

● Energy   
 ● Nutrient   
 ● Wastewater   
 ★ Feasibility studies



# FSM business case assessment and model development



## BUSINESS MODELS FOR TOILET ACCESS AND *IN-SITU* ENERGY RECOVERY

- Public toilet with energy recovery

## BUSINESS MODELS FOR TOILET ACCESS AND *IN-SITU* ENERGY RECOVERY (CONT.)

- Residential-institutional biogas

## FSM Business Models

- 18 FSM Business Models developed

### MODELS FOR EMPTYING AND TRANSPORT OF FECAL SLUDGE

- Commonly occurring private emptying and transportation
- Franchise
- Nonprofit
- Transfer station

### MODELS LINKING EMPTYING, TRANSPORT

- Commonly occurring public FSM
- Licensing
- Call center
- Scheduled desludging sanitation tax
- Incentivized disposal
- Full private

### MODELS EMPHASIZING REUSE AT THE END

- Farmer-truck operator partnership
- Co-composting
  - Town cluster approach
  - Pull-push

RESOURCE RECOVERY & REUSE SERIES 6

## 6 Business Models for Fecal Sludge Management

Krishna C. Ravi, Elizabeth Kivimäki, Luca Di Maro and Piy Dasgupta

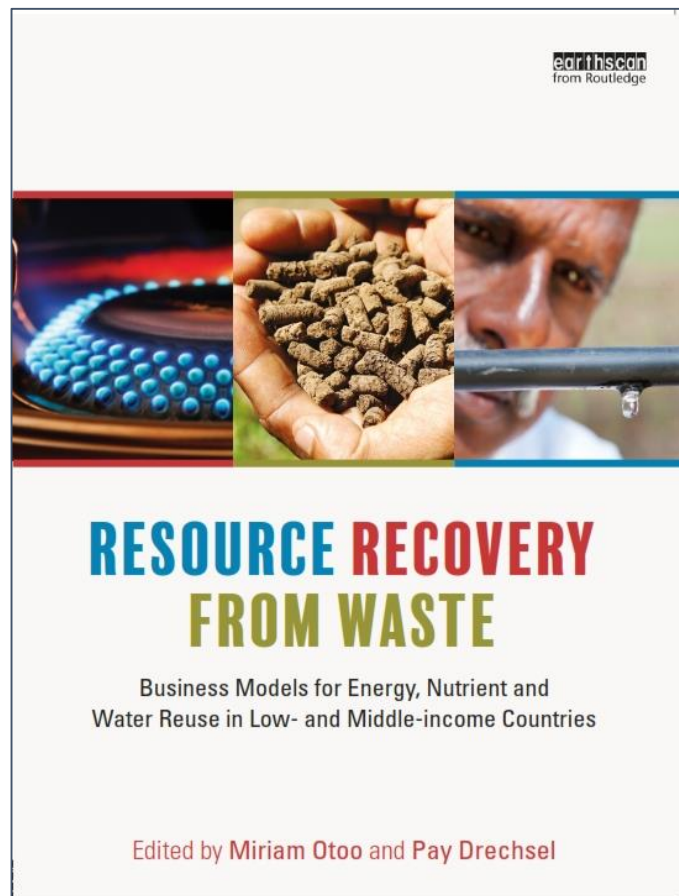


## MODELS COVERING THE ENTIRE SANITATION SERVICE CHAIN FROM TOILET ACCESS TO REUSE

- Non-movable UDDT installation
- Container-based sanitation (CBS)



- RRR businesses interlinked with WHO's effort to develop the Sanitation Safety Planning (SSP) manual.



# Conclusions

- Advancement in **technologies** for treatment, but for reuse and not disposal.
- Resource recovery and reuse is as relevant in low-income countries as in high income countries, although the enabling environment might only be emerging.
- These products should consider value propositions beyond the supply of irrigation water. **More business thinking** is required.
- With economic and social benefits, **financial gains should not be ignored**, and this beyond energy (cost) recovery.
- Ample opportunities, but **high risks** (health, informal markets, unclear institutional responsibilities).
- Investments in **capacity development**.



# Thank you.



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<http://www.iwmi.cgiar.org/research/rural-urban-linkages/resource-recovery/>