

# Business models for resource recovery and reuse in the wastewater sector

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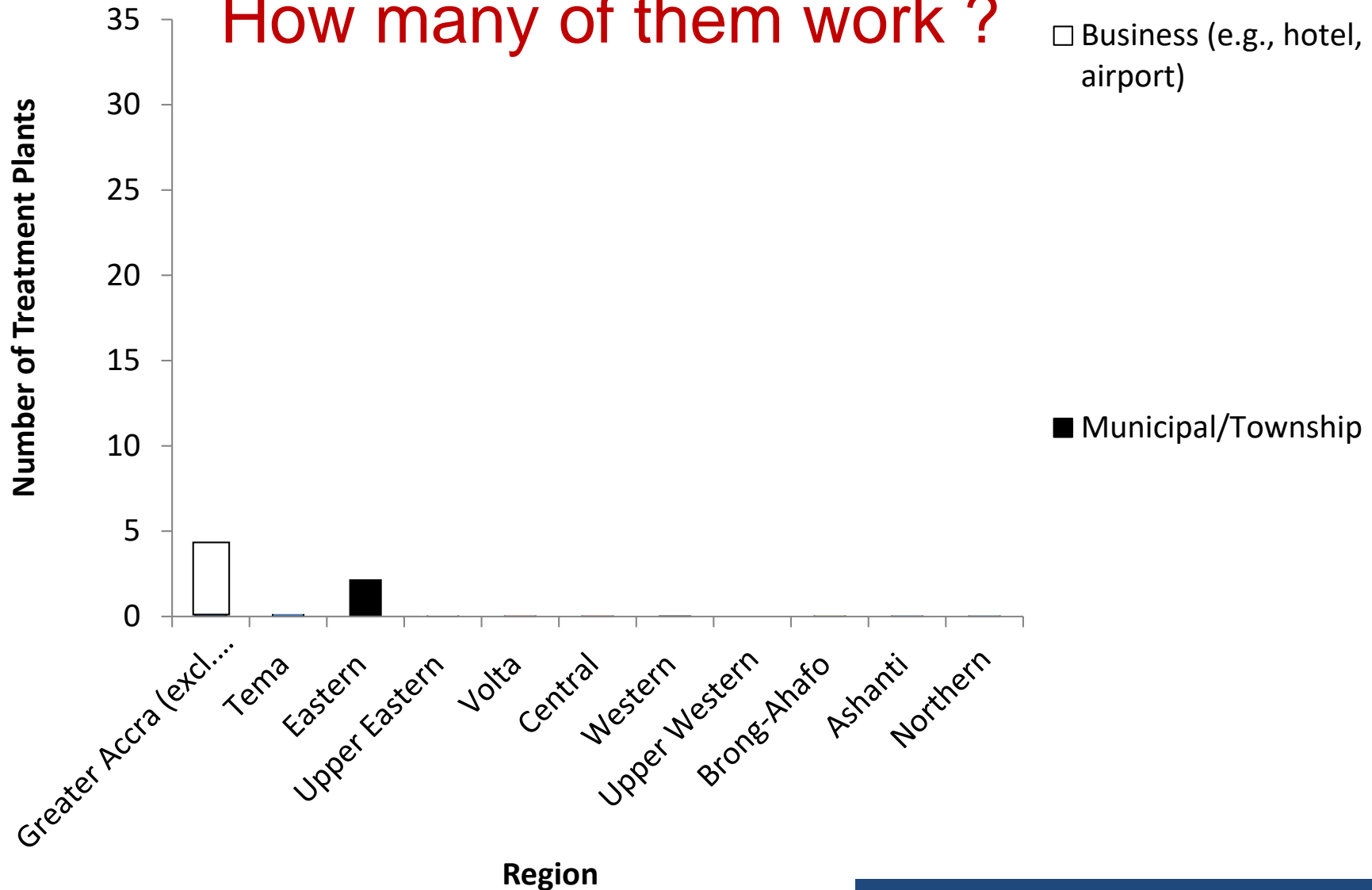


- Across the developing world, max. 20% of wastewater gets treated:
  - Public sector with limited incentives for O&M (absence of resources);
  - Driven by inadequate billing system, low hhld ability and willingness-to-pay.
- How do we achieve RRR at scale if we are still struggling with getting treatment plants to work?



# Operational Status

How many of them work ?





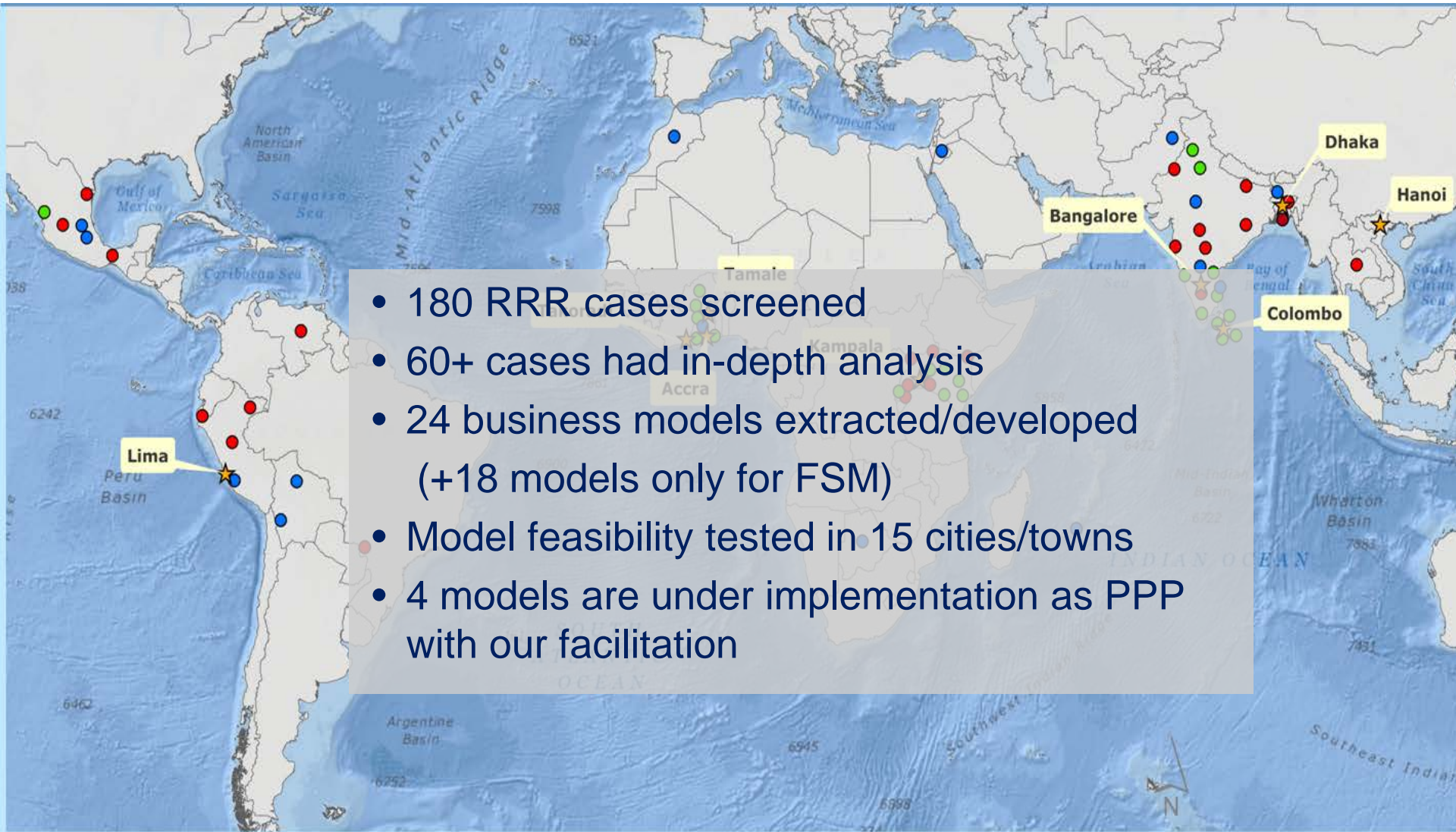
# Challenges for business development in RRR sector

- Most RRR initiatives in low-income countries characterized by:
  - High dependence on **subsidies**;
  - **Limited up-scaling** potential.
- **Challenges: Access to financing**
  - Lack of local capital markets
  - New technology or business model
  - Liquidity concerns
  - Lack of track record, low credit worthiness
  - External factors introduce lending risk  
(geopolitical, political uncertainty, governance)

# Challenges for business development in RRR sector

- Gaps in **business thinking** and market-driven mechanisms that represent:
  - sources of revenue generation or social benefits for all relevant actors;
  - incentives for private sector participation.
- Fundamental gaps in **business capacity**:
  - Business planning and strategies, market knowledge;
  - Economic aspects and institutional linkages.

# From analysis to implementation (2012-2020)



- 180 RRR cases screened
- 60+ cases had in-depth analysis
- 24 business models extracted/developed (+18 models only for FSM)
- Model feasibility tested in 15 cities/towns
- 4 models are under implementation as PPP with our facilitation

**Legend:**

- Energy
- Nutrient
- Wastewater
- ★ Feasibility studies

**Scale:** 0, 2,050,000, 4,100,000, 8,200,000 M

# Cost-recovery: Wastewater reuse for agriculture and forestry



- Limited alternative water sources;
- Appropriate **freshwater pricing** is needed to value wastewater;
- Different constellations of institutional composition can drive greater efficiency and cost-recovery;
- Unclear reuse standards and weak regulations – limiting factor.

**Egypt – El Berka WWTP**

- WW trt: 450,000 m<sup>3</sup>/day;
- Reuse: 10,000 to 30,000 m<sup>3</sup>/day on max. 147 ha.
- Service by public sector company
- O&M costs: **US\$ 3 m/yr** for treatment plant;
- Revenues: **US\$3.65 m/yr** from hhld fees; **US\$11,700-28,000/yr -ag system; US\$ 609,000/year -sludge sale**

**Morocco**

- WW trt: 1,800 to 2,700 m<sup>3</sup> /day;
- PPP model
- O&M costs: US\$2300 to 3600/month;





# Beyond cost-recovery: Leapfrogging the value chain



- Great potential for **replication** in developing countries with supportive institutional envt.;
- Strong **market demand** (consumer perceptions) – need for 3<sup>rd</sup> party **certification of product quality**;
- Clear structural elements of **contractual PPP agreement**;
- Sound technical and **business capacity**;
- Replication may be limited by **land requirements**.



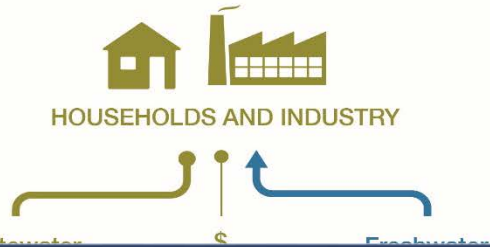
## Ghana

- WW trt: 225 m<sup>3</sup>/day ;
- Cap. Invt: less than 30% borne by WE and over 70% by KMA.
- Service: **PPP**
- O&M: US\$ 3,429 /yr/WSP (5 WSP) to US\$11,440 /year/WSP (for 1 WSP)

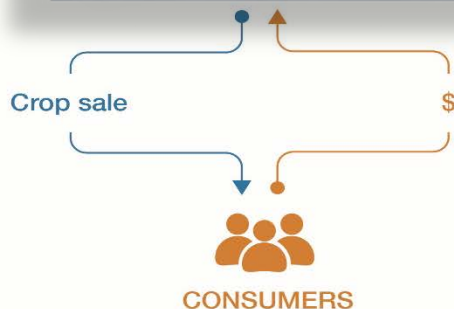
## Bangladesh

- WW trt: 300 m<sup>3</sup>/day;
- Cap. Invt: US\$ 20,000 for trt system (32% as loan for land & equip.; 68% land lease):
- Service: **NGO & Private Trust partnership**
- Revenue: US\$7,500 from fish (7.5 tons/yr of fish sold @US\$1/kg), US\$1000 from crops.
- Gross margin: **20%**
- Payback period: **6 years** (loan)

# Inter-sectoral water exchange



- Cost savings in water extraction, improve. in living standard and economic development because of additional freshwater, reduced overexploitation of aquifers, rivers and lakes;
- **Incentive systems** and **well-formulated contracts** to secure buy-in of large number of farmers who release freshwater required;
- Well-defined **water rights** or **entitlements**, which can be transferred, and regulations that allow the use of (partially) treated wastewater for ag. are required.



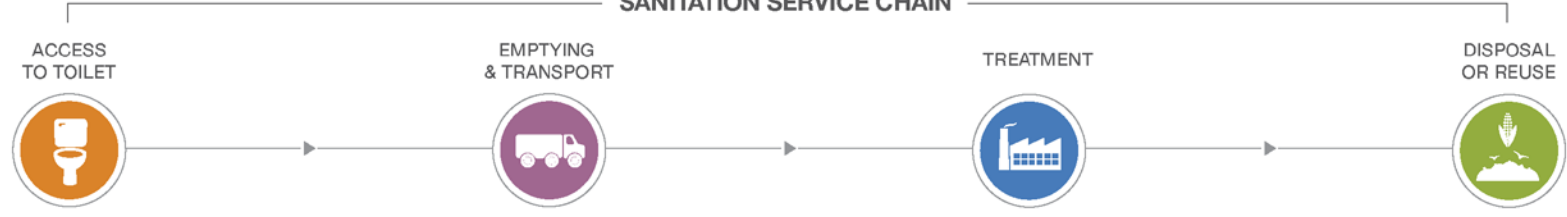
## Iran – Kardeh dam

- WW trt: 25 MCM treated effluent used for irrigation;
- Service: Public and private (farmer assoc.)
- Cap. Invt: US\$ 6 million
- O&M: US\$ 650,000/ yr
- Output: Release of ca. 21 MCM of freshwater for municipal use

## Spain

- WW trt: 146 Mm<sup>3</sup>/yr, 20 Mm<sup>3</sup> for ag. (water swap);
- Service: Public and private
- Cap. Invt: €15.12 m (treatment upgrades)
- BC ratio: 2.9 – 5.4

**SANITATION SERVICE CHAIN**



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

- Public toilet with energy recovery

**FSM Business Models**

- 18 FSM Business Models developed

**MODELS FOR EMPTYING & TRANSPORT OF FECAL SLUDGE**

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

**MODELS LINKING EMPTYING & TRANSPORT TO TREATMENT**

- Commonly occurring private and transportation
- Licensing
- Call center
- Scheduled desludging services
- Incentivized disposal
- Full private

**MODELS EMPHASIZING REUSE**

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

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



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

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

# SANITATION SERVICE CHAIN

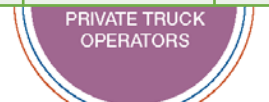
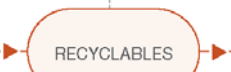
ACCESS TO TOILET

EMPTYING & TRANSPORT

TREATMENT

DISPOSAL OR REUSE

(\$/ha)	Users	Non-users
Total fixed costs	191	137
Total variable costs	314	323
Revenues	919	606
<b>Net Income</b>	<b>414</b>	<b>146</b>



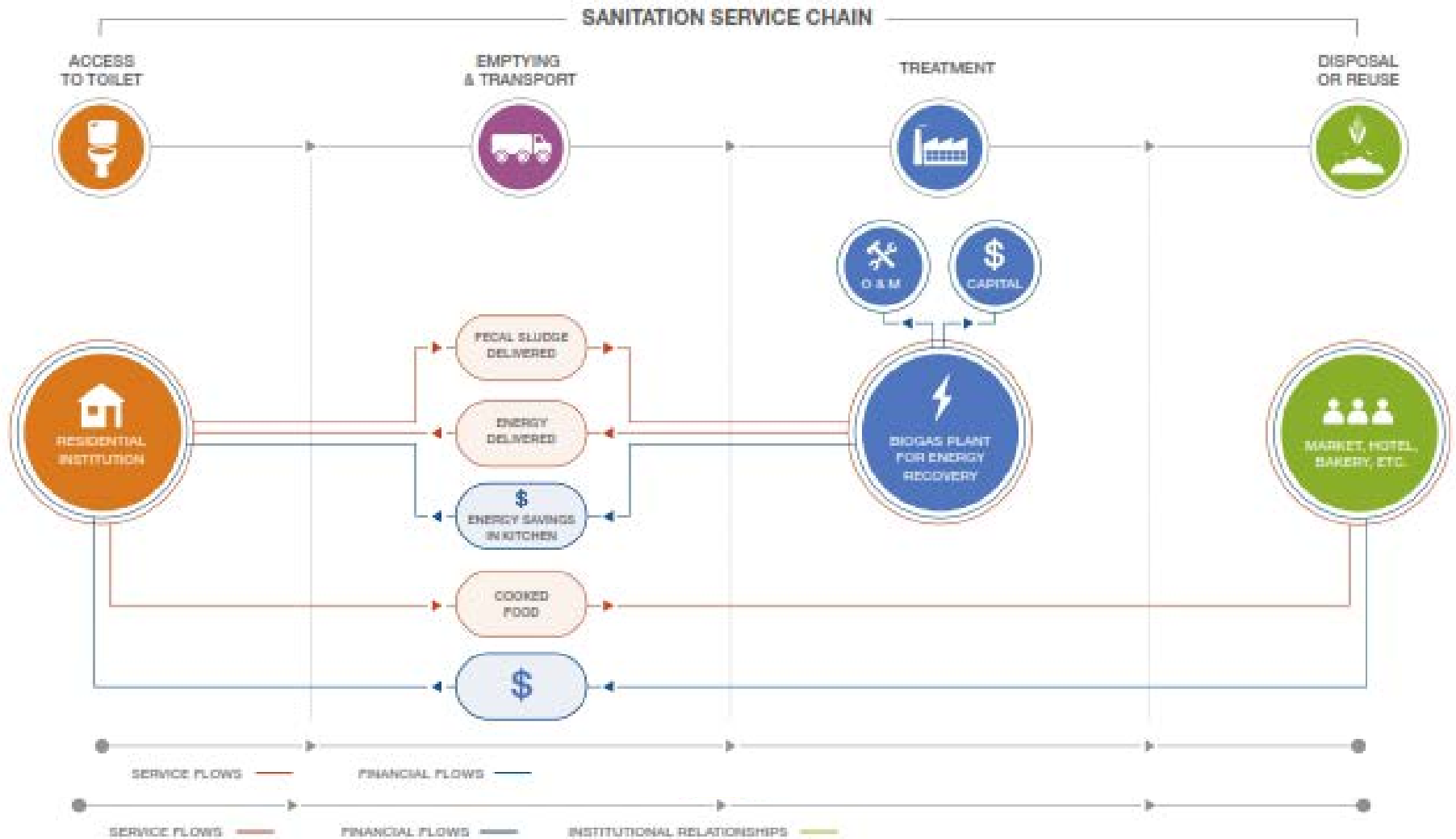
SERVICE FLOWS

FINANCIAL FLOWS

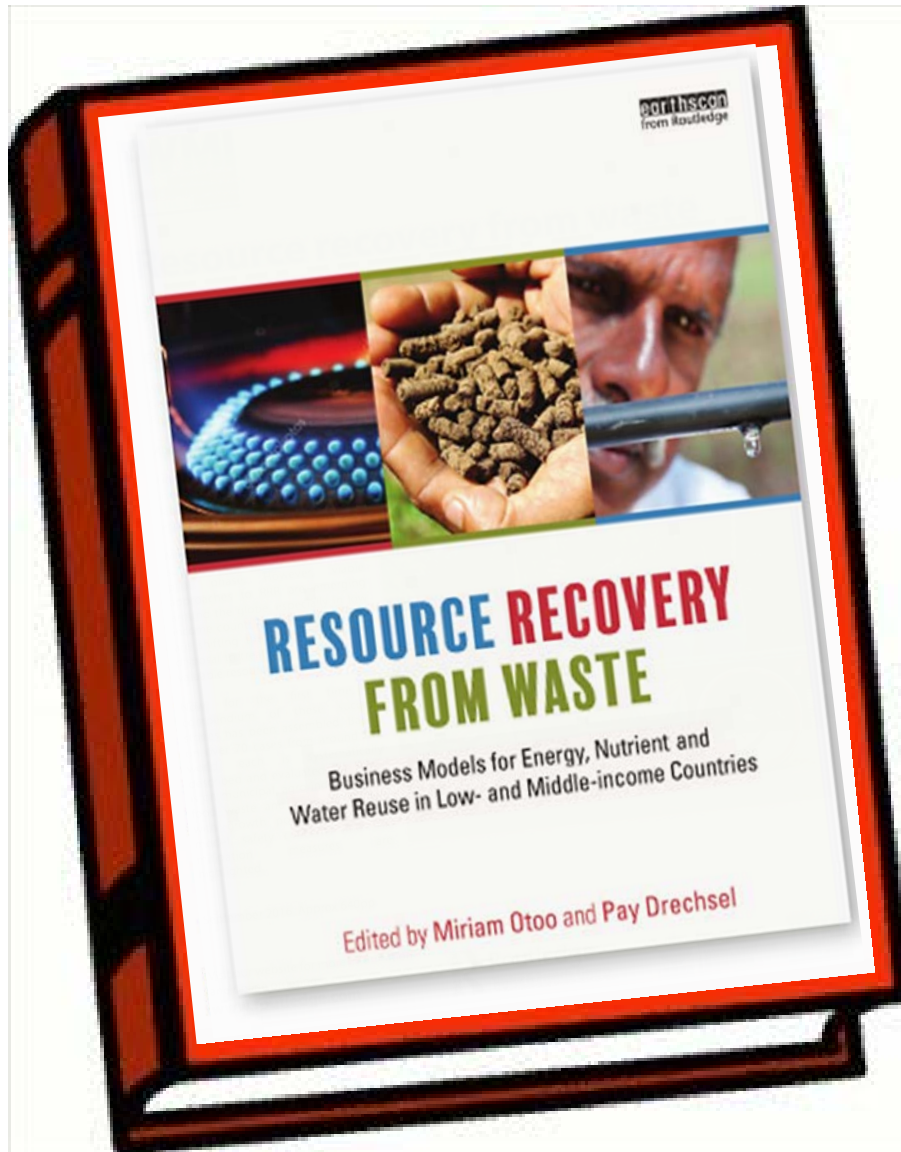
INSTITUTIONAL RELATIONSHIPS

# Co-Composting

# A range of possible business model which require local feasibility studies and adaptation



# On-going & Future Work



## Briefs for Investors



Available Dec. 2017

# Thank you.

