

Integrated Resource Recovery Center (IRRC)

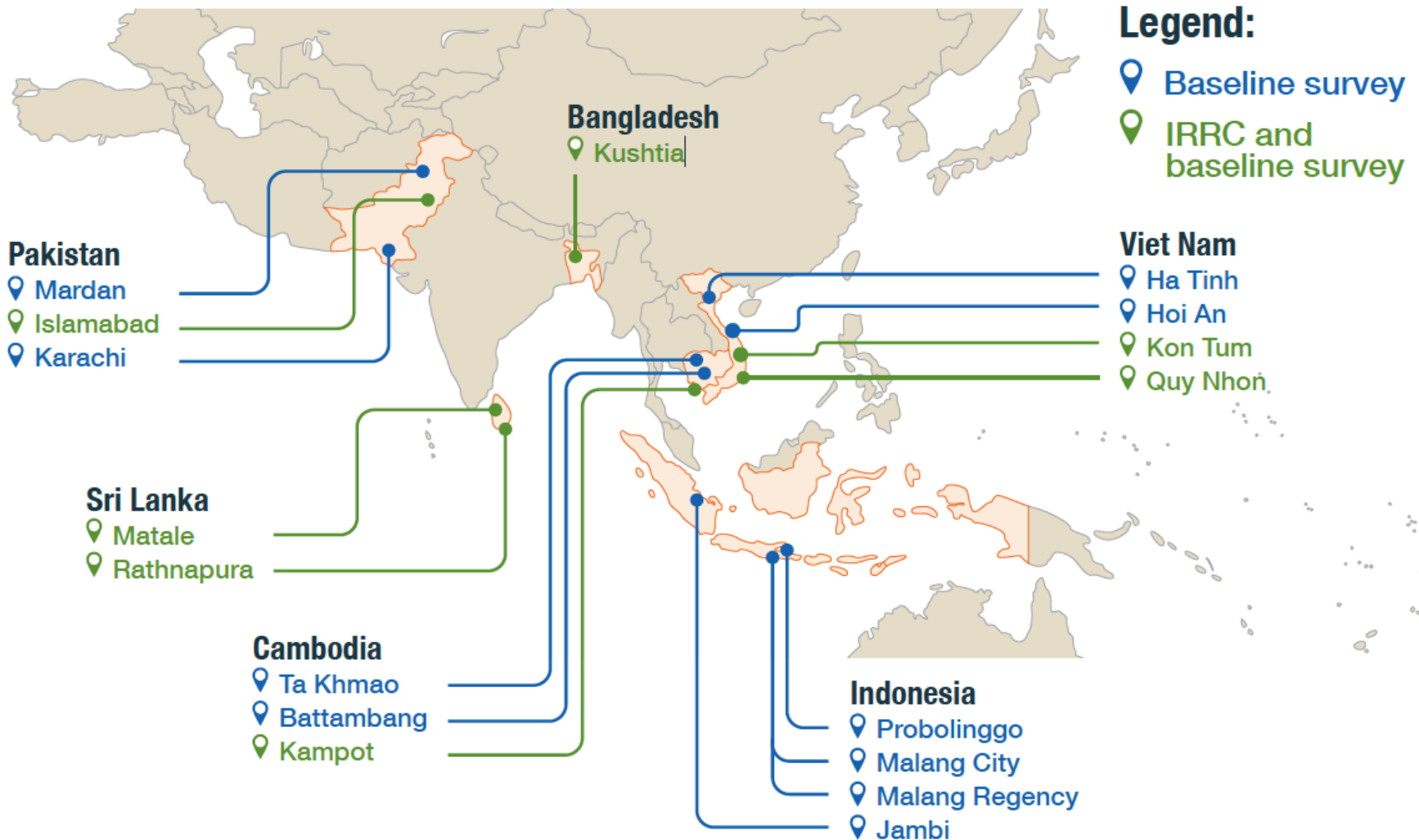
A model of pro-poor and sustainable solid waste management in small cities



Rahul Teku Vaswani
Consultant, ESCAP

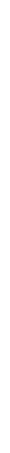
10 August 2017

ESCAP IRRC cities in 6 countries

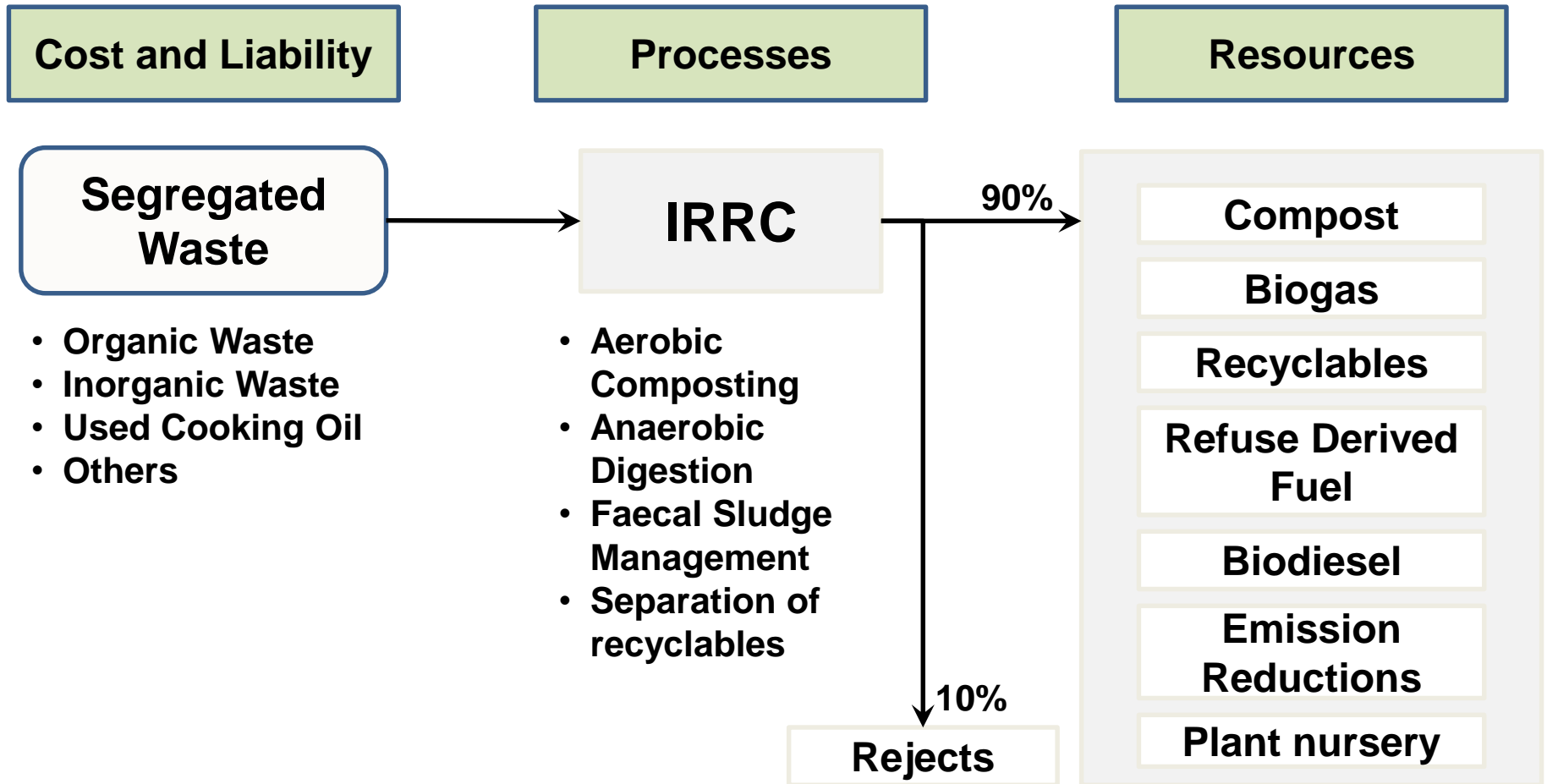


IRRC: A pioneering solution

- An **Integrated Resource Recovery Center (IRRC)** is a recycling facility where a significant portion (80-90%) of waste can be processed in proximity to the **source** of generation, and in a **decentralized** manner. The IRRC concept is based on the reduce, reuse and recycle (3R) principles
- The **Integrated Resource Recovery Center** model was developed by Waste Concern, an NGO based in Dhaka
- The model is **cost-effective, affordable, low-tech and community-based**, and allows transforming waste into various types of resources



Turning waste into resources

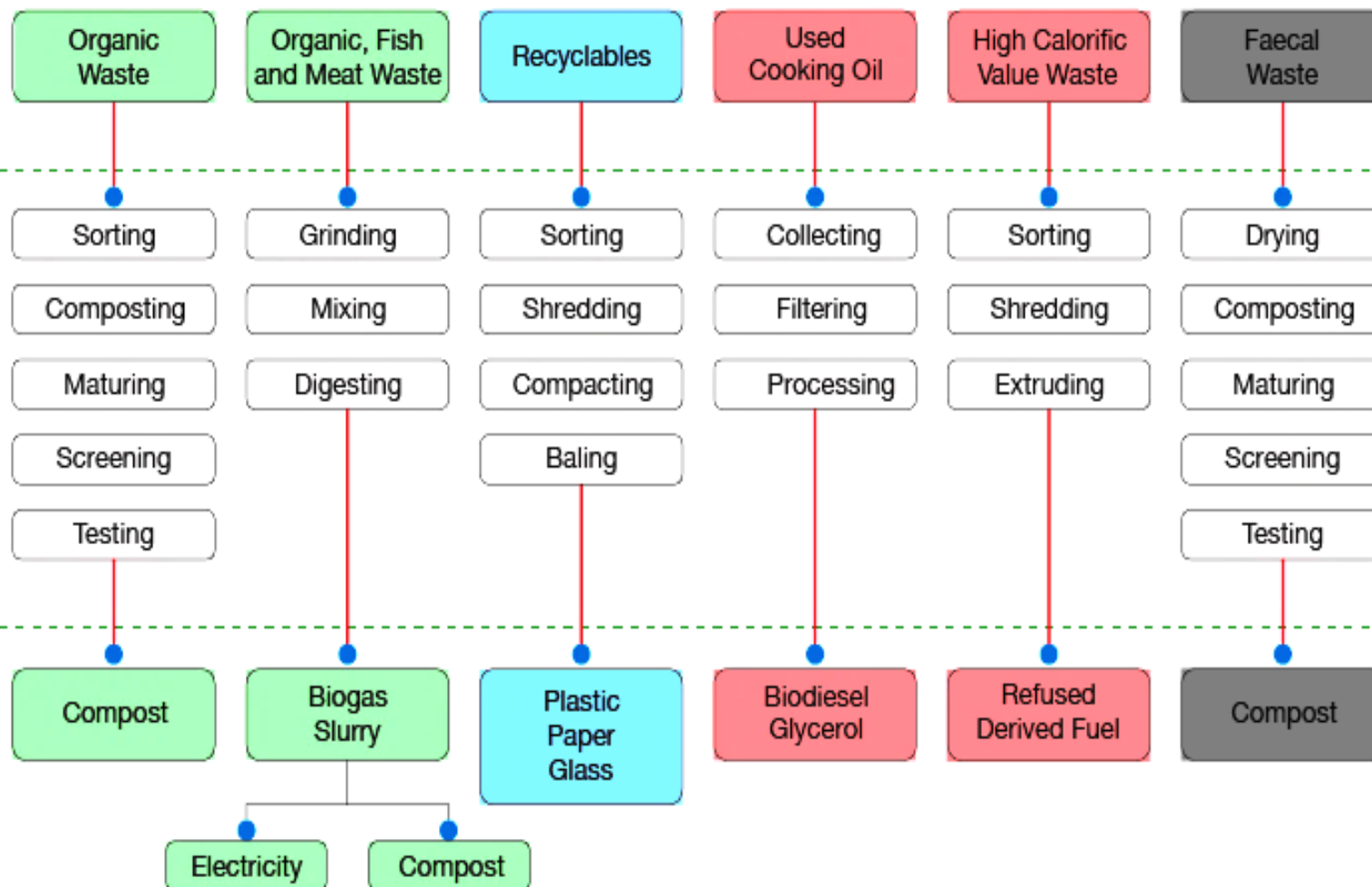


IRRC material flows

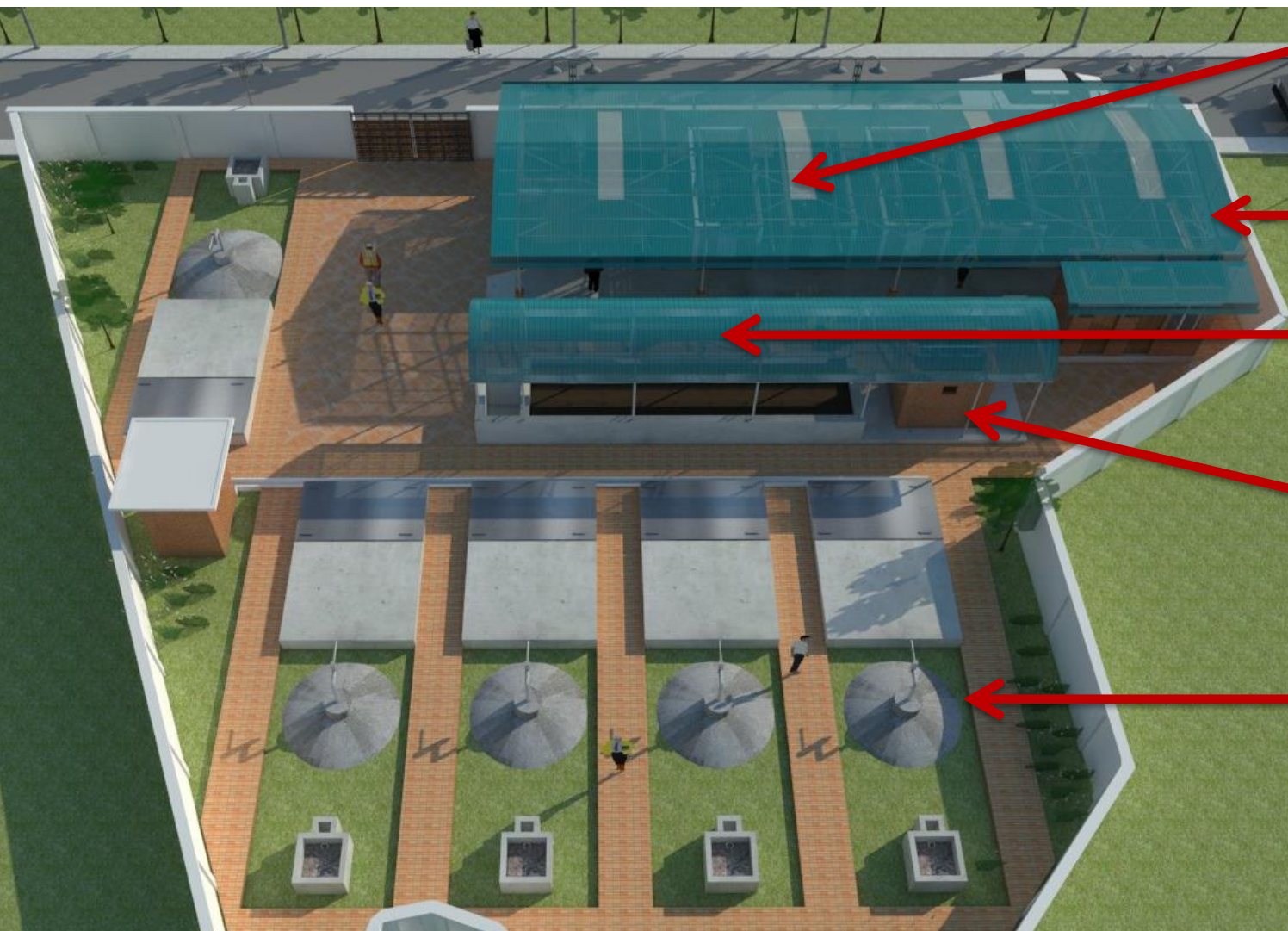
Input

Process

Product



IRRC: Aerial view



**Aerobic
Composting Shed**

**Biogas to Electricity
Generator room**

**(Faecal) Sludge
Management Shed**

Cocopeat Filter

**Anaerobic
Biodigester (Biogas)**

IRRC: Aerial view



IRRC: Aerial view



IRRCs – helping achieve Sustainable Development Goals



Economic benefits from IRRCs

11 SUSTAINABLE CITIES
AND COMMUNITIES



**Reduced
landfilling
costs**



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



**Extended
landfill life**



**Reduced subsidy
for chemical
fertiliser**

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



**Improved crop
yields**

2 ZERO
HUNGER



Social benefits from IRRCs



Better job opportunities



Improved living conditions



Reduced disease



Improved environmental awareness



Environmental benefits from IRRCs



**Reduced
pollution**



**Reduced
greenhouse gas
emissions**

**Improved soil
quality**



**Low-carbon
fuel**



Capital and Operational Estimates for IRRCs

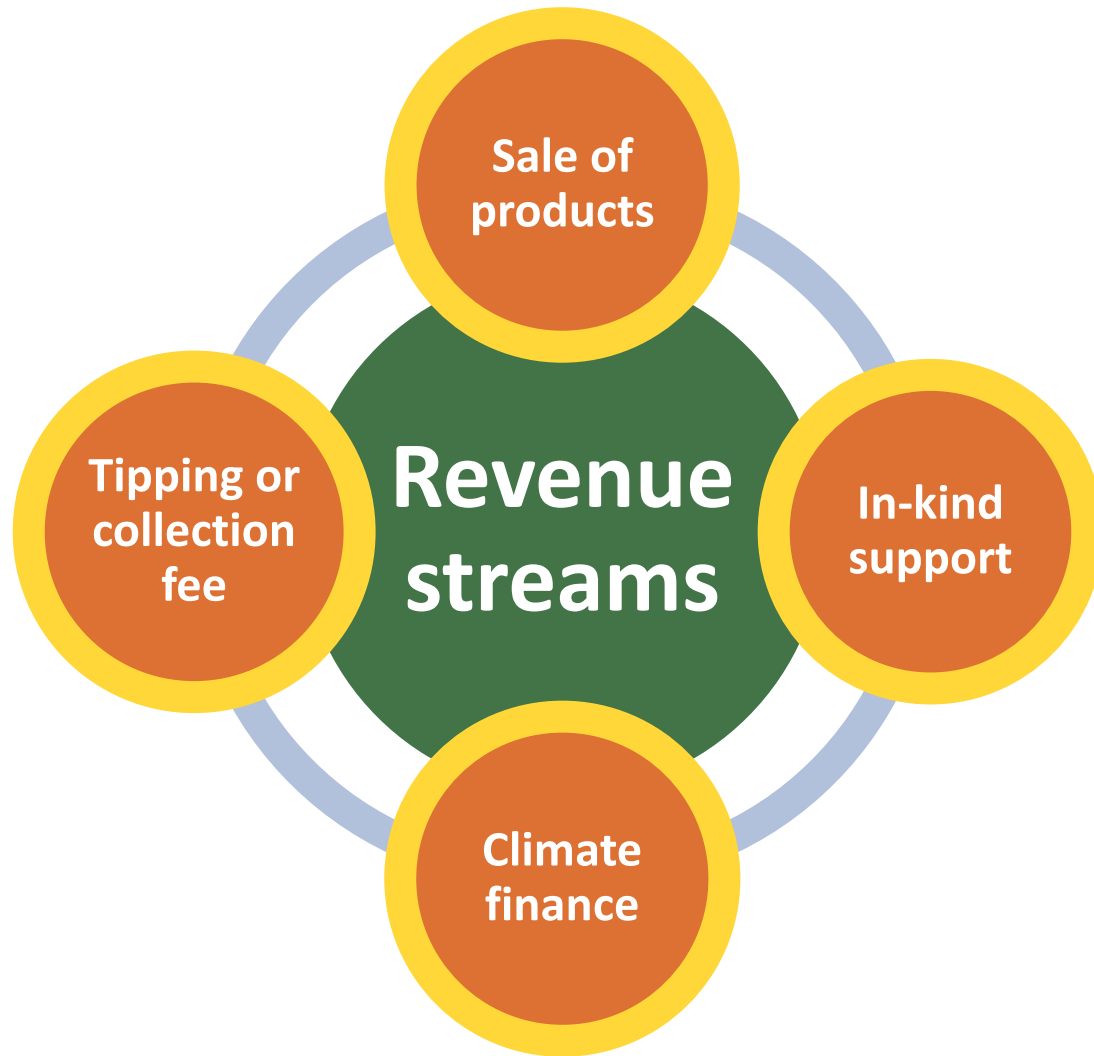
Activity	IRRC with composting and recyclables	IRRC with Anaerobic Digestion (biogas)
Land requirement	150-200 m ² per ton of waste	400-500 m ² per ton of waste
Waste required	High quality organic waste required; cost of segregation	High quality organic waste required; cost of segregation
Technical training & capacity building for establishing policies and programs	USD 5,000 to USD 10,000 per 1 to 2 tons of waste	USD 5,000 to USD 10,000 per 1 to 2 tons of waste
Community awareness building, & waste separation advocacy programs	USD 5,000 to USD 10,000 per 1 to 2 tons of waste	USD 5,000 to USD 10,000 per 1 to 2 tons of waste
Permits, surveys, assessments	USD 10,000 to USD 15,000	USD 10,000 to USD 15,000
Establishment of IRRC (CAPEX)	USD 20,000 to USD 30,000 per ton of waste	USD 30,000 to USD 40,000 per ton of waste
Operation of IRRC (electricity, waste, staff, maintenance) (OPEX)	USD 2,000 to USD 3,000 /ton/year (about 10% of CAPEX)	USD 3,000 to USD 4,000 /ton/year (about 10% of CAPEX)

Economic Benefits of IRRCs (composting only)

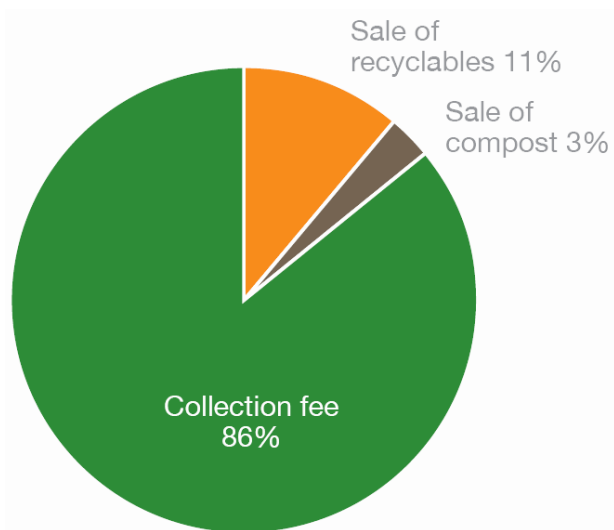
Benefit	Type	Value (US\$)		
		Bangladesh	Sri Lanka	Viet Nam
Job creation: additional income for waste-pickers employed	Social/Economic – Public & Private	3.76	3.00	N/A
Cost savings for the municipality for avoided landfilling of waste	Economic – Public	11.68	28.75	34.85
Savings in chemical fertilizer use (25% reduction)	Economic/Environmental – Private & Public	4.85	1.13	10.54
Savings in subsidy to chemical fertilizers	Economic – Public	2.07	2.74	N/A
Increase in crop yields	Economic – Private & Public	24.55	21.52	46.71
TOTAL		46.91	57.14	92.10

All values are in USD, for composting of 1 ton of organic waste; *Source: ESCAP and Waste Concern*

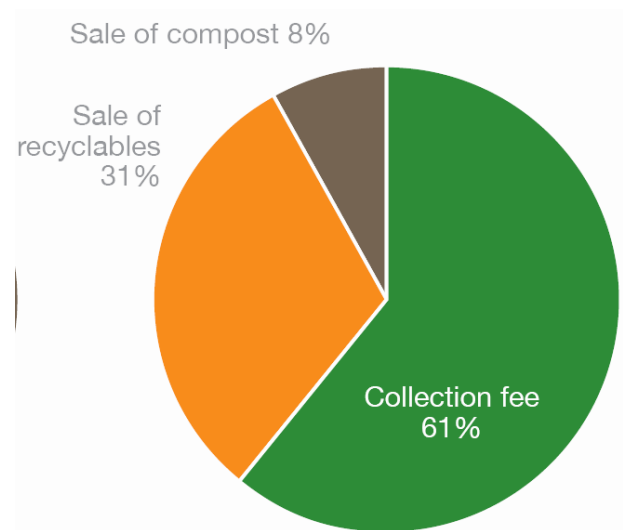
Revenue Streams for IRRCs



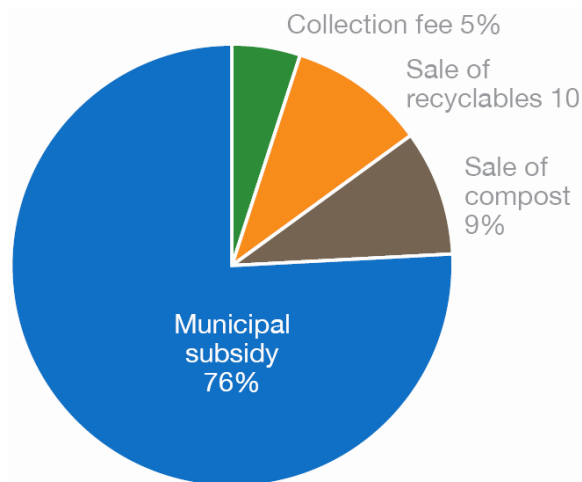
Revenue Streams for IRRCs - Examples



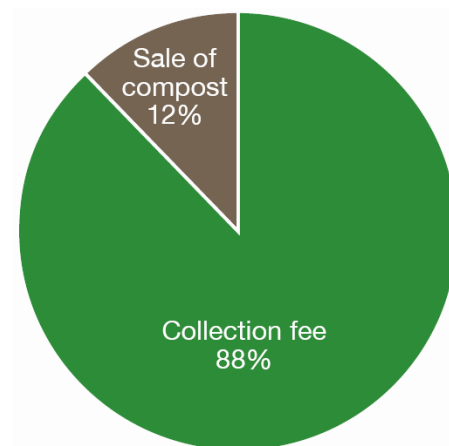
Quynh Nhon, Viet Nam



Islamabad, Pakistan



Matale, Sri Lanka



Kushtia, Bangladesh

4 key areas of IRRC sustainability





Building multi-stakeholder partnerships

- Success and sustainability of the IRRC depends on locally embedded partnerships between diverse stakeholders



Improving awareness and changing behavior

- Changing people's perceptions and behaviors about waste segregation and management are essential; this takes time, resources, and sustained engagement
- Need to involve the informal waste sector in sustainable waste management



Managing facilities and improving operations

- A business plan, careful resource accounting, and efficient plant operations are needed for financial resilience
- Collection and tipping fees are usually required to achieve cost-recovery



Creating an enabling environment for scaling up

- A successful pilot leads to successful, modular, scaling up
- Policies for sustainable waste management must be sectorally integrated, as well as vertically integrated with national priorities; a local legal framework or regulation for waste segregation, collection and management is necessary
- Private sector involvement must be leveraged; international climate financing can be leveraged

Thank you

Valuing Waste, Transforming Cities



- Part I: Overview of **the waste crisis** in Asia-Pacific and the urgent need for change; **introduction of the IRRC** model
- Part II: **Lessons learned** and recommendations for waste-to-resource initiatives across four areas
- Part III: **Factsheets** on eight cities where waste-to-resource initiatives have been launched

Download the report from:
www.unescap.org/publications