



# **Technical Paths for Inclusive Recycling in middle-income countries:**

**UFMG / Observatorio, 16 September 2014**

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**based in part on the author's PhD defence presentation "Value Added"**



# Getting started

- **Introductions**

- Rules of the Road**

- Structure of this presentation**

# Structure of this Presentation

1. **Introduction: Recycling, puzzle or promise**
2. **ISWM: Service Chain and Value Chain**
3. **The Modernisation Path of Waste Management**
4. **Examples of different paths and results**
5. **5 items on the technical path agenda**

# 1. Introduction: Recycling: puzzle or promise?

**Why is recycling considered to be:**

- ❖ **a strong example of environmental progress in Australia, Japan, Europe, North America, but**
- ❖ **a source of global conflict, competition for recyclable resources, and economic struggle with informal recyclers in middle-income countries?**

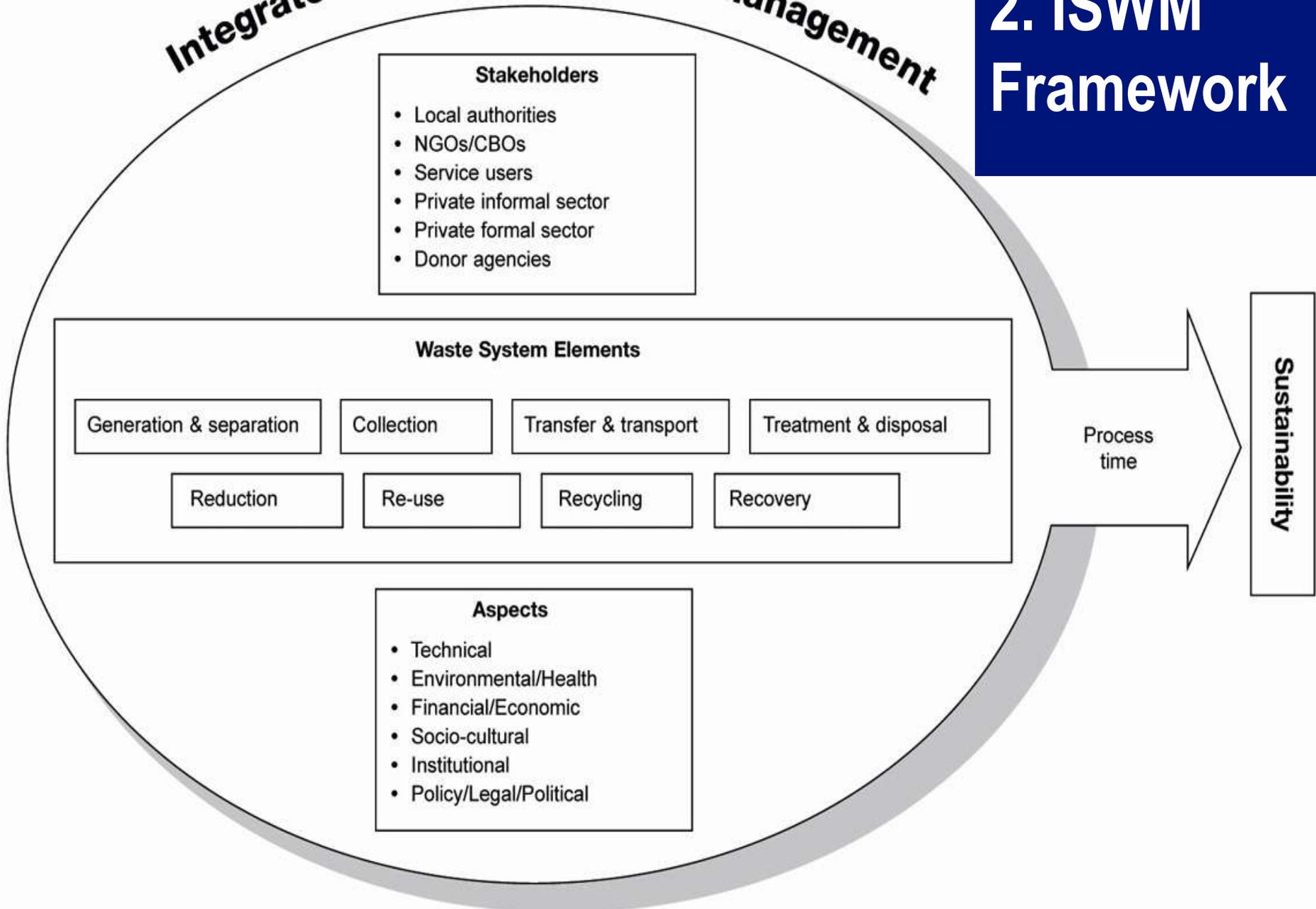
# The challenge of sustainable recycling:

Can we identify a framework to organise *valorisation* in , that:

- ❖ gives better results for people, the environment, and the economy?
- ❖ Enables cities to divert 50% of waste from landfill to value chains?
- ❖ Provides jobs and resources for the (circular) economy?

# Integrated Sustainable Waste Management

## 2. ISWM Framework

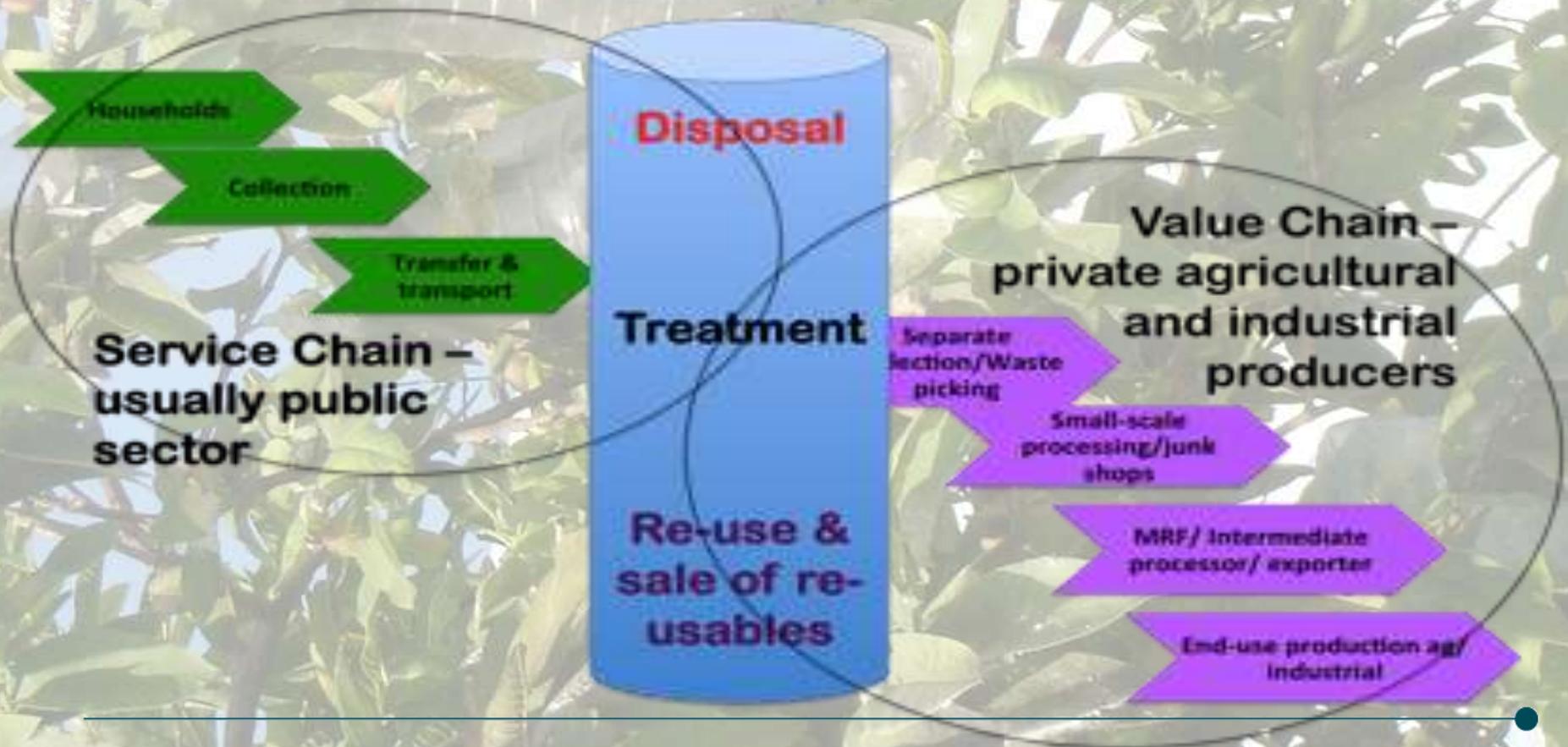


# 3 dimensions of ISWM

1. Stakeholders
2. Service and value chain operations
3. Sustainability dimensions:
  - a. Economic and financial
  - b. Technical and performance
  - c. Environment and public health
  - d. Institutional and governance
  - e. Legal and policy
  - f. Social, cultural, and inclusive

# Service chain & value chain in ISWM

## Service Chain and Value Chain Separate but connected



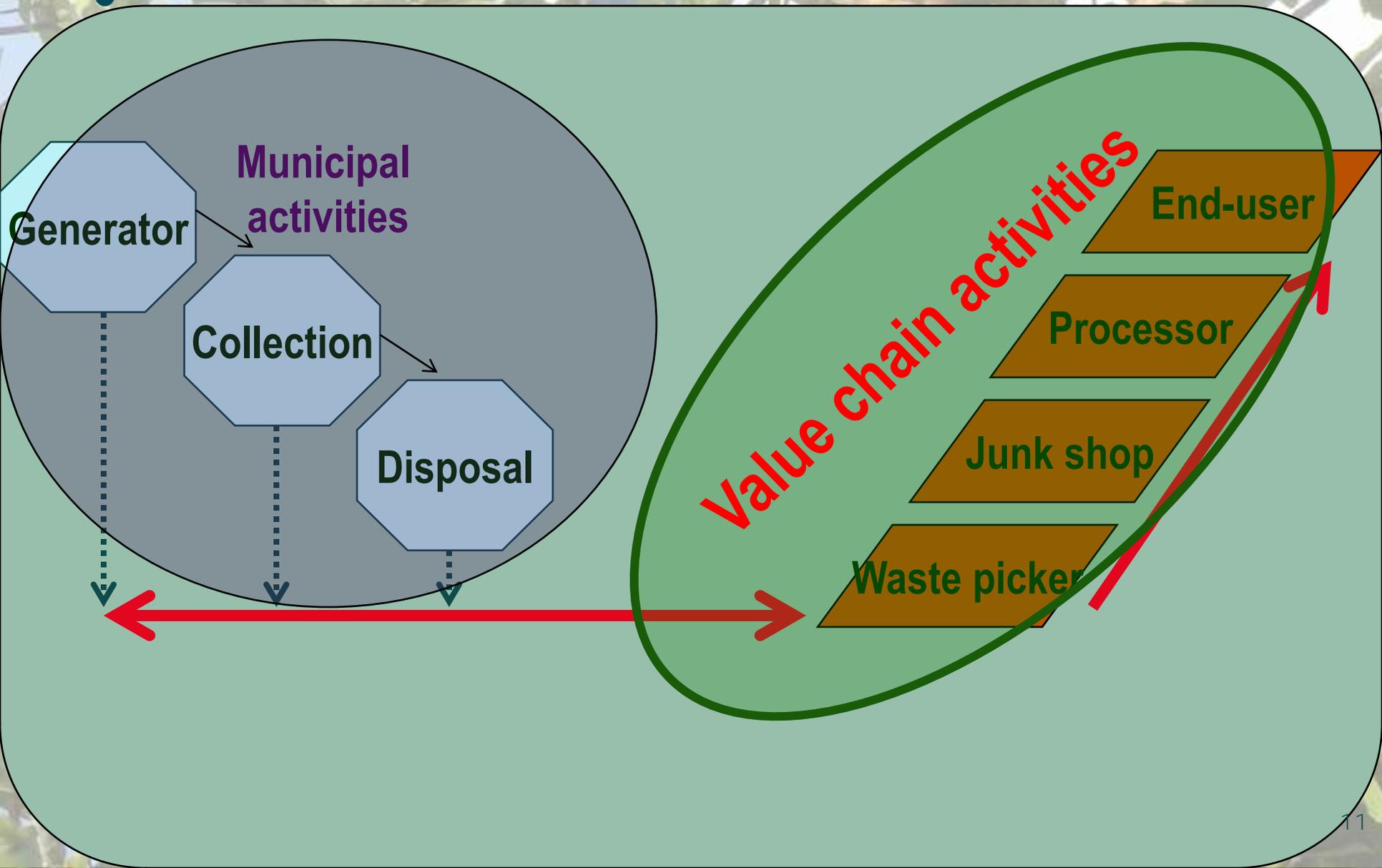
# Service Chain (Public Waste Management)

1. The service chain and the value chain are different.
2. The service chain is about *removing* waste/disvalue.
3. Users pay for the clean empty space.
4. Workers are paid per hour or per service unit
5. Risks are small, but so are margins/profit
6. Collection is profitable BUT 2% of household income won't cover transfer or disposal costs.

# Value Chain (Private Recycling and Re-use)

1. The value chain is about trading valuables.
2. Most if not all valuable materials in the local waste stream are already claimed and valorised.
3. Value chains are private, secret, difficult to enter.
4. Informal recyclers know how to sell recyclables. City officials do not.
5. Private sector recycling generates positive externalities for local authorities, for which cities do not pay.

# Value chain recycling – the default framework



# What is going on here?

1. The value chain “pulls” the materials for which there is real economic demand.
2. Waste pickers, junk shops, and intermediate processors pass materials along the value chain to the *end-users*.
3. The local authority benefits by having to dispose of fewer materials, but they often don't know it.
4. This is a case of private commercial activities generating *positive environmental externalities*.
5. The tonnages diverted are seldom counted by the local authority and are therefore invisible.

### 3. The modernisation path – Drivers

1. The first driver of modernisation is public health: response is to organise collection
2. the second driver is environmental protection, usually focused on water. The response was to introduce sanitary landfills, and to keep waste and water away from each other.
3. The third driver is either resource management, or sustainable financing
4. The response to the third driver is either *municipal* recycling (path of rich countries) or *inclusive or abusive recycling* (Middle-income countries)

### 3. The modernisation path – 1: sanitary landfills

1. Environmental laws at national level require regulated sanitary landfills, control pollution
2. The technology: balance, gate control, geo-textile and leachate collection and treatment
3. Donors pay only capital costs, not operations.
4. Operation costs US\$40 to US\$200/tonne.
5. Politically acceptable service fees cannot cover this in a middle-income country.
6. Subsidy at national level is difficult.
7. The landfill is abandoned /reverts to a dump.
8. Everyone loses – donor, national government, local authority.

# The modernisation path – 2: regionalisation

1. Sanitary landfills are large, expensive, and work only for large cities
2. Smaller cities have to work together, to have one *regional* sanitary landfill
3. Making regional institutions is complex, and allocating costs and benefits is difficult
4. Regional landfills are usually far from urban centres, sited to serve multi-town regions
5. The *cost of transport* of the waste is high
6. To control the cost, cities make *transfer stations*, adding another level in the chain

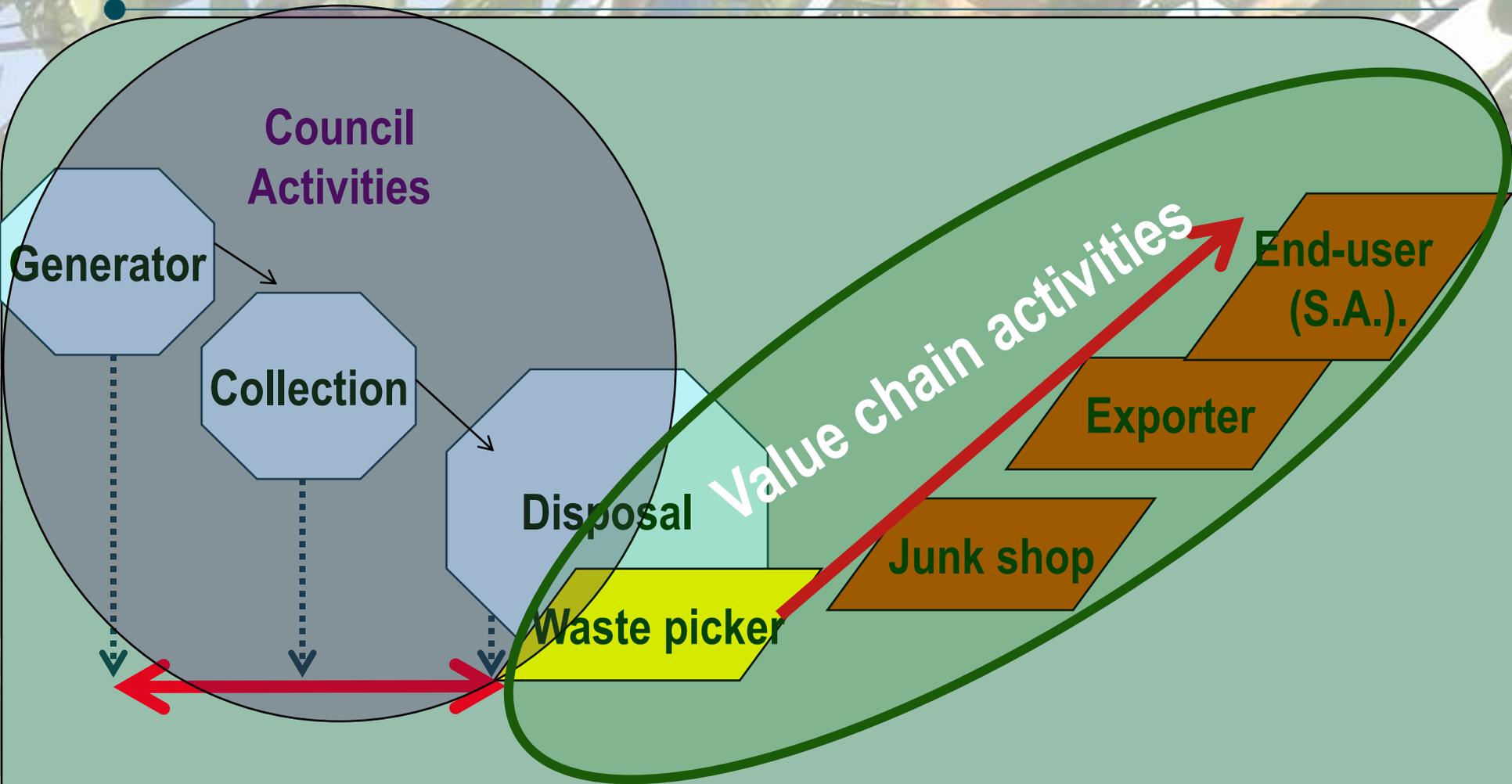
# The modernisation path – 3: recycling.

1. Modern and international financial institutions and donors demand cities recover costs from users.
2. Politicians “**sign**” but in practice refuse to charge more than US\$10-\$25 per tonne
3. Its not enough, so cities look for more sources of income to pay for disposal.
4. One place they look is recycling.
5. At that point they may try to compete with or co-opt the private value chains.

# The modernisation path – 4: affordability

1. Making users pay generates income.
2. Payers want better service – including recycling, **but don't care about disposal**
3. Households can pay 1% of hh income for waste service, in countries like Brazil, 2%.
4. **It's not enough to operate a sanitary landfill**
5. **Towns "claim" recyclables but don't know how to commercialise them (pickers DO know)**
6. Informal recyclers may be driven out of the system, a lose-lose situation
7. Inclusive recycling is a win-win alternative.

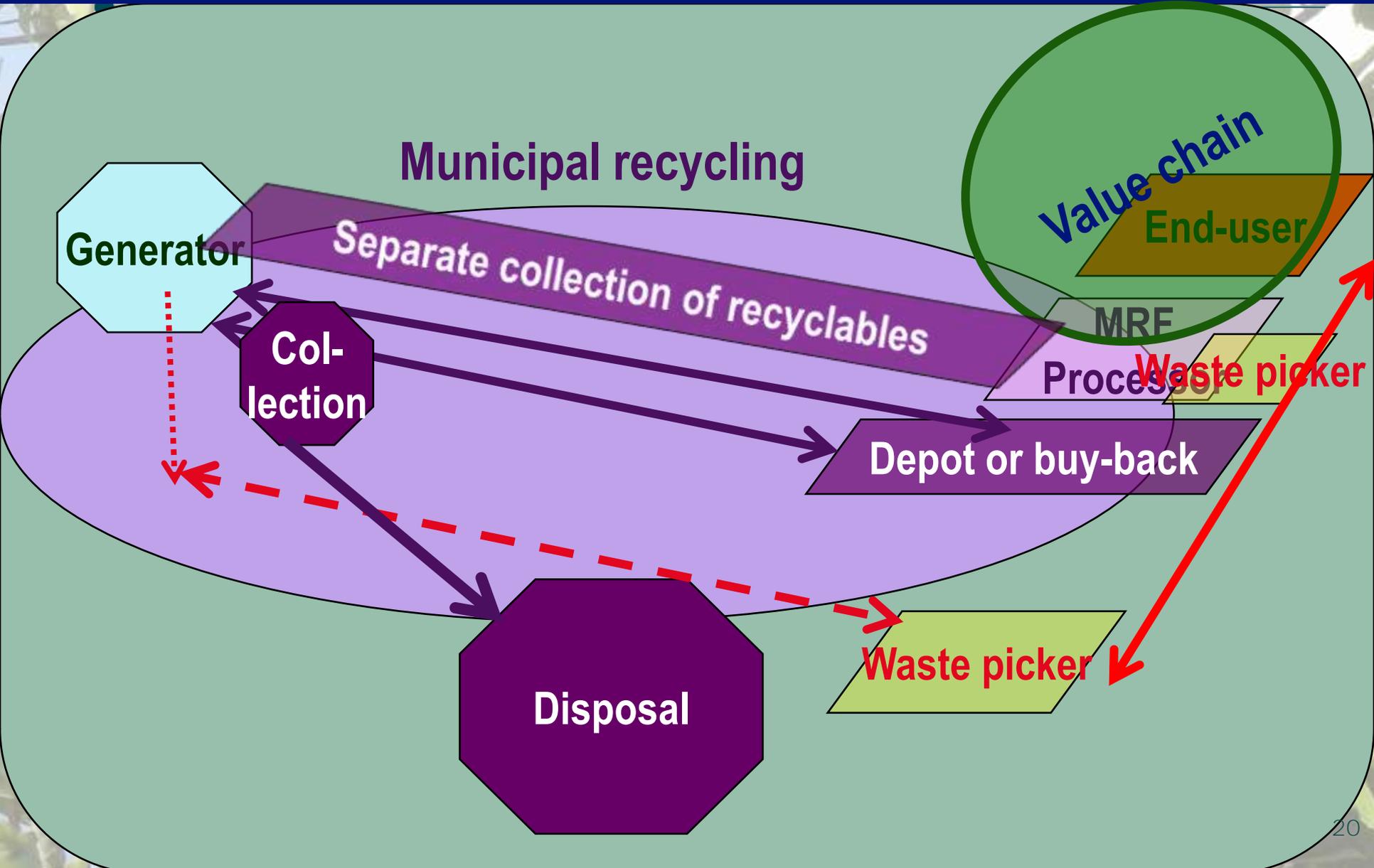
# Value chain recycling Botswana anno 2012



# What is going on in Botswana?

1. The collection function is under-developed
2. Community containers are supplemented by private d-to-d
3. The service chain ends in controlled disposal
4. The tipping fees are too low for municipal recycling,
5. The South African value chain has real economic demand.
6. The Councils authorise companies to “place” up to 5 waste pickers on one of the 14 regional landfills
7. Value chain recycling functions, without many problems
8. The situation is not much different from the default

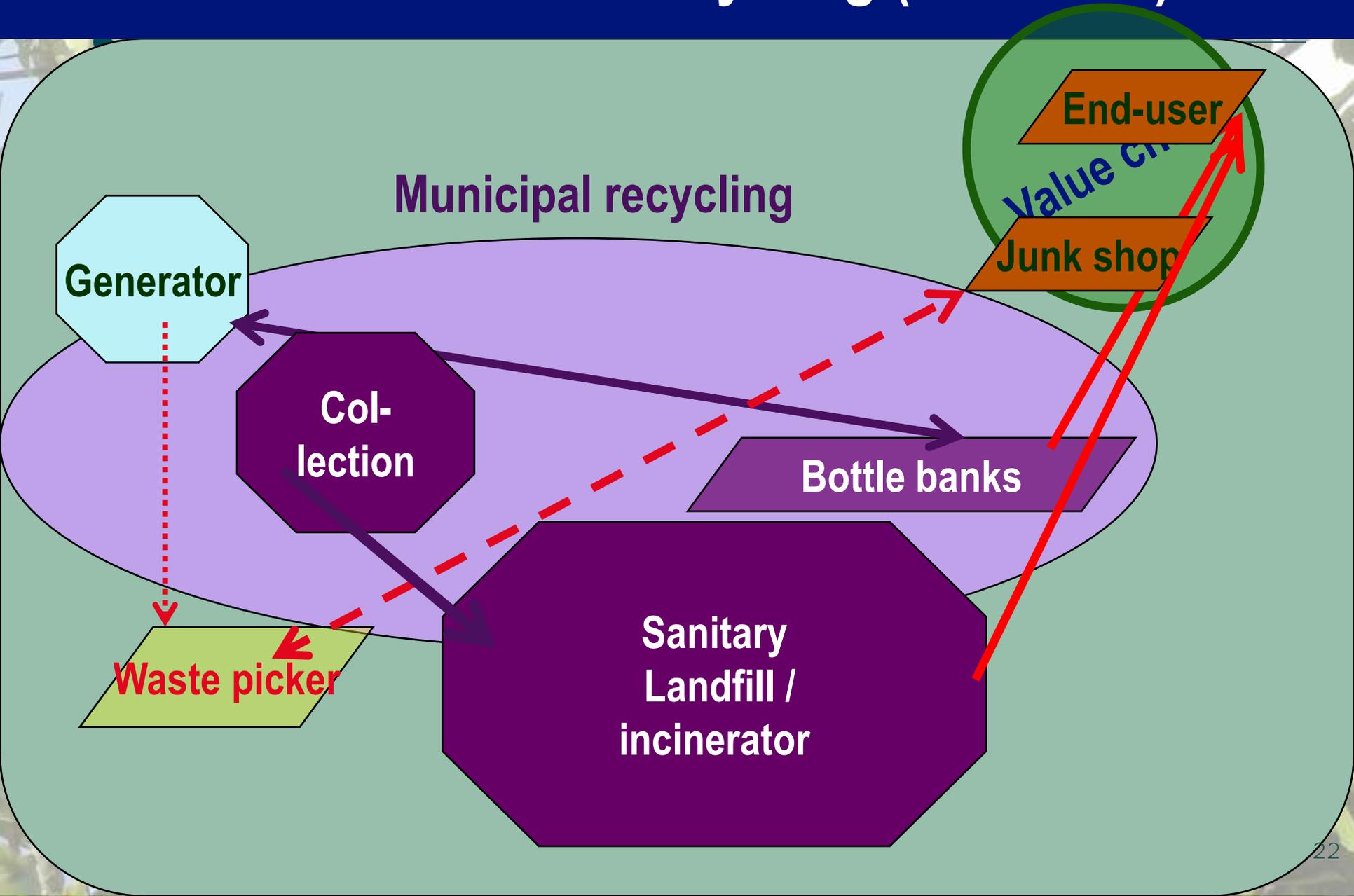
# Framework: Municipal Recycling USA



# Framework: Municipal Recycling:

1. Regionalised disposal is necessary, but expensive
2. Public and private landfills charge tipping fees – also to local authorities and for their own waste.
3. Priced disposal creates need for *diversion from disposal*
4. Cities invest in separate collection, integrate waste pickers
5. Cities develop or hire value chain expertise.
6. Investment in recycling = environmental/economic benefits
7. Tons diverted *avoid disposal costs* and save City money
8. Recycling revenues partly offset operating costs.
9. Value chains invest over the long term in new end-use
10. This is the *municipal recycling* virtuous circle

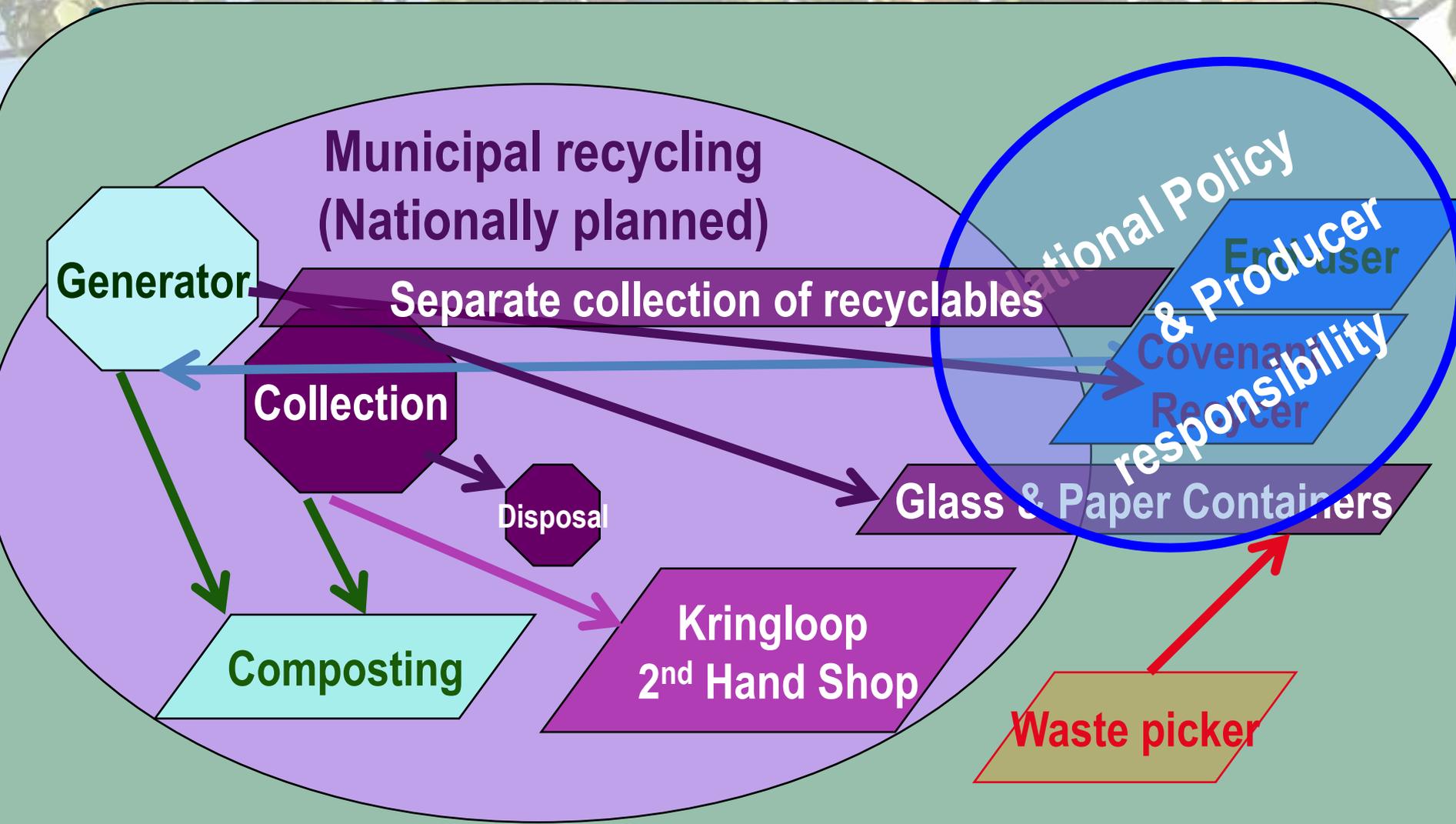
# Framework: Exclusive Recycling (Some EU)



# Framework: Abusive / exclusive Recycling:

1. Regionalised disposal is necessary, but over-capitalised
2. Public and private landfills have to be subsidised, and so require more waste, under-charge for disposal
3. There is no economic benefit in *diversion from disposal*
4. Cities claim recyclables, for the revenues, criminalise waste pickers, but cannot valorise or market recyclables well
5. Value chains refuse contaminated, small quantity materials
6. Public recycling efforts fail, with high costs per ton
7. More ends up being disposed, less recycled
8. Waste pickers lose their livelihoods
9. This is the *abusive recycling* vicious circle

# Framework: EPR /Municipal Recycling Netherlands



# Framework: EPR/Municipal Recycling in the Netherlands

- 1. The national government makes all the decisions.**
- 2. Municipalities charge one integral fee that covers the cost of all activities – composting, recycling, sweeping, disposal.**
- 3. Recyclables and compostables are banned from landfills, creating a strong incentive for all types of diversion.**
- 4. The government makes arrangements with producers for end-of life management, recycling, marketing .**
- 5. Local authorities provide separate collection of organics, re-usables and recyclables, door to door and bottle banks**
- 6. The recycling is paid for by EPR point-of-purchase fees.**
- 7. Each tonne valorised saves the local authority money, by allowing more efficient collection and reducing risks.**

# Framework: EPR in Costa Rica for E-Waste

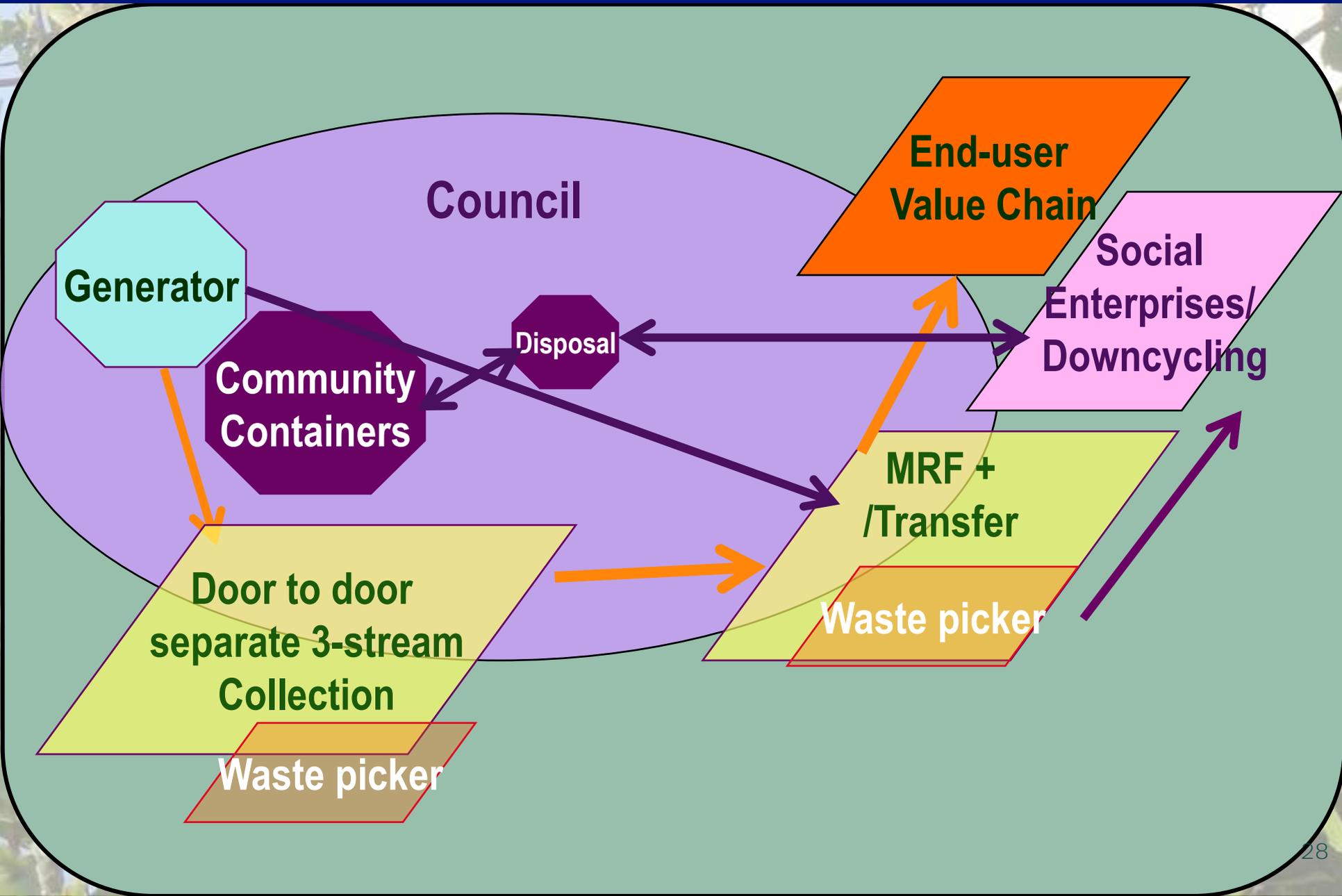


The value chain continues to function alongside the EPR collection channels.

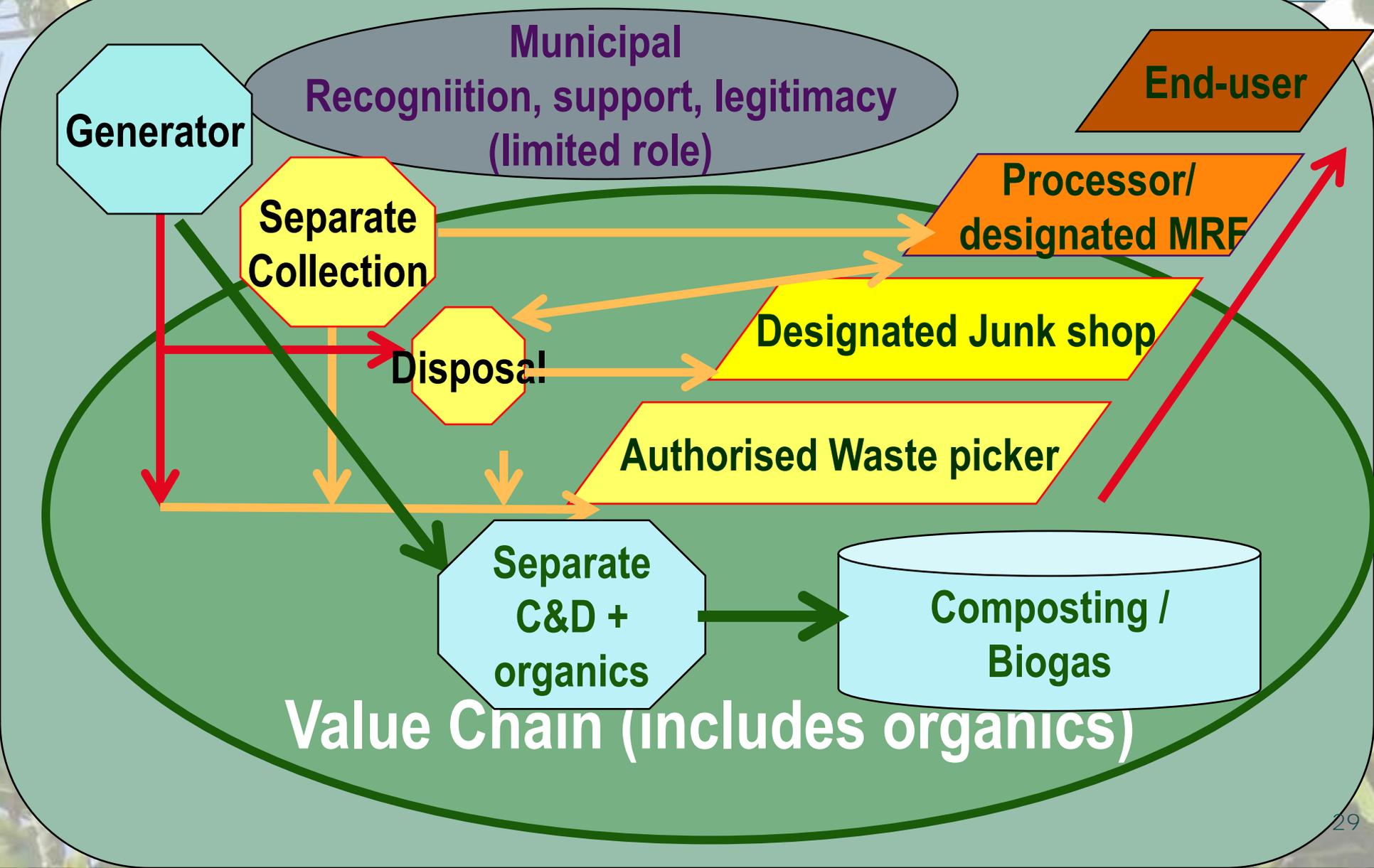
# Framework: EPR E-Waste Recycling in Costa Rica

1. Landfills are both municipal and regional, controlled dumpsites and sanitary landfills
2. Private operators charge market rates for disposal fees
3. Priced disposal creates an incentive for diversion
4. The E-waste system supports and co-operates with municipal and NGO recycling centres “centros de acopio.”
5. E-waste recycling is paid for by producers directly and through point-of-purchase fees & price supports.
6. The EPR decisions are made by a multi-stakeholder “technical committee” with full participation of producers
7. Value chain recycling and EPR operate side by side.
8. Each tonne valorised benefits the municipalities indirectly.

# ISWM Inclusive ISWM Hybrid Recycling & Service



# Private to Private Inclusive Recycling – Proposal for middle-income countries like Brazil



# Framework: Inclusive Recycling:

1. Priced disposal isn't (politically) possible
2. Valorisation "centre of gravity" is in the private value chain, without cost to municipalities or government
3. Each tonne valorised saves the *household* money, by avoiding *collection/transport*.
4. Authorities gain positive externalities, benefits in terms of jobs, *environment & governance*
5. Municipality shares responsibility through recognition, insurance, authorisation, support to the value chain.
6. Formal and informal recyclers invest in operations, keep materials revenues, secure livelihoods.
7. The vicious circle is avoided

## **5 Technical Path Items on the ISWM Agenda**

- 1. Integrating separate collection in the service chain**
- 2. Disposal technology, pricing and regulation, diversion credits, landfill bans, regionalisation**
- 3. Transfer, including recycling, composting, MRFs, Better Market Opportunities**
- 4. Kitchen and garden organics from households, businesses, gated communities, hotels, restaurants: central, decentralised, or on-site**
- 5. Automation of information management**

# 1. Separate collection

1. Municipal or value chain recycling: will disposal be adequately priced to drive recycling incentives?
2. Setting recycling goals: diversion, livelihoods, other

3. Separation technology: blue box, containers, bags,

4. Frequencies. container size

5. Capturing efficiency: reducing residual frequency

## Tompkins County, NY, USA

**SINGLE STREAM RECYCLING**  
Paper and containers...Mix it up!

**NO**

- ✗ Plastic bags
- ✗ Styrofoam®
- ✗ Drinking glasses, Pyrex®, or coffee pots
- ✗ Paper cups, tissues, napkins
- ✗ Syringes
- ✗ Containers from hazardous waste
- ✗ Compostable plastics
- ✗ Hangers
- ✗ PVC pipe

**YES**

- ✓ Paper clips, staples, rubber bands, and plastic windows on envelopes and paper are OK.
- ✓ Labels and neck rings on containers are OK.

**Plastics** (MORE ITEMS through)

**Glass Containers**

**Paper Milk & Juice Cartons**

**Cardboard & Mixed Paper**

**Metal Cans & Foil**

**Small Rigid Plastics** (NEW!)

YAD-GUIDE 07/2011

## **2. Disposal Technology, Pricing and Regulation**

- 1. Sanitary landfill, regional, private or public?**
- 2. Avoiding bad, false, or harmful technological choices**
- 3. Fast recirculation or conventional technology?**
- 4. Gas recovery and valorisation, or flaring**
- 5. Landfill bans for recyclables, debris, organics?**
- 6. Scalehouse, tipping fees, pricing levels, rules,**
- 7. On-site management of recyclables for valorisation, organic waste for composting**
- 8. Pre-treatment of medical waste, debris**

### **3. Transfer, MRFs, Composting, Markets**

- 1. Transfer with or without re-charging a vehicle**
- 2. Integration of the MRF function with transfer**
- 3. Integration of composting**
- 4. High-value compost or only for cover**
- 5. Separation of mixed waste streams on-site?**
- 6. Separation of commingled recyclables on-site?**
- 7. Operators: City, Cooperatives, NGOs, CBOs, Private companies, Sub-municipalities**

## **4. Intensifying Organics Diversion**

- 1. Separate collection at households, gated communities**
- 2. Kitchen and garden waste, or garden waste only?**
- 3. Collection routes, or dispatch on request**
- 4. Integrated with recycling and co-operatives, with debris and cartoneros or with service chain and mixed waste collection**
- 5. High or low-value compost production, biogas, or innovative uses like valorisation for animal feed**

# Organics collection Quezon City



## **5. Automation of information management**

- 1. Improve registration and reporting from all parties**
- 2. Collect factual information on tonnes, costs, materials prices, to make a clear evidence base.**
- 3. Develop capability to model, monetise gains, and calculate economic, environmental, social benefits**
- 4. Establish incentives, such as diversion credits, authorised small traders, access to benefits or PAYT**
- 5. Build software and data base (for entire state)**
- 6. Improve technology of the data entry function**
- 7. Integrate with the Observatory on Inclusive Recycling**

# Discussion:

1. What do you want this system in Brazil to look like in 5 years? In 50 years?
2. How do you avoid others' technological mistakes?
3. Where to look for existing models: Municipal Recycling in US/Europe, inclusive recycling in Colombia/India, or develop your own unique Brazilian approaches?
4. What are the roles of co-operatives, SLU, experts, equipment providers and the value chain in the technical path agenda?

Thank-you!