# Waste management in Veneto Region

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Source data and slides: ETRA spa - Regione Veneto - ARPAV

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# **Etra** at a glance

**Integrated water supply**

**Waste management**

**Renewable energy**

| | |
|---|---|
| Population | 601.266 |
| Surface extension km² | 1.709 |
| Municipalities | 75 |
| Employees | 890 |

# EU principles

## (only some)

# Waste management: subjects involved

| | |
|---|---|
| European Union | philosophy and standardization |
| Member States (Italy) | measures adoption |
| Regions | contextualization |
| Municipalities | operationals decisions |
| Waste Companies | actions |
| Other bodies | technical roles |

(Consiglio di Bacino, ARERA, supply chain consortiums, etc)

# The European Union hat – the framework

## EPR – extended producer responsability

Schemes to decrease the environmental impact of the productions.

Producer must cover the costs of separate collection, treatment, information to waste holders and data collection and communication. The contribution can depend also on durability, repairability, recyclablity and presence of hazardous substances.

Already mandatory in EU for:

1) end of life vehicles

2) waste electrical and electronic equipment

3) waste batteries and accumulators

By 2025 mandatory also for every kind of packaging.

**Minimim cost coverage: 80%**

**Currently active in Italy**

1) end of life vehicles
2) electrical and electronic equipment
3) batteries and accumulators
4) packaging **Etra's area receive 9 MC$**
5) tires
6) natural oils and greases
7) polyethilene
8) mineral oils

# The European Union hat – the framework

## Urban waste diversion

| | Past Directive | update 2018 |
|---|---|---|
| **separate collection** | if possible | mandatory |
| **waste streams** | Paper<br>Metals<br>Plastic<br>Glass | Paper<br>Metals<br>Plastic<br>Glass<br>Organic waste (2023)<br>Textiles<br>Domestic hazardous waste |

## Municipal waste recycling targets

**Past Directive**

by 2020 50% of paper, metals, plastic and glass of municipal waste and similar

**Current**

| Year | 2025 | 2030 | 2035 |
|---|---|---|---|
| % of total municipal waste | 55 | 60 | 65 |

# The European Union hat – packaging

## Directives 1994/62 and 2018/852

### Updated recycling rate targets

| % of **total** packaging (not only municipal) | 2025 | 2030 | Italy 2016 (current recycling rates) |
|---|---|---|---|
| General | 65 | 70 | 67 |
| Plastic | 50 | 55 | 41 |
| Wood | 25 | 30 | 61 |
| Iron | 70 | 80 | 77,5 |
| Aluminium | 50 | 60 | 73 |
| Glass | 70 | 75 | 71,4 |
| Paper and cardboard | 75 | 85 | 80 |

nb: current targets are about 10% lower

**Not so hard, except for plastic**

### Other requirements

- measures to foster the use of reusable packaging
- plastic packaging: by 2030 only recoverable or entirely recyclable.

# The European Union hat – landfills

## Directives 1999/31 and 2018/850

**Target**

max 10% of municipal waste disposed in landfill by 2035

Targets summary:

- min 65% recycling
- max 10% landfill
- the rest preparing for re-use, energy recovery

# The operative point of view

## Veneto Region and Etra spa

# Municipal waste: the Italian meaning

**Municipal waste = urban waste**

**Where do they come from?**

**70% residential**
**30% ICI* residential like waste**

***industrial, commercial and institutional sectors**

# Veneto at a glance 2017

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571 Municipalities

4.900.000 inhabitants

65.000.000 tourist nights per year (first in Italy)

GNP € 72 billions (second in Italy)

# Brief history: why we started

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## 1990 - 2000

**Landfill emergency**

- closures
- environmental problems (leachate, biogas, odours)

**Disposal costs increasing**

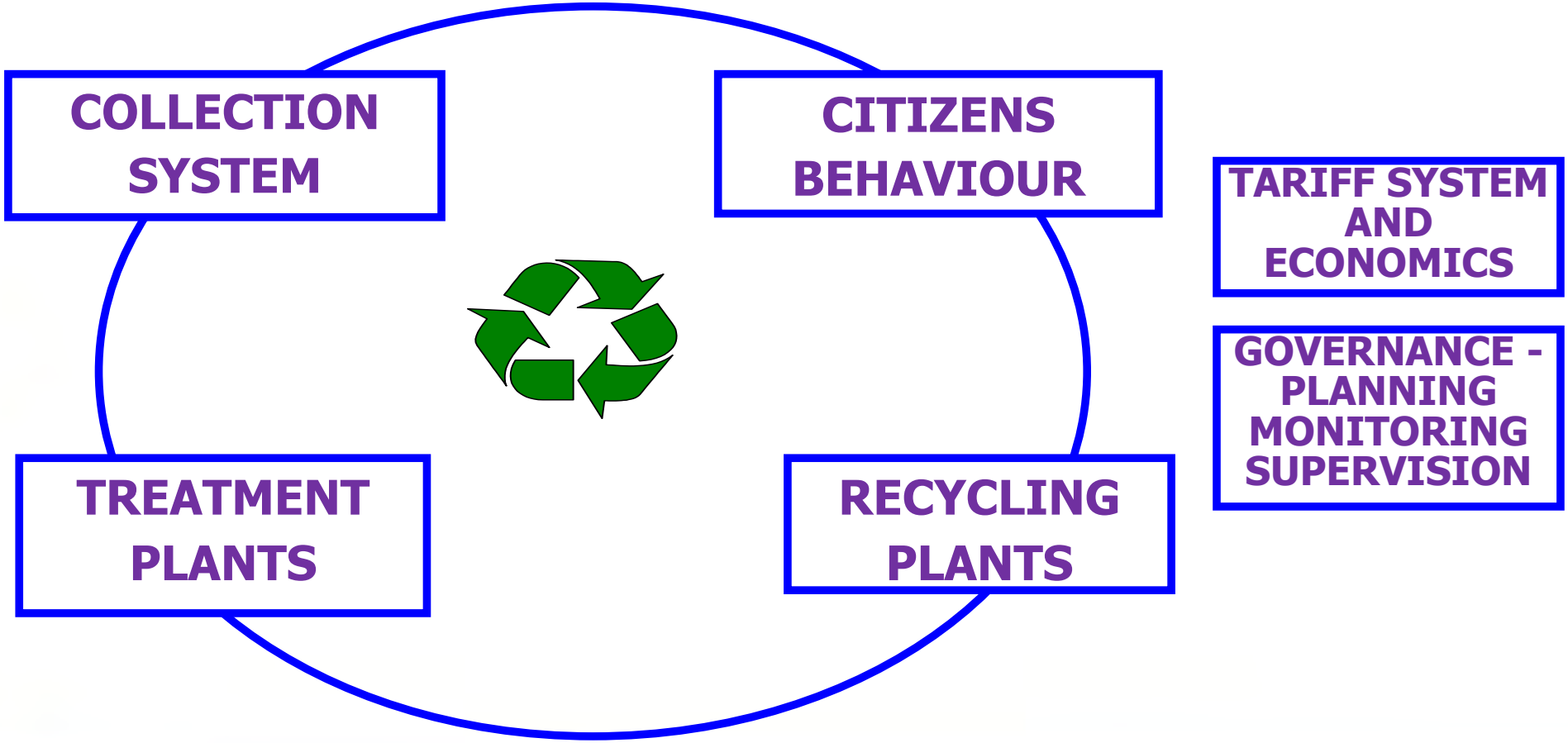
- technical rules on landfills (building, management, closure)
- technical rules on waste (waste organic content <15% in case of disposal)
- administrative rules (costs totally covered with waste tariff, landfill tariff approved by the Region, ecotax,)

**Governance**

- Municipalities Consortiums
- Regional Observatory on Waste
- laws (i.e. rules on composting)

# A consequence

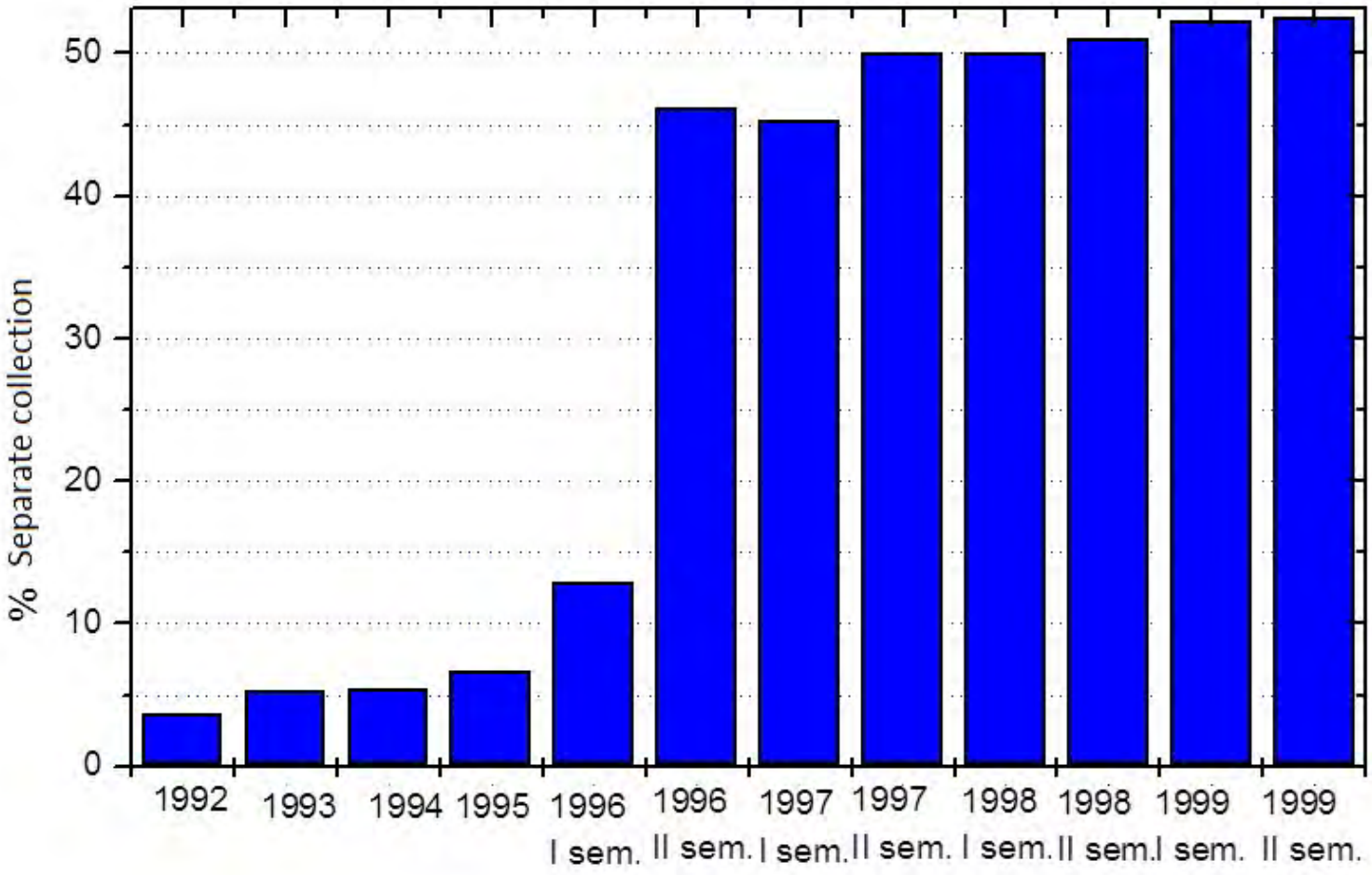
## A new waste management concept



# Quick results

## Waste diversion

(part of Etra's area)




Data from ufficio tecn. bacino PD1 su dati dei Comuni Consorziati

# Waste diversion

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## A pillar:

## diversion of organic waste

**Kitchen waste from households, restaurants, etc**
**Green waste from private and public areas**

## WHY?

**Organic stream > 30%**

**Simplified waste management**

**Knock-on effect**

**98% of the population**
**85% door to door collection system**
**67% door to door for all streams**

**nb: best performances: single material exept plastic+metals**

**423 collection centres**
**90% of Municipalities**
**21% of the diverted waste**
**particular waste collections**

# COMMUNICATION

## Another pillar:
## Strong communication
**widespread, various, continuous**

- Local TV, radios, newspapers
- Web site
- Call center
- Brochures
- Meetings with citizens **in each district**
- Education
- Teacher's training
- Treatment and recovery plant guided tours and open days
- Fairs

**Crucial steps**: start-up
feedback and monitoring evidences
service changes

# Tariff system

## Third (but not least) pillar: Tariff system

**Cover the costs, address behaviours**

**Directive 2018/851**

economic instruments to provide incentives for the application of the waste hierarchy

"Pay-as-you-throw" (PAYT) schemes charge waste producers on the basis of the actual amount of waste generated and provide incentives for separation at source of recyclable waste and for reduction of mixed waste

# Tariff system and waste diversion

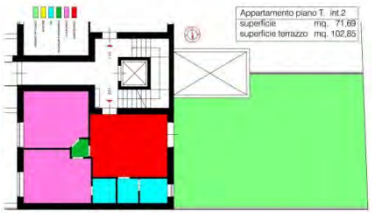
## Typical diversion system

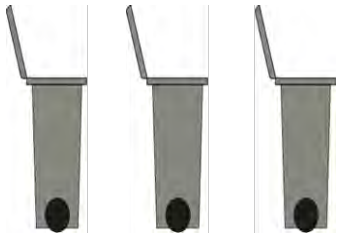
1) **door to door collection** bins for single material except plastic and metals
2) **optional collections** green waste, bulky waste, etc
3) **domestic composting** exempt rate for organic fraction
4) **collection centres**
5) **specific solutions** tourist and isolated areas, industries, etc

# Tariff system: the way we use

## PAYT: three parts tariff

Fixed part (mq,..) + Calculated variable part (coeff.) + Measured variable part (volume, flat, on request)





**The measured part is usually further divided in a fixed part (minimum number of emptying still charged) and a really progressive part. The minimum is required to prevent bad behaviours to avoid the fee (littering, residual waste in recyclable waste bins, etc)**

# Tariff system: the way we use

## PAYT in Etra spa

**Involved inhabitants (estimated 2019): ~ 500.000**

**Separate collection: ~ 70%**

**Start adoption: 2005**

| | Etra spa rate model (main elements for domestic users) | | | |
|---|---|---|---|---|
| **Measured stream** | **residual waste** | **green waste (grass and wood from gardens)[*]** | **kitchen waste [*][1]** | **bulky waste [*]** |
| **Measuring method** | volume (number of emptyings of predefined volumes) | flat (predefined collection frequency) | flat (predefined collection frequency) | call, number of pieces and maximum volume |
| **Equipment** | trolley-mounted bins 120 liters with tag (RFID) | trolley-mounted bins 240 liters without tag | garbage can 25 liters without tag | none |

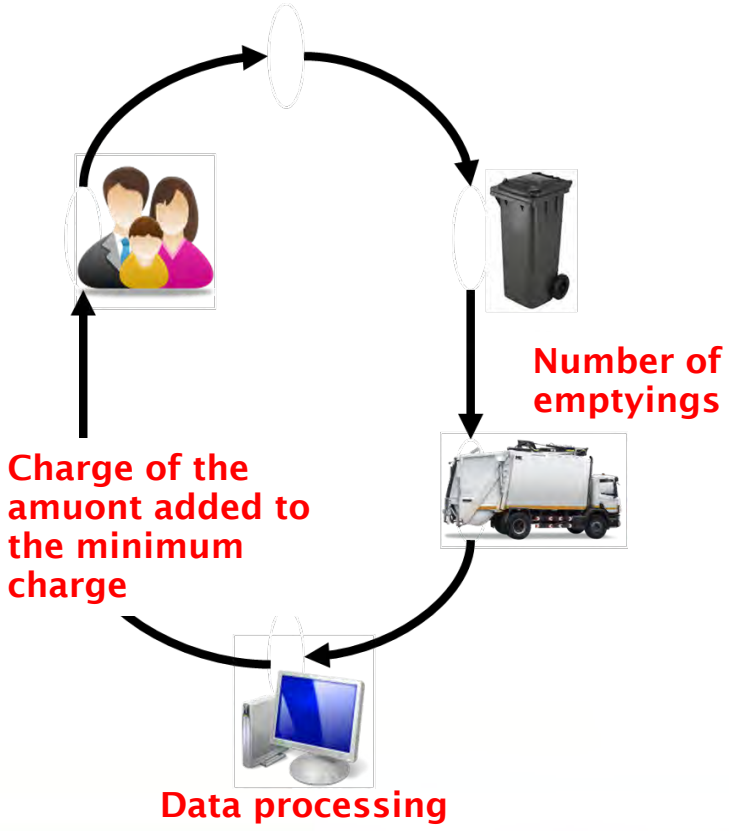
**[*] service on individual demand**

**[1] service cancelled on demand**

# Tariff system: the way we use

## How to measure residual waste: bin with tag RFID and reader on the truck

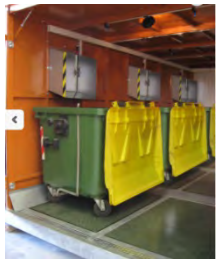
Count of the emptying of a bin containing residual waste, exposed by the user (measurement of the volume).



# Tariff system: the way we use

Other options in case of multiuser structures
(garbage bins with volumetric limiter, press containers, collection centres)

## Alternative measuring systems



Scale

## Structures

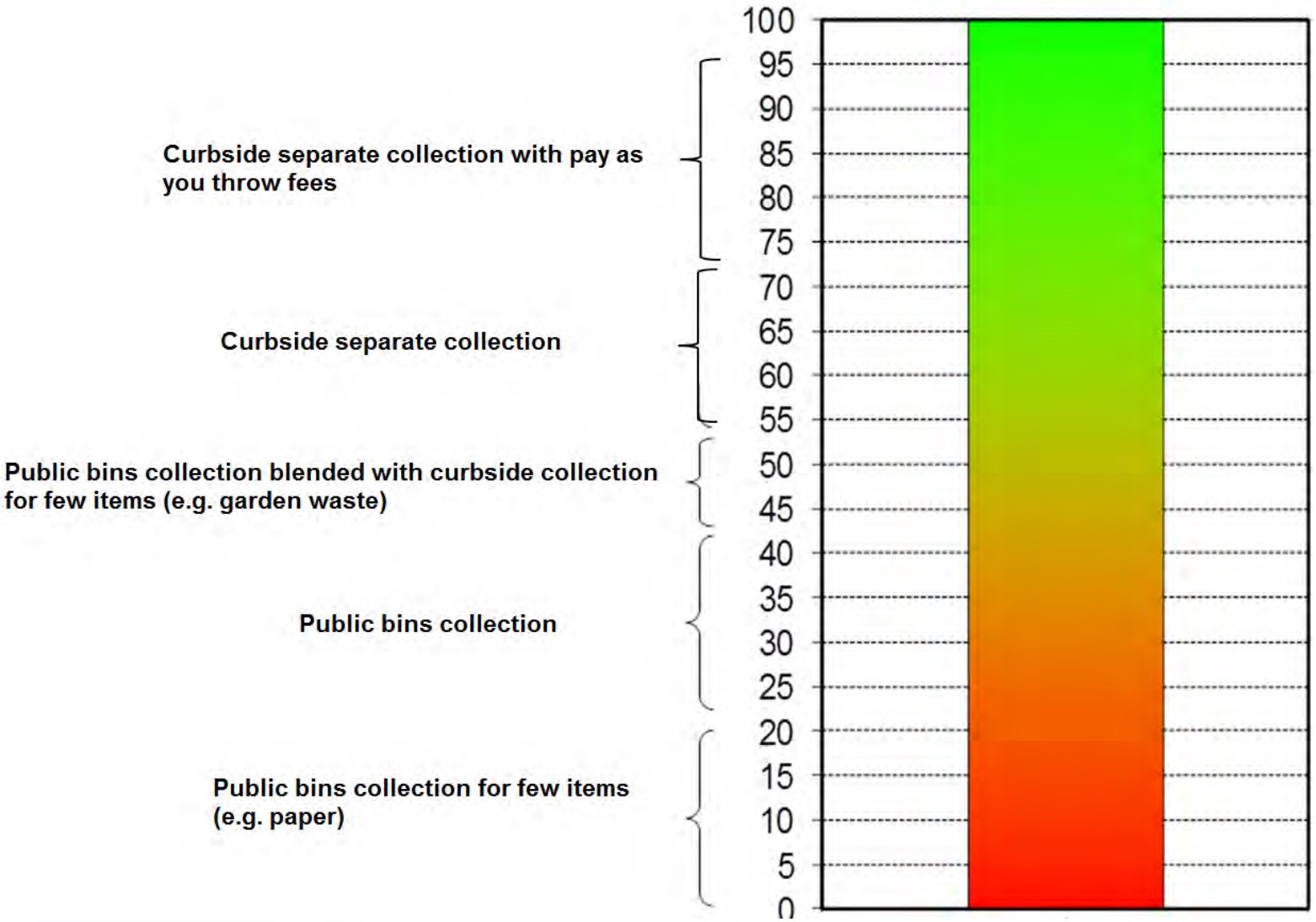
Press Container

Garbage bins with volumetric limiter

Collection centres

# Tariffs and collection systems: effects on diversion rate

## PAYT: really effective to enhance diversion rate%



# Material recovery inside Veneto

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## A strong sorting and treatment plants net

| 1.125 | Plants for matter recovery |
|---|---|
| 80 | Composting plants |
| 10 | Anaerobic digesters (electricity, heating, biomethane) |
| 200 | Sorting plants for paper, plastics, metals, and other recyclable |
| 30 | Recovery plants for electric and electronic waste |
| 25 | Bulky waste sorting plants |
| 6 | Treatment plants for waste from street cleaning |

# End of waste inside Veneto

**650.000 t**
Recyclable waste from
separate collection (2016)

| 59 Kg/inhab | 45 Kg/inhab | 24 Kg/inhab | 6 Kg/inhab |
|---|---|---|---|
| paper | glass | plastic | metals |

**Sorting and refining plants**

| 8 papermills | 4 glassmakers | 80 plastic industries | 5 foundries |
|---|---|---|---|

# Some outcomes

# Municipal waste total production 2016

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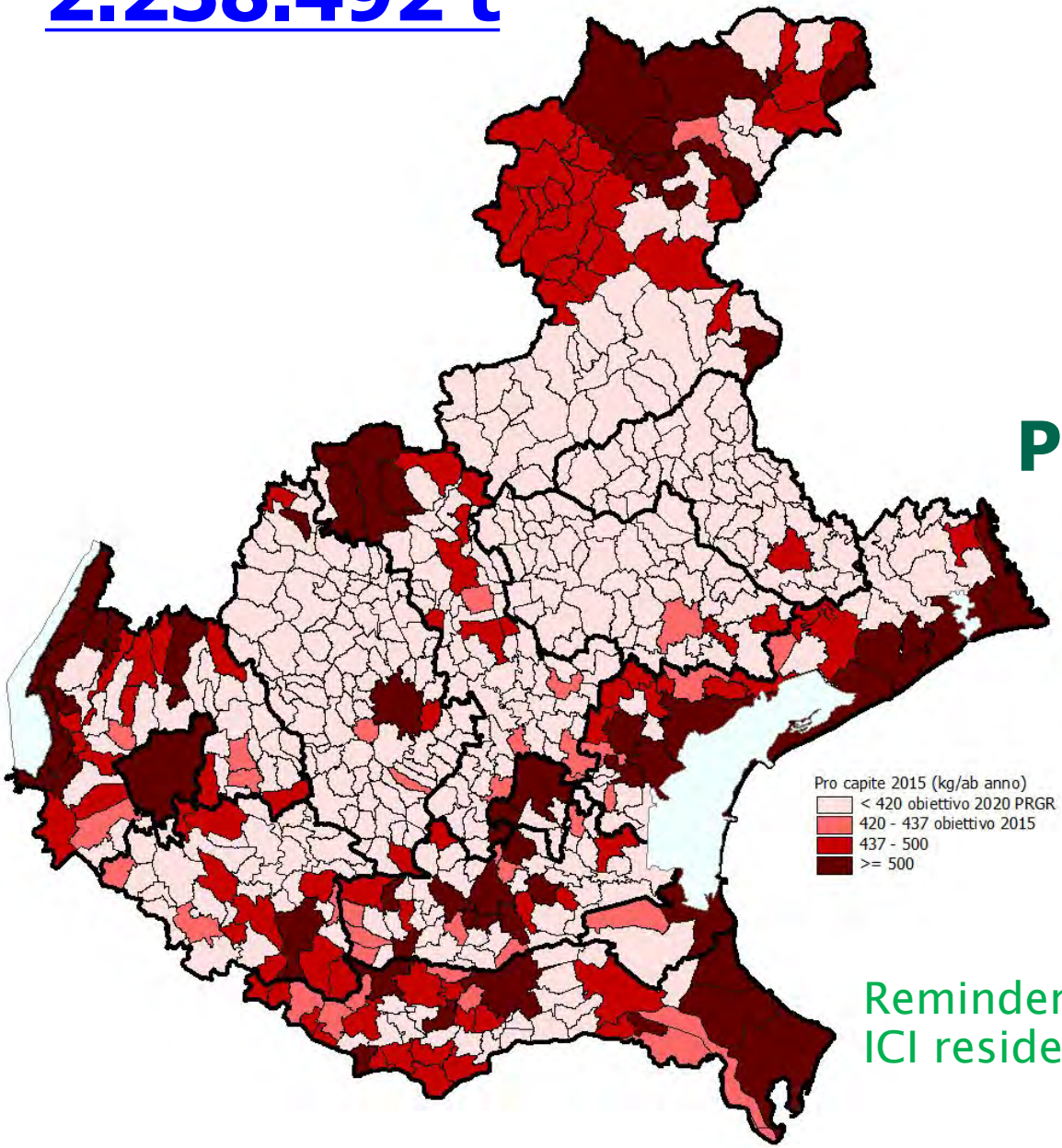
## 2.238.492 t




## Per capita production

456 kg/pc

## Per capita residual waste

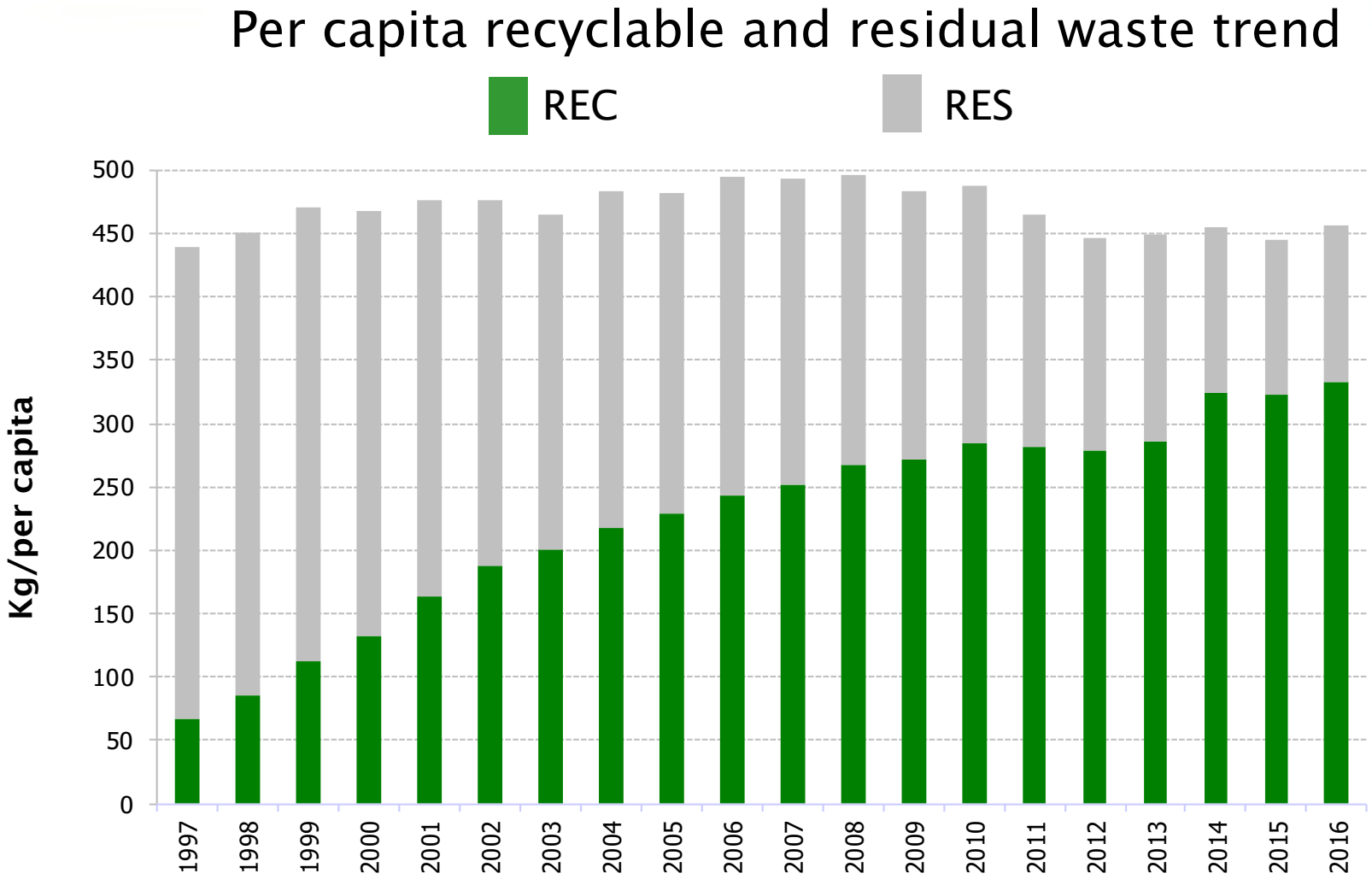
123 kg/pc

## Diversion rate

73%

Reminder: municipal waste means residential + ICI residencial like waste

# Per capita separate, residual and total waste collection




*Source: ARPAV – Osservatorio Regionale Rifiuti*

# Recycling

**~70%** net of scraps

**484** **Municipalities over 65%** (EU target 2035)

**181** **Municipalities over 76%** (Veneto target 2020)

**Only 4% landfill** (EU target 2035: 10%)

**The rest:**
**mainly to energy recovery**
**small quantities to landfill covering**

# Organic waste diversion

***700.000 t organic waste (>30%)***

***144 kg per capita***

- Total treatment potential 1 million t
- 270.000 t compost certified by ARPAV
- 50 million $m^3$ produced biogas (energy, heating, biomethane) **~120.000 MWh/y**
- **Domestic composting**: 320.000 families, 90.000 t organic waste
- Osservatorio Regionale Compostaggio

# Etra's best cases

## Cassola (14.729 inhabitants)
## 83%

| Collection system | | | | | | | | Tariff system | |
|---|---|---|---|---|---|---|---|---|---|
| Door to door as follows: | | | | | | | collection centre | residential users | ICI users |
| residual waste | paper and cardboard | glass | plastic and metals | kitchen waste | green waste | bulky waste | | | |
| 120 liters bin with microchip | 120 liters bin | 120 liters bin | plastic bags | 25 liters can | 240 liters bin only for households that requested the service; alternative: on request | collection on demand | access with badge; only for domestic users | a) fixed part: house surface<br>b) calculated variable part: family members<br>c) measured part: number of emptying residual waste bin<br>d) reduction foreseen in case of domestic composting<br>e) green waste: additional yearly fee (if on call: payment from time to time)<br>f) bulky waste: payment from time to time, only over 6 pieces | fixed tariff depending on occupied surface and kind of activity |

## Rosà (14.417 inhabitants)
## 82%

| Collection system | | | | | | | | Tariff system | |
|---|---|---|---|---|---|---|---|---|---|
| Door to door as follows: | | | | | | | collection centre | residential users | ICI users |
| residual waste | paper and cardboard | glass | plastic and metals | kitchen waste | green waste | bulky waste | | | |
| 121 liters bin with microchip | 120 liters bin | 120 liters bin | common plastic bags | 26 liters can | collection on demand | collection on demand | spot check of users identity; only for domestic users | a) fixed part: house surface<br>b) calculated variable part: family members<br>c) reduction foreseen in case of domestic composting<br>d) green waste: payment from time to time<br>e) bulky waste: payment from time to time | fixed tariff depending on occupied surface and kind of activity |

# Average costs

## C$/(per capita x year)

**VAT not included**

| | |
|---|---|
| **Etra average:** | **136** |
| **Etra families:** | **88** |
| **Veneto:** | **196** |
| **Italy:** | **243** |

**Average income in Veneto: 29.000 C$/(pc x y)**

## Current landfill cost ~170 C$/t

**municipal waste**

# Near future in Etra: biomethane for collection vehicles

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ANAEROBIC DIGESTION

AEROBIC COMPOSTING

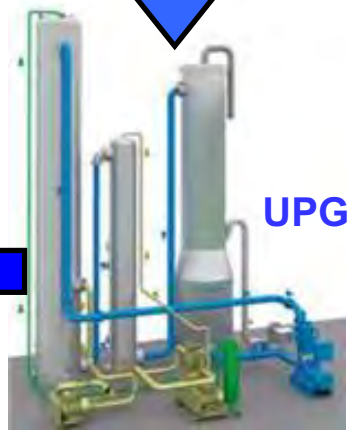
COMPOST

Fertilization

OFMSW

COLLECTION

BIOME-THANE



BIOGAS

UPGRADING

# Near future in Etra: biomethane for collection vehicles

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## Biomethane from biogas

| | Etra spa (based on current biogas production) |
|---|---|
| **biomethane (t/y)** | 3.524 |
| **diesel equivalent (l/y)** | 4.580.950 |
| **current consumption for waste collection (l/y)** | 2.800.000 |

Industrial recovery of CO2 from upgrading
5.700 t CO2/y
still under assessment but **very promising perspectives**

# Near future in Etra: ICI diversion rate improvement

**Municipal waste**
**70% residential**
**30% ICI (industrial, commercial and institutional) residential like waste**

**ICI waste affects the average diversion rate*:**
**domestic 79%**
**firms 50%**
**average 70%**

**Inspections and APP to promote better diversion and find the best solutions case by case**

***Estimated for Etra's area**

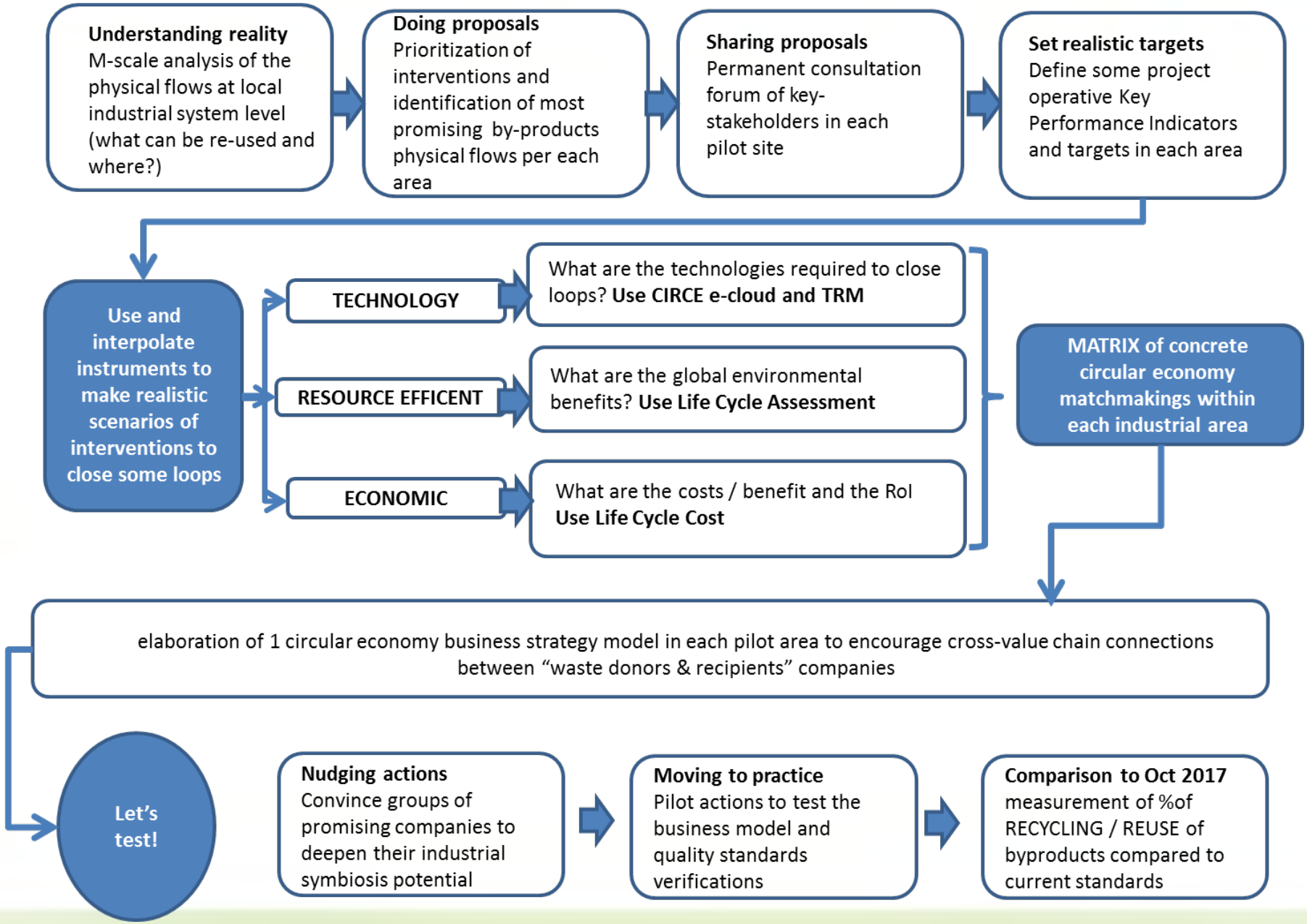
# Near future in Etra

Broader adoption of **PAYT**

Fight abandonment and **littering**

Promote **circular economy** inside the industrial system

# Near future in Etra



# *Thank you*

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