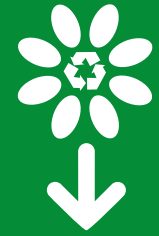


# Parma towards Zero Waste

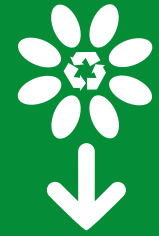


**“Door by door waste collection and pay-as-you-throw system in a 190.000 inhabitants town”**



Gabriele Folli, Deputy Mayor for Environment, Municipality of Parma

# Parma – City general figures

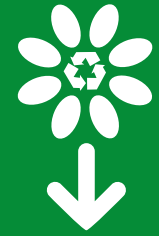


- 194.374 inhabitants in 260,6 km<sup>2</sup> (745 inh/km<sup>2</sup>)
  - 24.124 in the historical center (2,4 km<sup>2</sup>; 10.093 inh/km<sup>2</sup>)
  - 129.060 in urban area (29 km<sup>2</sup>; 4.407 inh/km<sup>2</sup>)
  - 41.190 in rural area (229 km<sup>2</sup> ; 178 inh/km<sup>2</sup>)
- 96.141 families, 12.337 business activities
- 15% of the population of different native language
- Important presence of University students coming from outside (66% on a total of 26.000 students)



# Parma goals

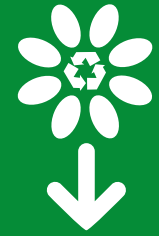
Reach 80% separate collection within 2017



- Extend door-to-door system on the whole territory
- Apply pay-as-you-throw system as a method of equity for citizens
- Introduce a cultural change in the habits of the citizens
- Introduce waste prevention and reduction at the source



# At the beginning - nov 2012



- 48,5% separate collection
- Most of the territory served with on road waste containers
- Less than 1/3 of the citizens served with door-to-door collection system
- City of Parma responsible for about 40% of the whole waste production in the province
- High incineration costs (170 Euro/ton)
- Low packaging recycling incomes (plastic, metals and glass collected together in one single stream)



# Parma – Municipal solid waste figures



- Total waste generated by households and big producers / business, excluding industrial waste is 530 kgs/inhabitant/year (vs an average of other capital cities in the region of 700 kgs/inhabitant/year)

**73,5%**  
separate  
collection

## Main streams of collection

| Kg per capita/year | 2012   | 2013   | 2014   | 2015   | 2016   | Diff. 2016 vs 2012 |
|--------------------|--------|--------|--------|--------|--------|--------------------|
| Paper              | 49,84  | 49,38  | 54,09  | 54,44  | 55,28  | +11%               |
| Cardboard          | 18,77  | 19,71  | 19,61  | 19,23  | 19,95  | +6%                |
| Glass*             | 0,98   | 8,51   | 31,06  | 46,59  | 47,77  | +4760%             |
| Plastic/metals*    | 0,98   | 5,40   | 24,08  | 40,72  | 42,11  | +4208%             |
| Organic waste      | 52,67  | 62,69  | 90,50  | 99,11  | 104,85 | +99%               |
| Garden waste       | 55,55  | 59,50  | 62,22  | 82,92  | 77,97  | +40%               |
| Residual waste     | 248,62 | 220,87 | 143,52 | 117,43 | 110,13 | -56%               |

\* In 2012 we started to change method of collection of plastic, metals and glass that formerly were collected in one single flow

# Parma vs other capital cities in the region



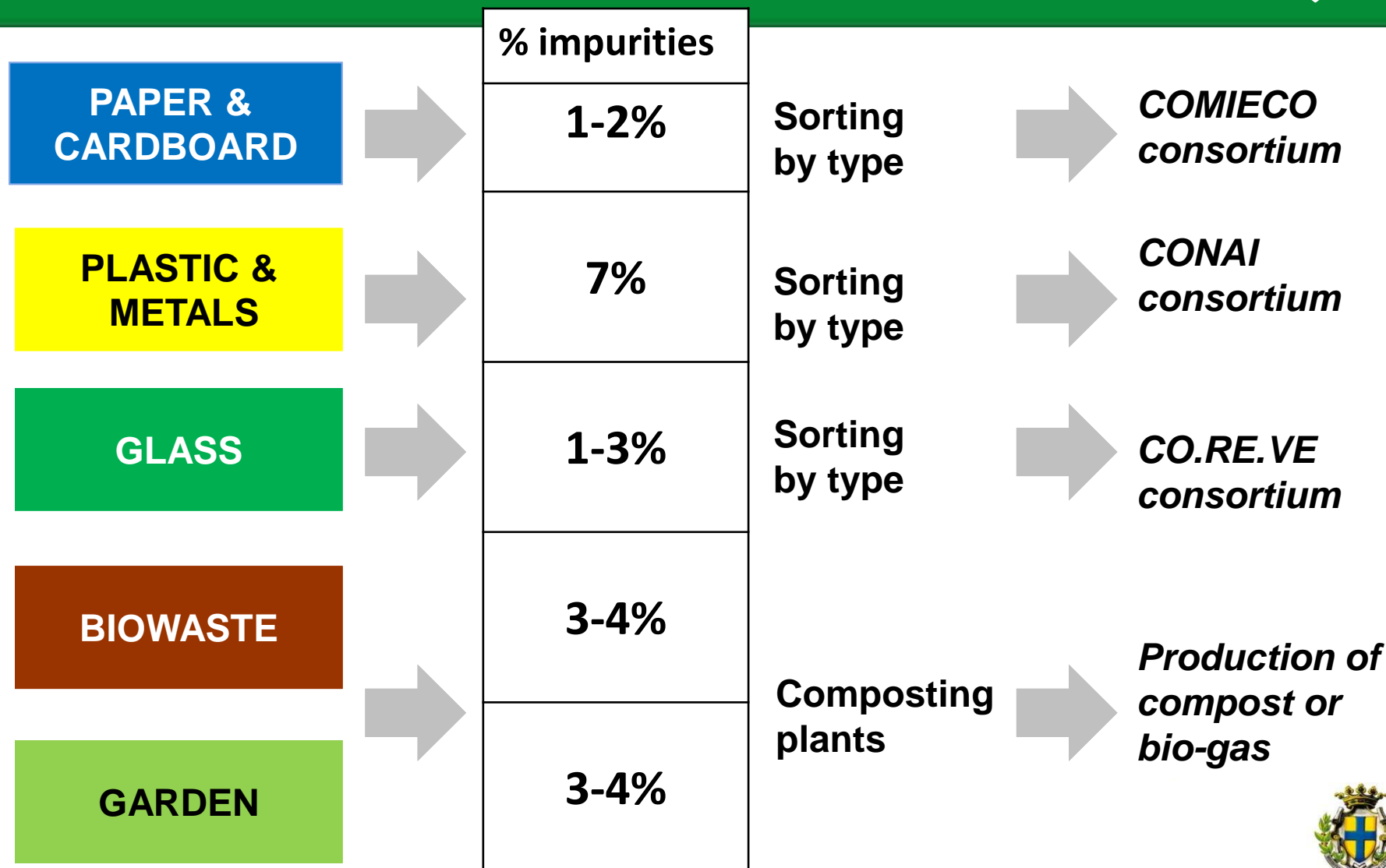
- Parma is the only city in the region that has introduced door to door collection and pay-a-you-throw system



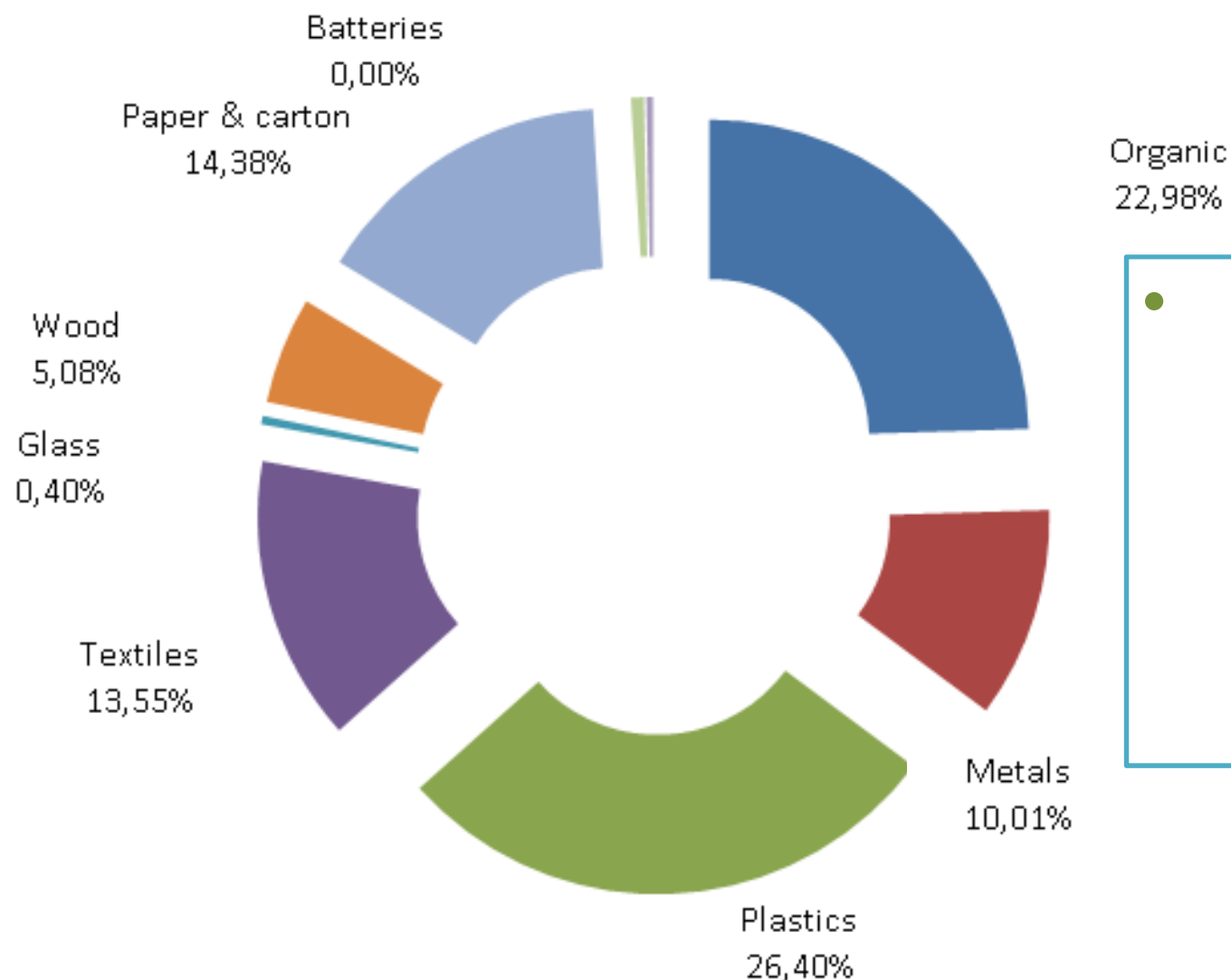
| Capital cities in Emilia Romagna | Inhabitants | Residual waste (kg/inh/yr) | Bio-waste (kg/inh/yr) |
|----------------------------------|-------------|----------------------------|-----------------------|
| Parma                            | 194.000     | 110                        | 105                   |
| Piacenza                         | 102.490     | 241                        | 48                    |
| Reggio Emilia                    | 171.520     | 252                        | 39                    |
| Modena                           | 184.973     | 261                        | 30                    |
| Forlì                            | 118.181     | 267                        | 49                    |
| Rimini                           | 148.527     | 272                        | 135                   |
| Ravenna                          | 159.669     | 282                        | 37                    |
| Bologna                          | 386.663     | 293                        | 50                    |
| Ferrara                          | 133.478     | 307                        | 42                    |

\* Data from Parma referred to 2016; other capital cities data taken from 2015 regional report

# Quantity of impurities collected of all waste streams



# Merceological analysis of the residual waste after 69% separate collection (dec 2014)



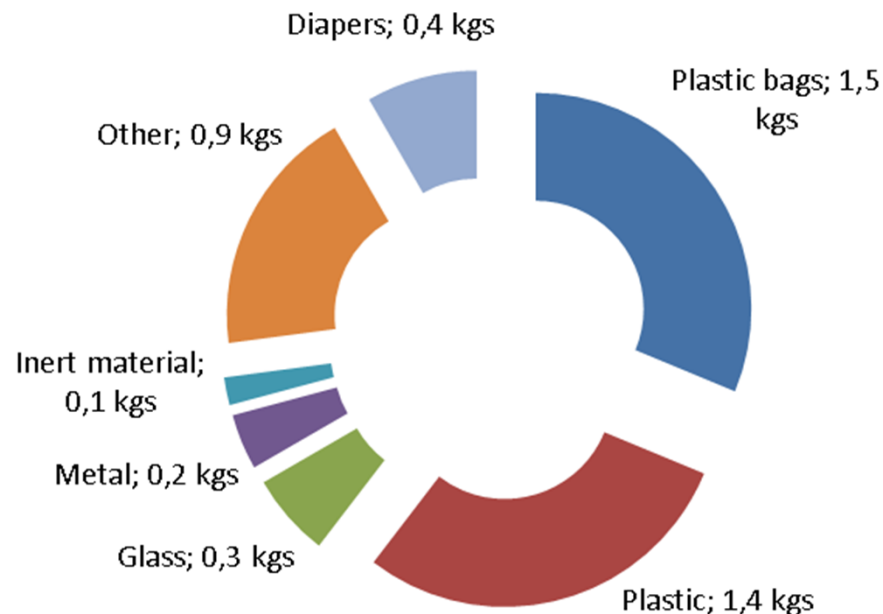
- **60% of what's in residual waste is still recyclable with actual technologies**



# Merceological analysis of bio-waste



- Analysis made by CIC (Italian Consortium of Composters) on 4 batches
- Average 3,3% of non compostable materials



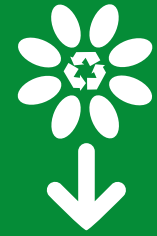
October, 16 2014 - Batch 2

| Organic waste analyzed   | Kg    | %     |
|--------------------------|-------|-------|
| Compostable material     | 144,2 | 96,8% |
| Non compostable material | 4,8   | 3,2%  |
| Total                    | 149,0 | 100%  |

| Non compostable material analysis | kg  | %     |
|-----------------------------------|-----|-------|
| Plastic bags                      | 1,5 | 31,3% |
| Plastic                           | 1,4 | 29,2% |
| Glass                             | 0,3 | 6,3%  |
| Metal                             | 0,2 | 4,2%  |
| Inert material                    | 0,1 | 2,1%  |
| Other                             | 0,9 | 18,8% |
| Diapers                           | 0,4 | 8,3%  |
| Total                             | 4,8 | 100%  |

| Compostable material analysis | kg    | %      |
|-------------------------------|-------|--------|
| Organic                       | 144,2 | 99,7%  |
| Grass scraps                  | 0     | 0,0%   |
| Wood-cellulose scraps         | 0     | 0,0%   |
| Paper and cardboard           | 0,5   | 0,3%   |
| Wooden packaging              | 0     | 0,0%   |
| Total                         | 144,7 | 100,0% |

# Delivery System Of All Fractions



- Organic waste collection
- Plastic, metals and tetra-pack collection with 80 lt bag
- Road collection for glass
- Paper and carton
- Door-to-door collection for residual waste

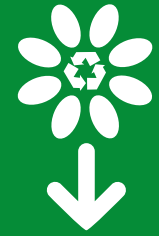


# Collection frequency (for families)



| Waste type                           | Family container   | Collection frequency | Building container   |
|--------------------------------------|--|----------------------|--|
| <b>Bio-waste</b>                     |   | 2/3 times a week     |                                   |
| <b>Plastic, metals and Tetra-pak</b> |   | 1 a week             |  |
| <b>Paper &amp; carton</b>            |    | 1 a week             |                                  |
| <b>Glass</b>                         |  | 1 a week             |  *road collection               |
| <b>Residual waste</b>                |  or  | 1/2 times a week     | <div> <div></div> <div>Delivery between 19,30 and 21</div> <div></div> <div>Collection starting from 21</div> </div> |

# Collection frequency (for business activities)

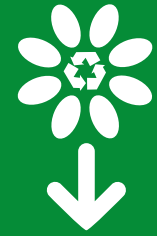


- Frequency is suited for non domestic users according to type of activity and area of the city
- In the city center for restaurants, bars, etc 3/week for residual waste, daily for bio-waste, plastic/metals and glass; for special cases (lack of spaces) we have also conceived twice/day for bio-waste and 3/day for residual waste (acutally only 28 cases)
- In the rest of the city usually standard frequency as for families except for particular cases (university campus, hospitals and some restaurants)





# Residual waste



- Residual waste containers completely removed from the public road
- Each family/business activity has a dedicated container with microchip
- 50 liters bags with microchip (only for the monumental area > 8.000 inhabitants)
- 40 liters bins with transponder (for the rest of the city the most diffused size/type container)

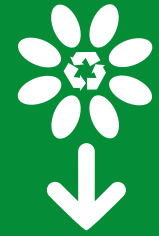
| Residual waste        | Quantity |
|-----------------------|----------|
| 40 liters bin         | 80.603   |
| 120 liters bin        | 7.486    |
| 240 liters bin        | 1.252    |
| 360 liters bin        | 1.691    |
| 660 liters container  | 13       |
| 1000 liters container | 1.503    |

**110 kg**  
per inhabitant  
per year



COMUNE DI PARMA

# Bio-waste



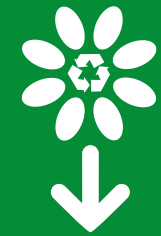
- Bio-waste vented kitchen caddy with bio-bags for each family
- Condominium bins with wheels for collection of bio-bags
- 12% discount on the bill for home composting
- Bio-bags use is mandatory and they are distributed free of charge yearly

| Bio-waste      | Quantity |
|----------------|----------|
| 20 liters bin  | 3.558    |
| 40 liters bin  | 8.819    |
| 120 liters bin | 12.243   |
| 240 liters bin | 862      |
| 360 liters bin | 6        |

**105 kg**  
per inhabitant  
per year



# Paper and cardboard



- Paper and cardboard collected 1/week for families through condominium bins
- Business activities has a dedicated cardboard collection with frequency according to type of activity

| Paper & cardboard                     | Quantity |
|---------------------------------------|----------|
| Roll-cart<br>(for non-domestic users) | 1.339    |
| 40 liters bin                         | 80       |
| 120 liters bin                        | 12.107   |
| 240 liters bin                        | 7191     |
| 360 liters bin                        | 5732     |
| 1000 liters container                 | 360      |

**75 kg**  
per inhabitant  
per year



# Plastic, metals & tetrapack



- 80 liters disposable bags for most of domestic users
- Yellow bins for rural areas
- Bigger containers for non-domestic users

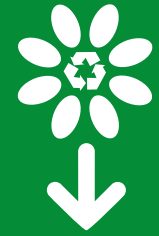
| Plastic, metals & tetrapack           | Quantity |
|---------------------------------------|----------|
| Roll-cart<br>(for non-domestic users) | 212      |
| 40 liters bin                         | 803      |
| 120 liters bin                        | 7.779    |
| 240 liters bin                        | 1536     |
| 360 liters bin                        | 1844     |
| 1000 liters container                 | 288      |

**42 kg**  
per inhabitant  
per year





# Glass



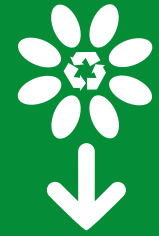
- Bins with wheels and calibrated hole in the street of the city center
- Bell containers on the road for the rest of the city
- Emptying is carried out weekly during daytime
- Restaurants and bars has their own dedicated bin

| Glass                        | Quantity |
|------------------------------|----------|
| 120 liters bin               | 216      |
| 360 liters bin               | 291      |
| 2200 liters "bell" container | 1.304    |

**48 kg**  
per inhabitant  
per year



# Garden waste



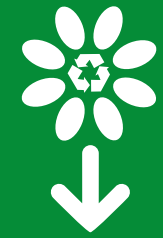
- Containers for garden waste available for free access on the road in urban areas (not in city center)
- Delivery also possible free of charge to waste collection centers
- Emptying is carried out 62 times/year according to the period (lower frequency during winter)

| Garden waste          | Quantity |
|-----------------------|----------|
| 2400 liters container | 767      |

**78 kg**  
per inhabitant  
per year



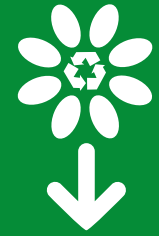
# Facilitations for newborns, elders and disable



- Maximum discount in the PAYT system for families with newborns up to 30 months yr old and elders/disable with health problems
- Collection frequency doubled



# Other waste types

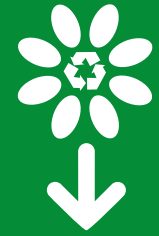


- Exhausted batteries, expired drugs, textiles, small dimensions electronics, toners are also collected with proximity containers located in supermarkets, gas stations, pharmacies, schools, etc.





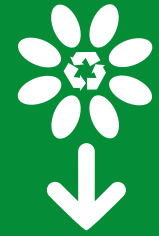
# Alternatives to door-to-door Eco-Station & Eco-Wagon



- Automated collecting stations for each waste type accessible with badge or twin-tub trucks with fixed paths and stops for city center active on days when standard service is not available
- Supplementary services offered to users as an alternative to standard calendar for:
  - Working shifts, commuters
  - Extra production of waste
  - Holidays, etc.



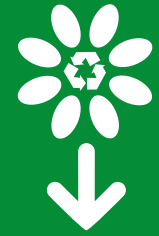
# Eco-Station



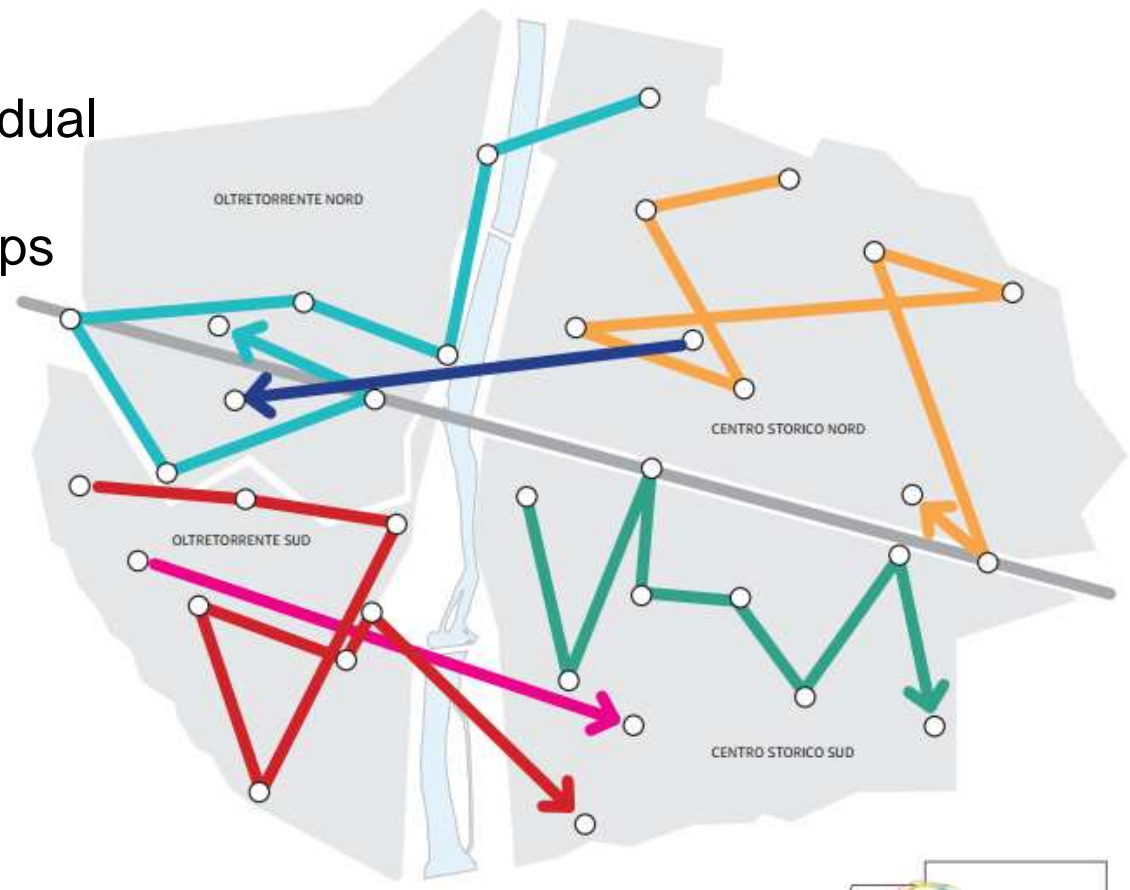
- Located in park + ride facilities (actually 4 + 4 in feb 2017)
- Access granted 24/7 with badge or health insurance card
- 8 doors of delivery for residual waste (volumetric controlled), plastics/metals, paper, bio-waste
- Controlled by cameras to prevent littering
- Remote control of the filling level
- Solar panels on the roof to power batteries



# Eco-wagon



- Operates in the historic centre similar to a bus with its own routes and stops
- Use of two-tubs trucks for lightweight material and residual waste
- 4 routes with 25 minutes stops
- 2 routes with 2 hours stops





# Eco-wagon



- Service conceived both for families and commercial users
- The service is active on days where standard door-to-door is not available

**Materiale:**

Imballaggi in plastica -  
Imballaggi in metallo -  
Poliaccoppiati tipo  
TetraPak

**Contenitore:**

Giallo

**Giorni di****raccolta:**

giovedì (Settimanale)

**Esposizione:**

Dalle ore 19:30 alle ore  
21:00

**Materiale:**

Residuo non recuperabile

**Contenitore:**

Sacco bianco

**Giorni di****raccolta:**

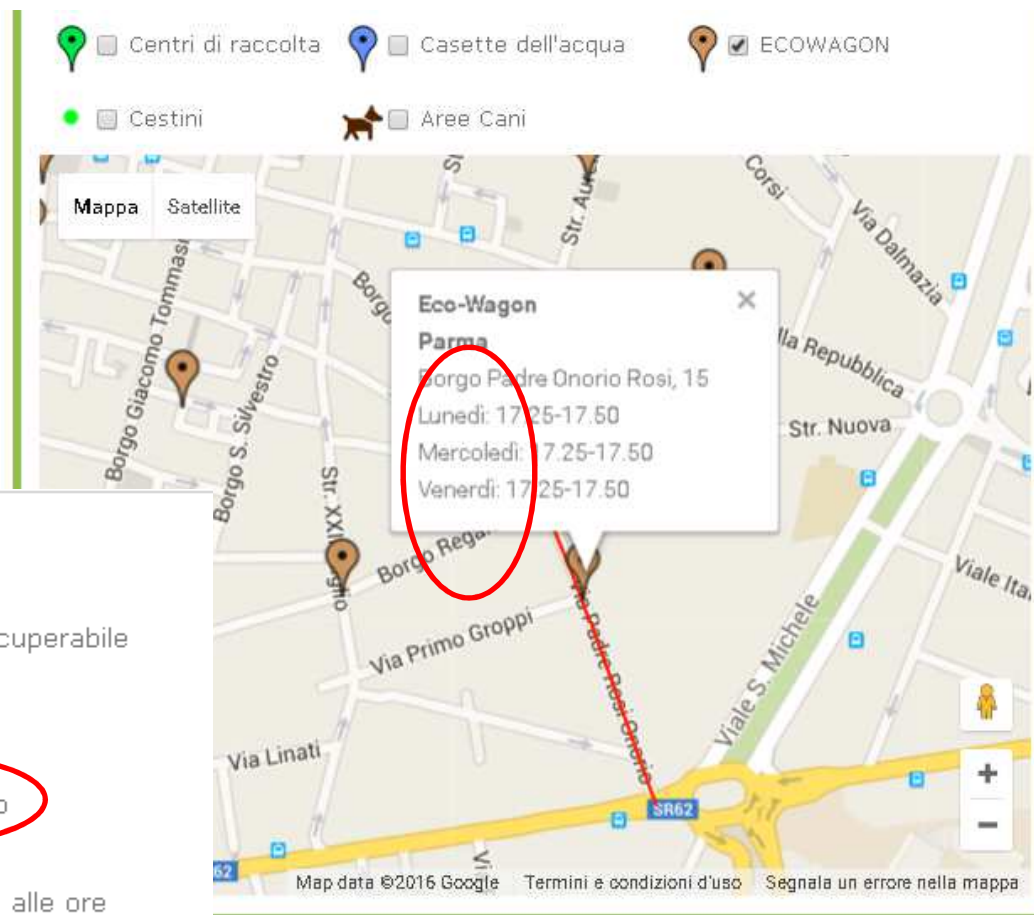
martedì, sabato  
(Settimanale)

**Esposizione:**

Dalle ore 19:30 alle ore  
21:00

**Modalità:**

Porta a port



Servizio di raccolta del tuo Comune

**PARMA, BGO PADRE ONORIO ROSI**



COMUNE DI PARMA



# Eco-wagon stops

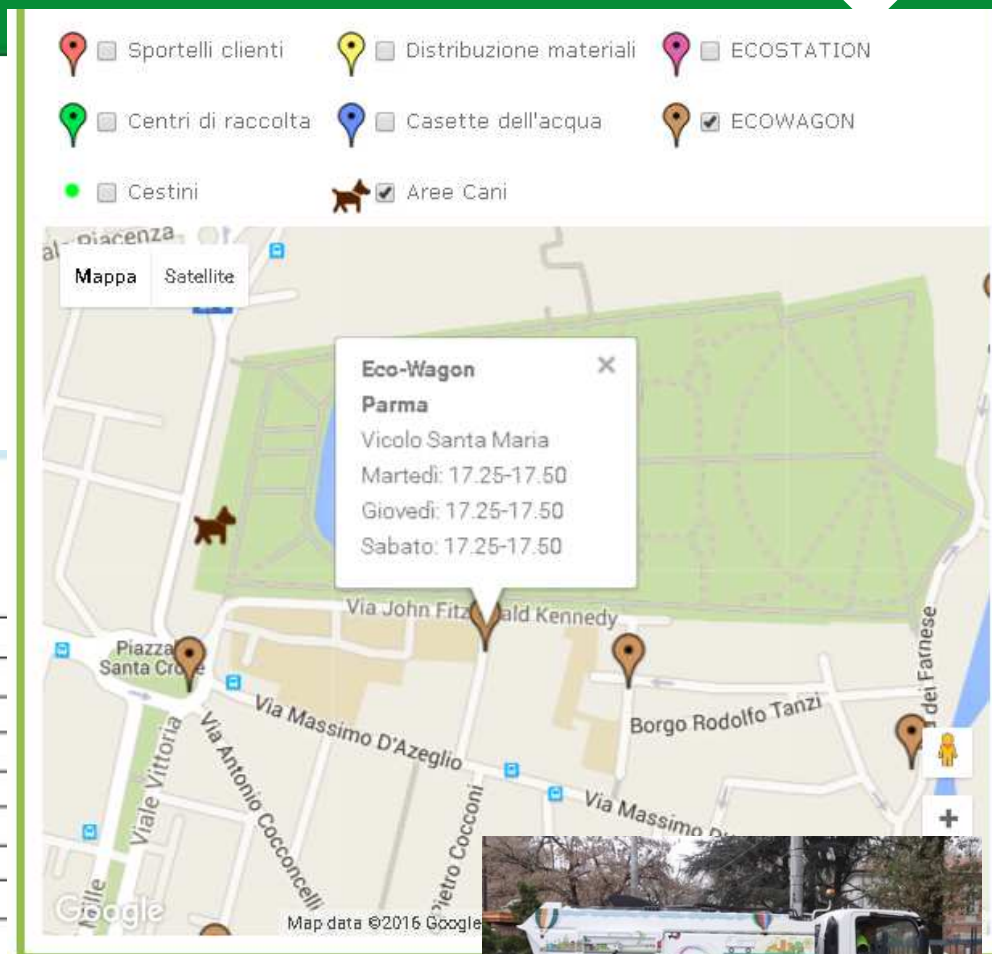


- Users can find on calendars as well on the web all the routes, times and stops

## Punti di raccolta sosta di 25 min

| INDIRIZZO                | DOVE                             |
|--------------------------|----------------------------------|
| Via Giuseppe Verdi, 10/a | dietro edicola - sul marciapiede |
| Strada delle Fonderie, 7 | ecoisola vetro                   |
| Via dei Farnese, 6       | fronte civ. 5 - lato chiesa      |
| Borgo S. Spirito, 29/a   | angolo Vicolo Grossardi          |
| Piazzale S. Croce, 27    | sul piazzale                     |
| Piazza Guido Picelli     | sul piazzale                     |
| Strada Imbriani, 2       | lato chiesa Annunziata           |
| Vicolo S. Maria          |                                  |

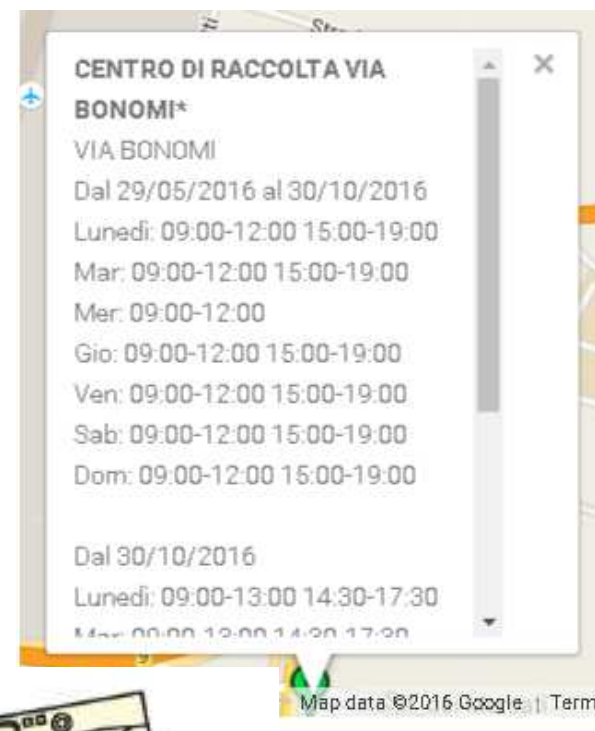
|                        |                           |              |               |
|------------------------|---------------------------|--------------|---------------|
| Via Alberto Riva, 2    | angolo Via Filzi Fabio    | lu - me - ve | 13:00 - 13:25 |
| Strada Costituente, 10 | angolo Borgo dei Grassani | lu - me - ve | 13:32 - 13:57 |
| Strada Costituente, 2  | angolo Strada Bixio       | lu - me - ve | 14:01 - 14:26 |
| Viale Gorizia, 19/b    | angolo Strada Bixio       | lu - me - ve | 14:32 - 14:57 |



# Waste collections centers and bulky waste withdrawal

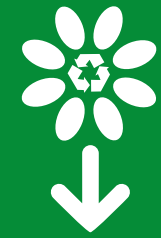


- 4 waste collection centers with wide opening times (3 on 4 are 7/7)
- Free bulky waste withdrawal service with booking via app, web or telephone



COMUNE DI PARMA

# Collection service organization



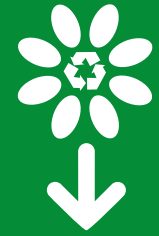
## Type of vehicle adopted

- Trucks with compactors with 5-7 m<sup>3</sup> tub
- Trucks with 5-15 m<sup>3</sup> capacity (for bio-waste)
- Trucks with back loading with 10-20 m<sup>3</sup> capacity
- Trucks with side loading with 15 m<sup>3</sup> capacity
- Trucks with 20 m<sup>3</sup> capacity with crane for «bell» containers (glass)





# Food Waste



## Prevention

- A series of projects are active in the city to prevent food waste (school and private canteens together with a network of association to collect food surplus and redistribute to charity organizations)

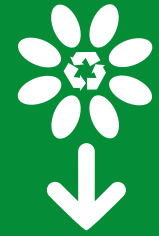


## Collection

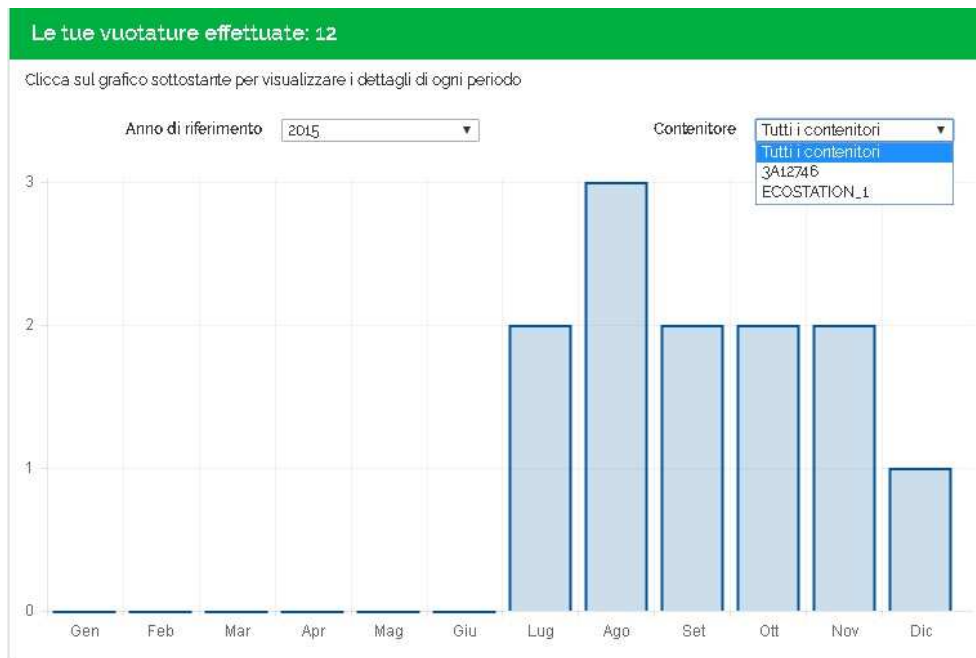
- Use of compostable bags made in biopolymers has been preferred for collecting remaining food waste due to good performances and reduced space required for stocking of rolls of biopolymers bags



# Pay As You Throw Or Volume Based Waste Fees



- Each family/commercial user has a dedicated bin equipped with a transponder for the residual waste
- A part of the cost of the bill is calculated on the times that the bin has been delivered for emptying
- A minimum number of bin deliveries is included in the bill to avoid littering





# Pay As You Throw Or Volume Based Waste Fees



- In the first 6 months of PAYT system application, more than 80% of the families and more than 70% of business activities has reached the maximum discount
- Each extra delivery is charged for 1,40 Euro (in case of 40 ltrs bin)



Example of a family of 3 persons in a 100 sqm apartment

| Method of billing                            | Euro | # deliveries |
|--|------|--------------|
| Old method (based on surface/nr. of persons) | 262  | n.a.         |
| PAYT - maximum discount                      | 244  | 24           |
| PAYT - point of equivalence                  | 262  | 36           |
| PAYT - maximum cost                          | 285  | 52           |

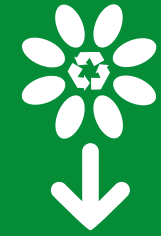
Data referred to 2016

Number of bin emptying included in the bill (according to nr. of persons and container type)

| Nr persons/family | 1  | 2  | 3  | 4  | 5 and more |
|-------------------|----|----|----|----|------------|
| 40 litres bin     | 12 | 18 | 24 | 30 | 36         |
| 120 litres bin    | 4  | 6  | 8  | 10 | 12         |



# Pay As You Throw Or Volume Based Waste Fees



- Each family/business activity can predict the bill to pay thanks to a calculator form available on the website

Calcola la tua TARI

Benvenuto nella sezione di calcolo della TARI (Tassa Rifiuti)

Comune:

Mq:

Componenti:

Contenitore (vuotature min):

Numero vuotature eccedenti:

Sacchetto 50 lt. (48)

Mastella 40 lt. (24)

Bidoncino 120 lt. (8)

TARIFFA UTENZE DOMESTICHE

Comune: I034027 - PARMA

quadri: 100

o componenti: 3

o da pagare: € 252,43  
(Corrispondente a : €



Calcola la tua TARI

importo è suddiviso nelle seguenti parti:

fissa: € 78,90

di Igiene Ambientale quali spazzamento e lavaggio strade, gestione dei rifiuti abbandonati su

variabile: € 161,51

Quota contenitori € 37,10

lta e trasporto dei rifiuti, raccolta differenziata e avvio al recupero, gestione e attività degli imp

buto ambientale provinciale (5%): € 12,02

Calcolo effettuato con le tariffe deliberate per l'anno 2015.

Nuovo Calcolo

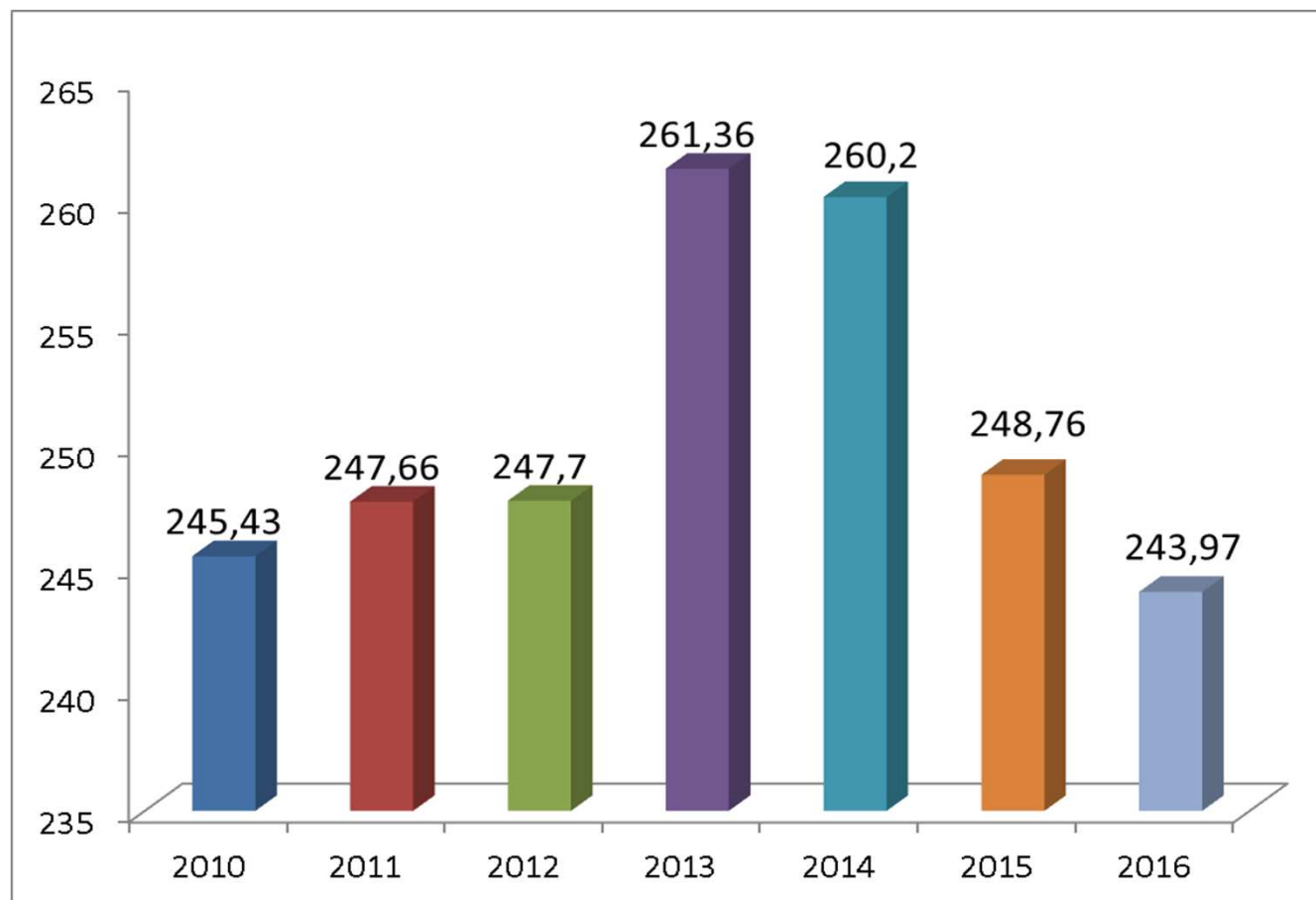
Stampa

Two different ERP systems

- Ecos for containers and transponder reading
- SAP for the billing



# Waste bill timeline

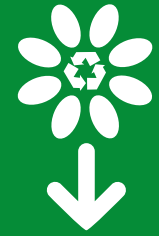


- Cost of the bill rised in the start-up period and then lowered to 6-years back

**3 persons family in 100 sqm**

**\* For 2016 considered maximum discount possible**

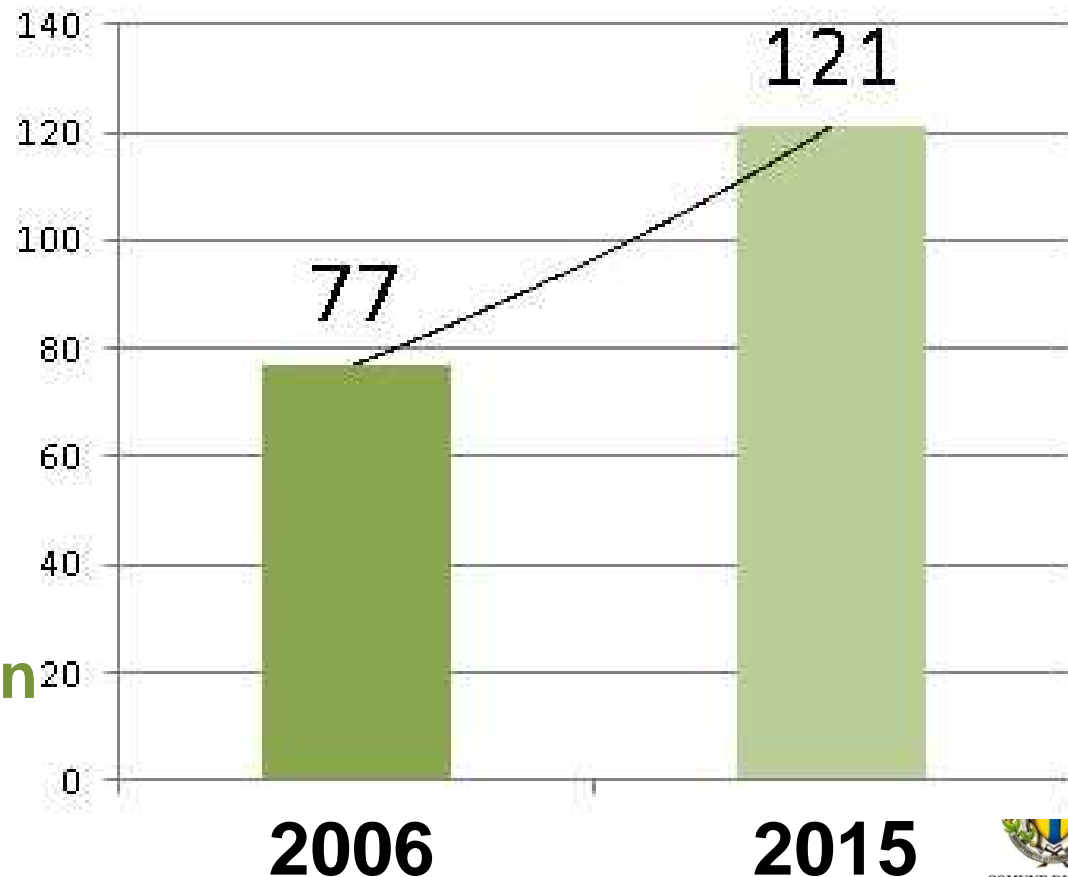
# Overall occupation effects



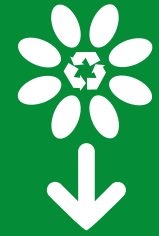
- Changing from road waste containers to door-to-door collection has created more jobs
- From 2006 since today operators dedicate to collection has increased by 57%

**+57%**

**jobs on waste collection**



# Monitoring And Evaluation Of The Collection System



- Task force to control, inform and issue fines to illegal activities
- Dedicated personnel of the municipality, the contractor and volunteers
- Wide use of video control systems





# App Ecolren – Send feedback



Through a dedicated app for smartphones users are invited to send feedback to waste collection company with photo and address (geo-referenced) for:

- littering
- damaged containers
- missing collection
- Other



## Inviare segnalazioni

Attraverso un sistema di “**fotosegnalazione**” l’App Ecolren puoi diventare una “sentinella ambientale”: puoi infatti fotografare rifiuti abbandonati, cassonetti danneggiati o altre situazioni anomale e inviare la foto a Iren allegata ad un breve testo descrittivo. Insieme all’immagine verranno registrate le **coordinate geografiche** relative allo scatto. Iren si attiverà per verificare la situazione nella via segnalata e, dove necessario, provvederà ad inviare personale sul posto.

The screenshot shows the app's main interface with a search bar at the top. Below it, there are sections for 'Luogo' (Location) with a 'Seleziona Indirizzo' button, 'Segnalazione' (Report) with an 'Aggiungi Descrizione' button, and a 'Scatta una foto' (Take a photo) button. At the bottom, there are two large buttons: 'Invia' (Send) and 'Annulla' (Cancel). The 'ecoiren' logo is visible at the very bottom of the screen.

# SWOT Analysis



## STRENGTHS

- High rates of separate collection
- High level of responsibility of the users
- Good quality of recyclable materials
- More equity of the PAYT system

## WEAKNESSES

- Need to improve controls on uncivilized behaviors
- Need to continuously invest in communication
- Need to increase recovery services in the first phases

## OPPORTUNITIES

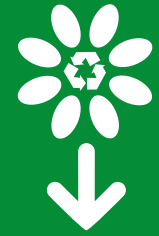
- Involve citizens in the process of change
- Progressively reduce cost of the whole system

## THREATS

- Increase of littering in rural areas
- Uncorrect use of the street bins

SWOT

# Start-Up And Awareness Raising Campaigns



- Public meetings at the start of the new system in every district
- Meetings with foreign and religious group (senegal, islamic, etc)
- Meetings with shop owners, scouts, buildings administrators, schools
- Door-to-door information with operators



- Info points in every district
- Press, tv, social media, internet
- Smartphone apps

**1,5-2%**  
per year

**Cost of communication on  
the total cost of the service**



# Information through web, apps & social media



- Dedicated portal and App for waste collection
- Dedicated website and App for invoicing
- Wide use of social media



Visita il nuovo portale

RACCOLTA RIFIUTI dove, come, quando.

la raccolta differenziata a portata di click



COMUNE DI PARMA

# Dedicated portal and App for information on waste collection



Georeferenced information based on user address to give custom data on:

- Days, hours of collection for each type of waste
- Street cleaning dates
- Waste bin position and emptying calendar

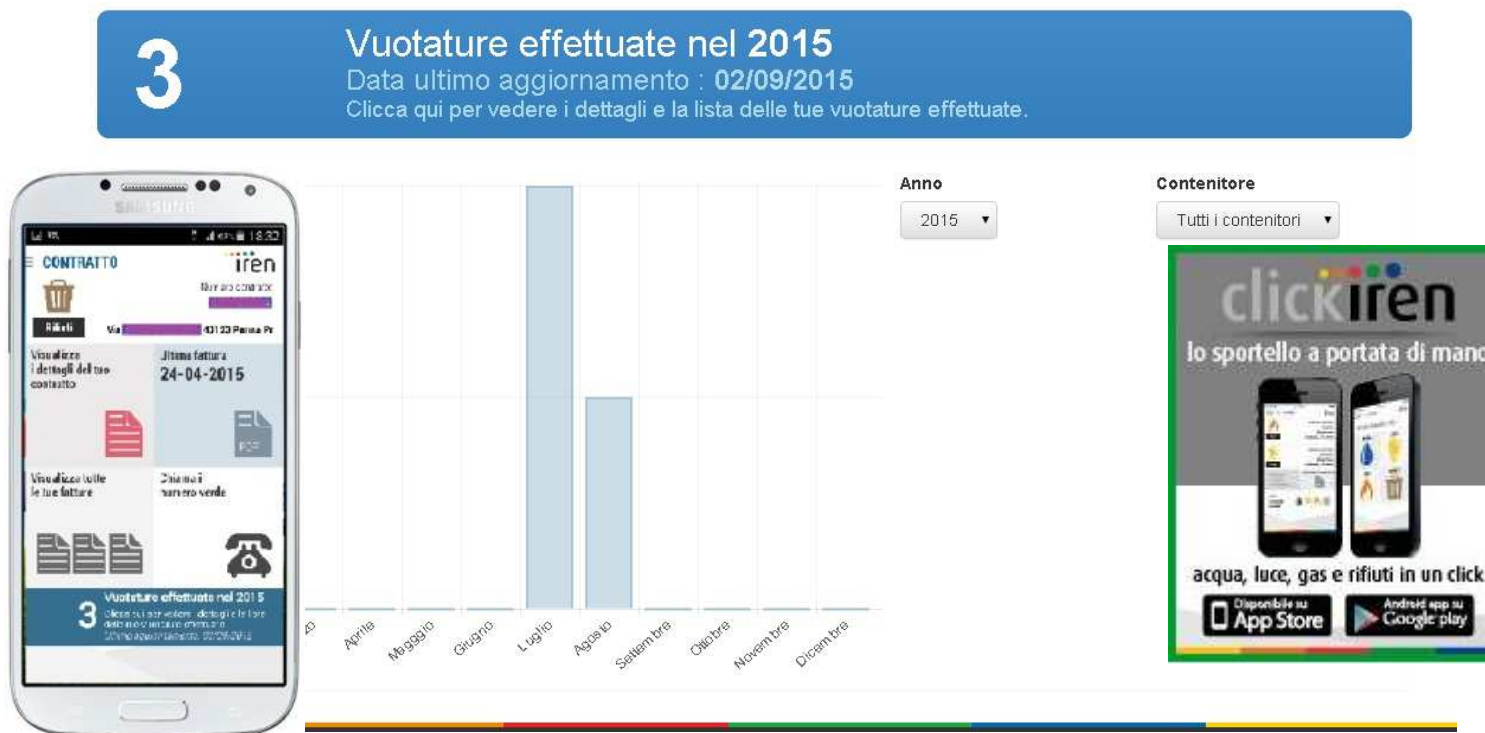
The screenshot displays the Iren Ambiente website interface. At the top, the logo 'iren ambiente' is on the left, and the title 'RACCOLTA RIFIUTI dove, e' on the right. Below the title is a navigation bar with links: 'Sospensione temporanea sito', 'Raccolta rifiuti urbani', 'Raccolta differenziata', 'Riduzione dei rifiuti', 'Tutto sulla TARI', and 'La carta dei servizi'. The main content area features a green box with the text 'Accedi al servizio di raccolta del tuo Comune'. Below this is a search bar with 'PARMA' entered, and a dropdown menu showing a list of streets: 'zaro', 'STRADA ZAROTTO ANTONIO', 'VIA CANNIZZARO STANISLAO', 'VIA MARZAROLI CRISTOFORO', 'VIA SPALLANZANI LAZZARO', and 'VIA ZAMENHOF LUDOVICO LAZZARO'. To the right of the search bar are four circular icons: a truck for 'Raccolta rifiuti urbani', two trash bins for 'Raccolta differenziata', a document for 'Carta dei Servizi', and a stack of papers for 'Opuscoli informativi'. At the bottom right, there is a green box for the 'Ecolren App gratuita per i cittadini e l'ambiente' with a recycling symbol icon.



# App ClickIren – Control invoices and verify container micro-chip reading



- In pay-as-you-throw systems part of the bill is related to how many times the residual waste container is emptied
- With the app users can check in real time how many times the container has been emptied




COMUNE DI PARMA

# App ClickIren – Control invoices and verify container micro-chip reading




- Users can verify invoices not only for waste but even for electricity, gas and tele-heating services (if applied)



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Intestatario: Folli Gabriele

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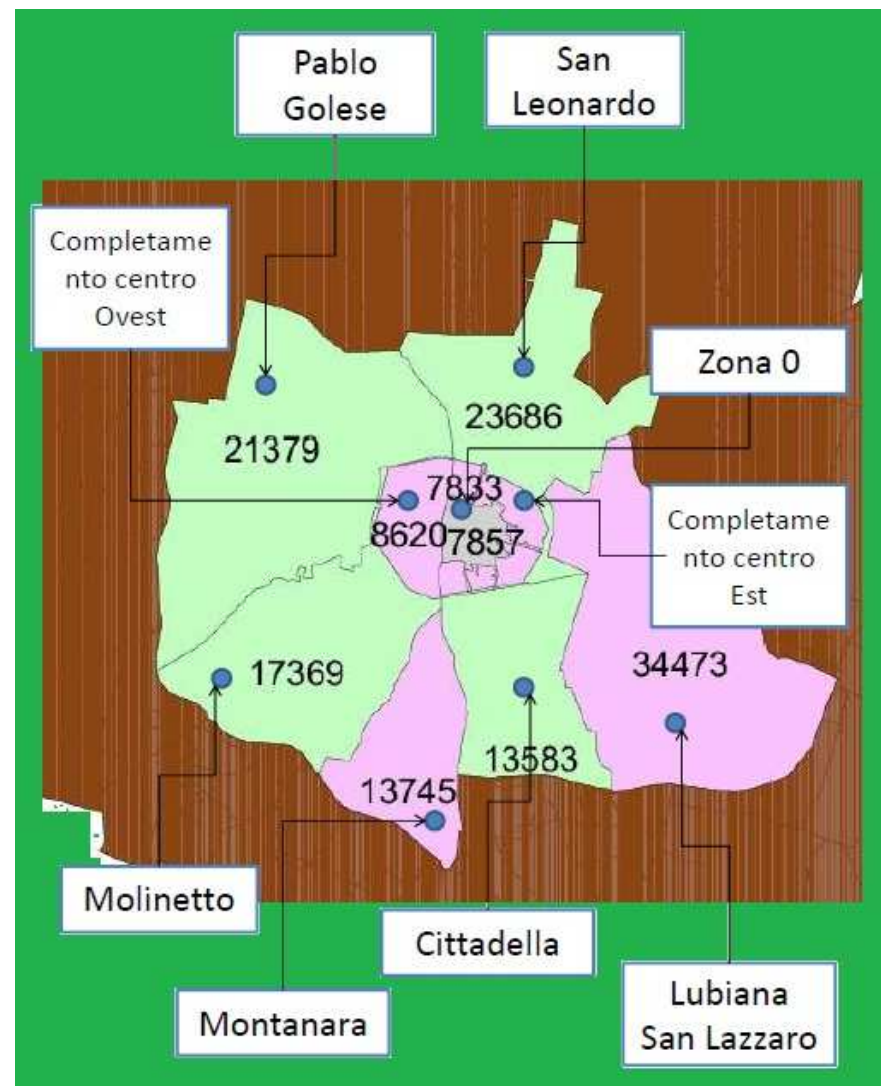
  
COMUNE DI PARMA

# Timeline



- Zona 0 (november 2012)
- Lubiana-San Lazzaro (june 2013)
- Completamento Centro est (september 2013)
- Oltretorrente (october 2013)
- Montanara (october 2013)
- Molinetto (november 2013)
- Pablo-Golese (march 2014)
- San Leonardo (april 2014)
- Adjustment Cittadella (june 2014)
- Adjustment Rural area (september 2014)

Pay-as-you-throw start july 2015



# Waste prevention

## Public water in school canteens and public water dispensers



- **Elimination of plastic bottles in school canteens** (93 schools; more than 15.500 children involved)
- 5 public water dispensers (sparkling and still) with more than 40.000 liters/month supplied

### Avoided energy in PET bottle production & transport for school canteens

- 219.000 1,5 lt PET bottles
- 7.328 kg of plastics
- 128.000 lt of water
- 183 kg sulfur oxide
- 161 kg carbon monoxide
- 16.855 kg carbon dioxide



# Waste reduction and prevention

## Reusable diapers



- Pilot project started in a child day care center to substitute single-use diapers with washable diapers:
  - Less waste
  - Positive change in child habits





# Waste reduction and prevention

## Eco-Events project



- Contribution to organizers of eco-events with advantages in terms of :
  - Free supply of compostable dishes
  - Zero costs for publicity and waste treatment



# Waste as a resource

## Eco-vendors

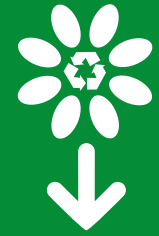


- Installation of 5 eco-vending machines that accept packaging waste such as plastic bottles, metal cans, etc and issue a bonus discount



# Waste reduction and prevention

## Re-use center

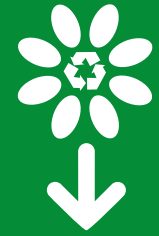


- Re-use center started in april 2016 to prevent waste production of furnitures, electric appliances, ect.
- Repair laboratory inside the center
- Educational activities with schools





# Incentives for domestic composting



- 12% discount on the waste bill for users
- At least 1000 families are making domestic compost
- Community compost facilities also available





# Customer Satisfaction Survey



- Interviews with CATI method in february 2015
- Local and national comparison



| Customer Satisfaction Index | Parma | Piacenza | Reggio Emilia | Nazionale | Emilia-Romagna |
|-----------------------------|-------|----------|---------------|-----------|----------------|
| CSI Totale                  | 85,9  | 86       | 90,3          | 74,5      | 80,2           |
| CSI Servizio                | 85,6  | 86,5     | 90,4          | 72,7      | 78,3           |
| CSI Relazione               | 89,8  | 72,2     | 87,1          | 80,5      | 86,6           |

- Collection frequency, timetable, containers supplied by the contractor, number of bins, street cleaning, information, cost/quality, ecologic centers, contact center response, problems solving, etc.



# Thanks for your attention

**Gabriele Folli**

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Comune di Parma

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