



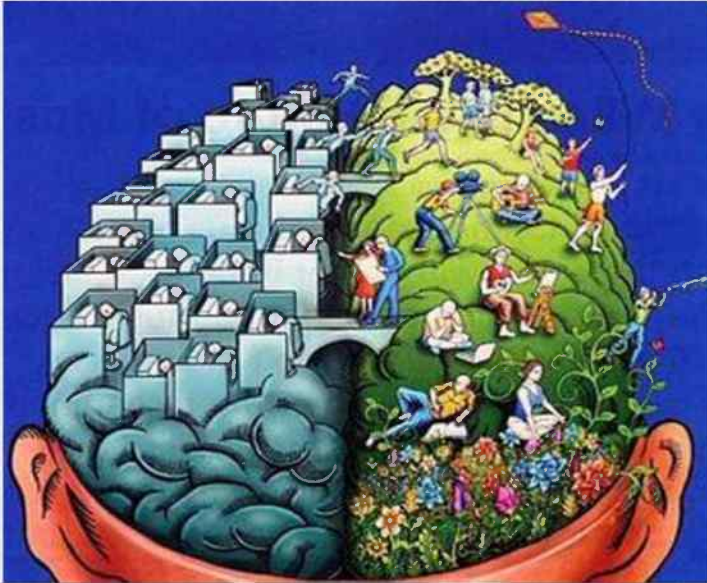
SERVIZI AMBIENTALI AREA FIORENTINA

INTEGRATED SUSTAINABLE WASTE MANAGEMENT IN FLORENCE METROPOLITAN AREA

Franco Cristo



Key words



not only waste
municipal hygiene

complexity

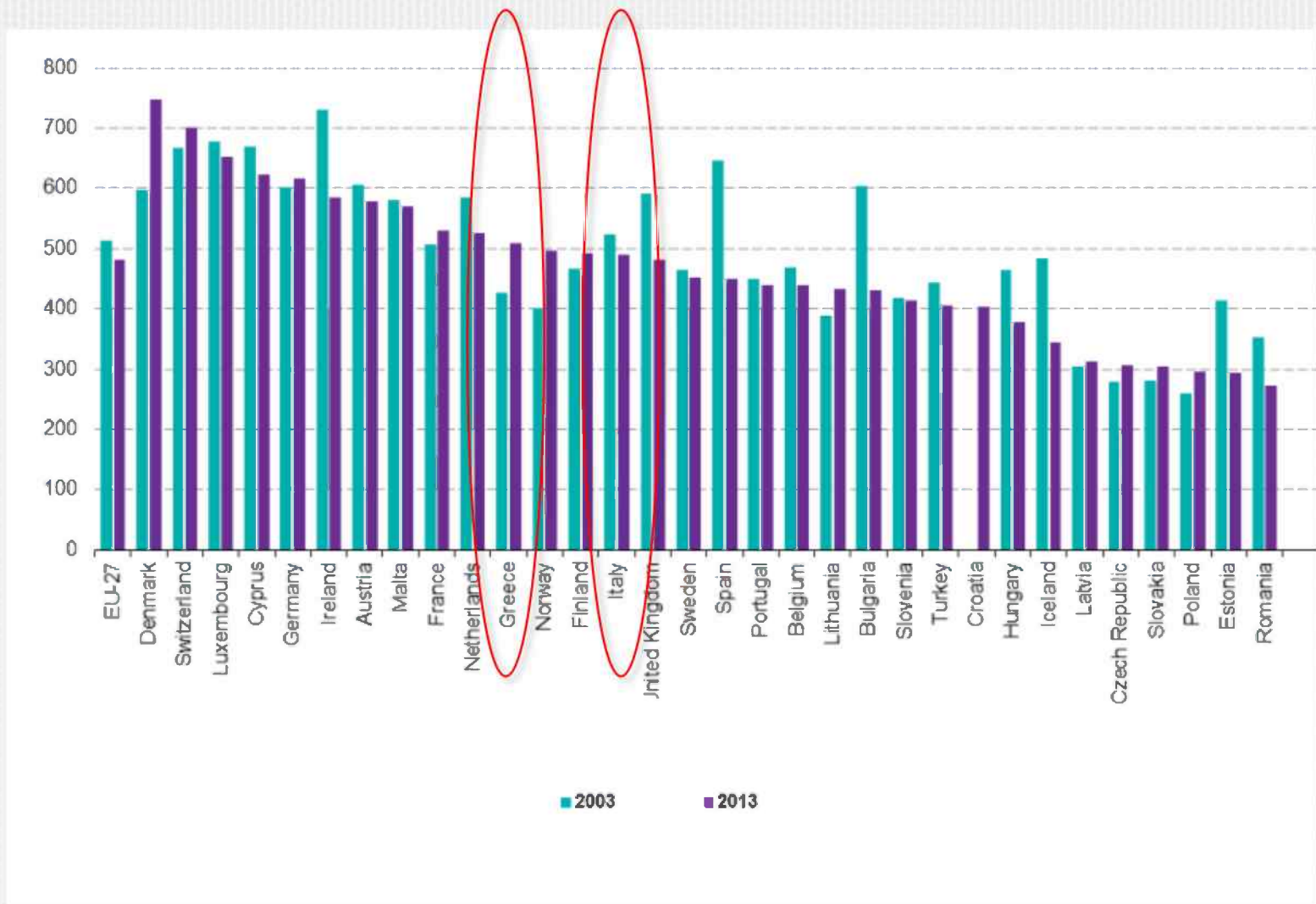
sustainable

flexibility

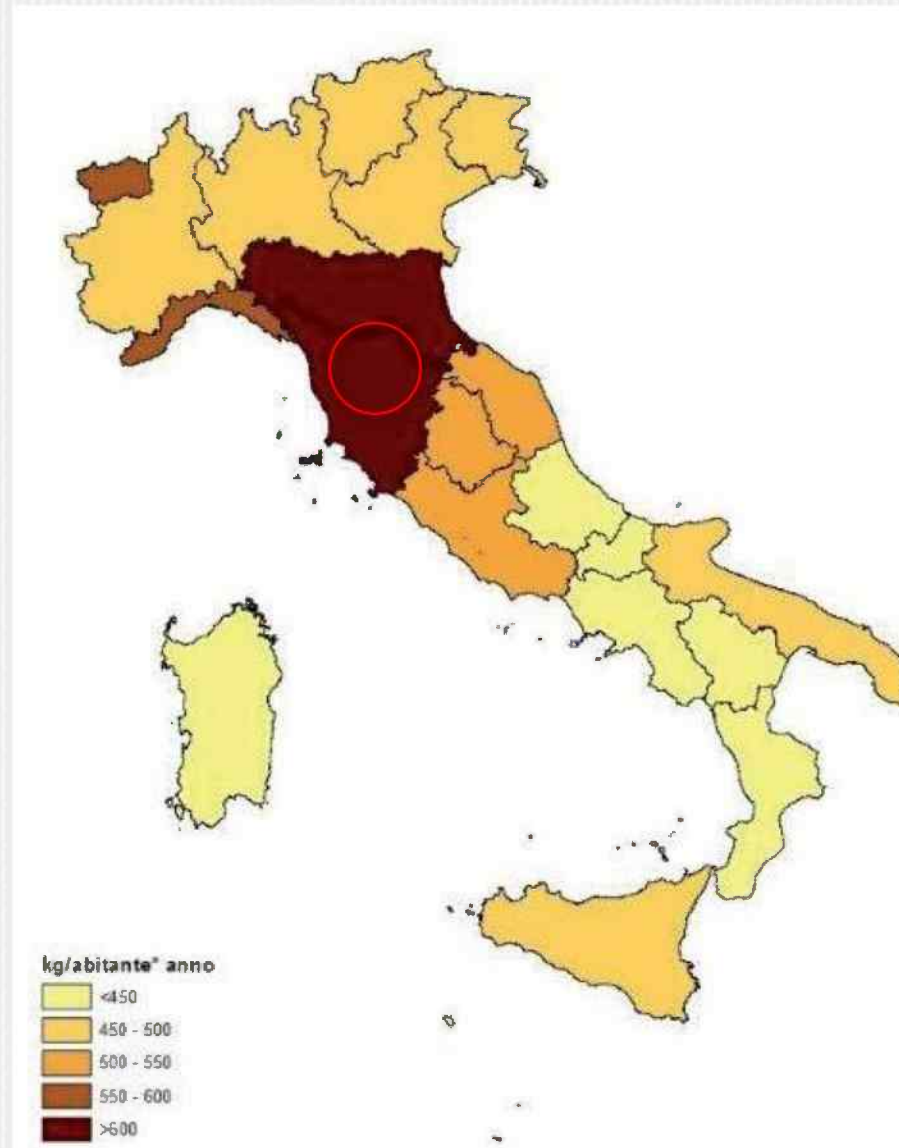
adaptability

integrated

MSW production per capita in EU Greece and Italy



MSW production per capita in Italy



The specificity of Florence



presence of tourists per year

population equivalent

2014

12,994,000

35,616

2013

8,282,930

22,693

2012

7,983,799

21,873

2011

8,066,423

22,100

2010

7,534,596

20,643

2009

6,605,236

18,097

UNESCO World Heritage Centre

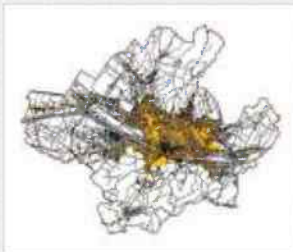


Florence and beyond.....



a metropolitan area very complex !

The evolution of territorial jurisdiction: from Florence to the Florentine Area



1988

1997

2011

2016

waste collection in metropolitan area



SERVIZI AMBIENTALI AREA FIORENTINA



We are working in Florence, Sesto Fiorentino, Campi Bisenzio, Calenzano, Signa, Bagno a Ripoli, Scandicci, Fiesole, Greve in Chianti, San Casciano VP, Tavarnelle VP, Impruneta and Greve.

A served area of about 922 sq km

675.000 inhabitants

325,500 household and 45.000 non-domestic users

A waste production of 410,000 tons per year

waste collection in metropolitan area: vehicles and equipment



SERVIZI AMBIENTALI AREA FIORENTINA



We use directly *413 vehicles*, other *211* by our contractors

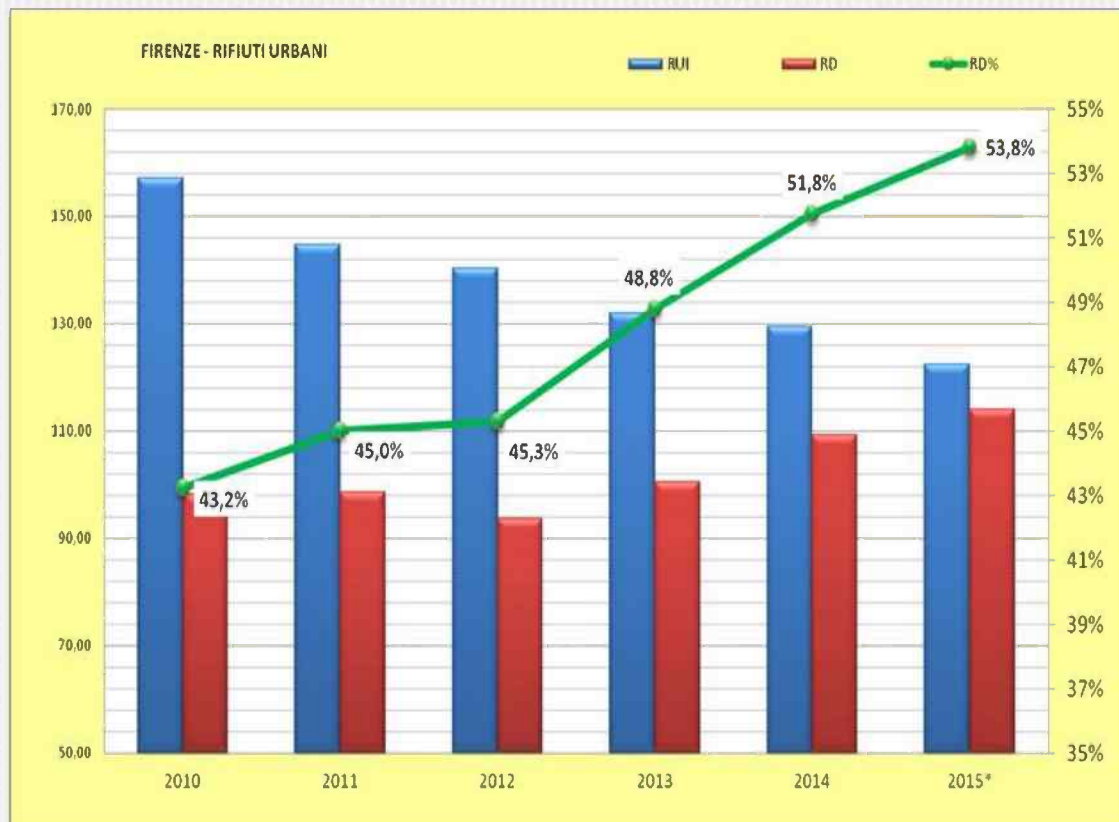
There are more than 41,000 bins for around *5,000,000 litres of capacity*

outcomes

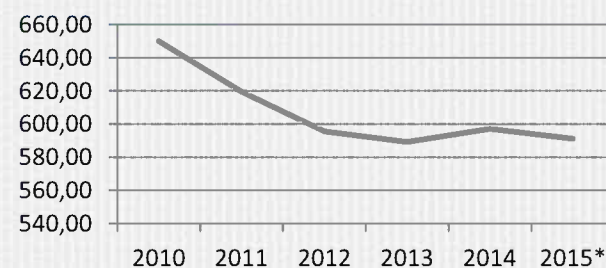


Gen. - Nov. 2015	Percentuale
Comune di Bagno a Ripoli	59,81%
Comune di Calenzano	68,30%
Comune di Campi Bisenzio	52,72%
Comune di Fiesole	72,53%
Comune di Firenze	53,84%
Comune di Greve	59,89%
Comune di Impruneta	75,59%
Comune di San Casciano V.P.	80,30%
Comune di Scandicci	53,49%
Comune di Sesto Fiorentino	63,14%
Comune di Signa	55,39%
Comune di Tavarnelle V.P.	87,37%
	57,17%

Waste Separate Collection in Florence



Pro capita



2015	SC	unsorted	% SC
Florence	114,060	124,696	53.8%
Metropolitan area	208,685	202,668	57.2%

Zoning of Collection

Areas with high level of urban settlement

- Road waste bins and volume control of unsorted waste



Historical centers

- “Door to Door” collection, Underground bins

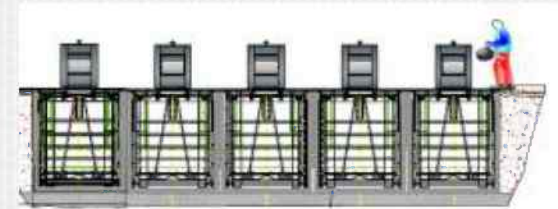
Hilly areas with low density of settlement

- “Door to door” and local collection with little bins



Industrial areas

- “Door to door” collection.



Distributed services

- Bulky waste collection, “Eco –stage”, “Eco-station”, “Collection Center”

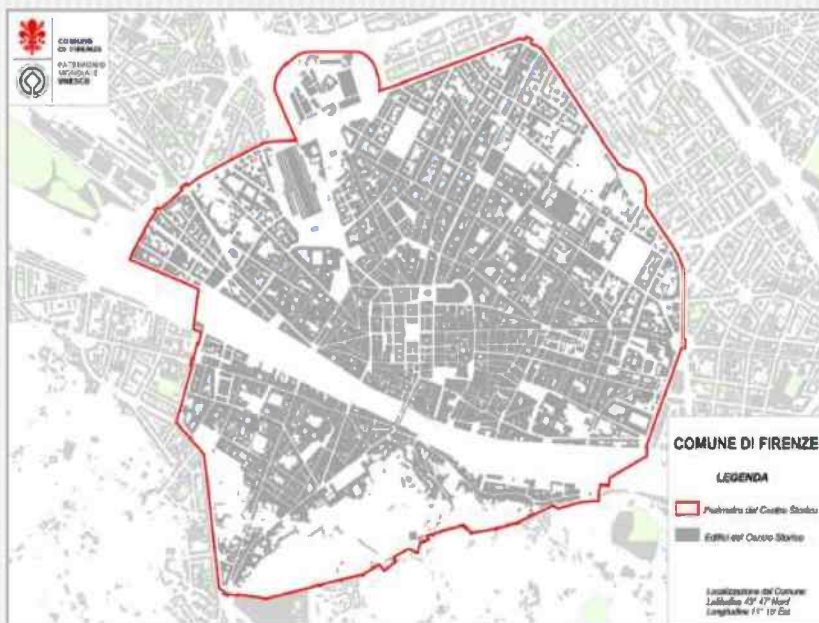


LUNEDÌ	ORGANICO
	TRACCANTI - FILM PLASTICI
MARTEDÌ	CARTA
	ORGANICO
MERCOLEDÌ	MULTIMATERIALE
	ORGANICO
GIOVEDÌ	RESIDUI CARTA
	ORGANICO
VENERDÌ	ORGANICO
SABATO	ORGANICO

UNESCO world heritage (4.0 sq. km)



Collection services and waste production in Florence historical center



- (1) Door-to-door collection
- (2) Collection with street bins
- (3) Collection with underground bins
- (4) Sweeping
- (5) Services on demand
- (6) "Eco-stage", "Eco-van", "Collection Center"

Collection	Service	Frequency	t (2014)	t(2011)	Δ
Paper & Cardboard	(1)	6/7	5.534,9	5.877,8	-5,8%
Plastic, Metal, Glass	(1) (2) (3)	7/7	5.575,0	2.869,9	94,3%
Organic	(1) (2) (3)	7/7	7.115,7	1.039,2	584,7%
Bulky waste e Vegetables	(5)	On demand	2.233,1	2.754,3	-18,9%
Other	(6)	On demand	24,0	84,7	-71,7%
Mixed waste	(1) (2) (3) (4)	7/7	21.508,1	28.684,8	-25,0%
Total			41.990,7	41.310,7	1,6%
Separate Collection %			53,0%	33,2%	19,8%

Florence : the historical center, castrum romano 0.3 sq km

Collection services and waste production in Florence “castrum”



- (1) Door-to-door collection
- (2) collection with street bins
- (3) collection with underground bins
- (4) sweeping
- (5) services on demand
- (6) “Eco-stage”, “Eco-van”, “Collection Center”

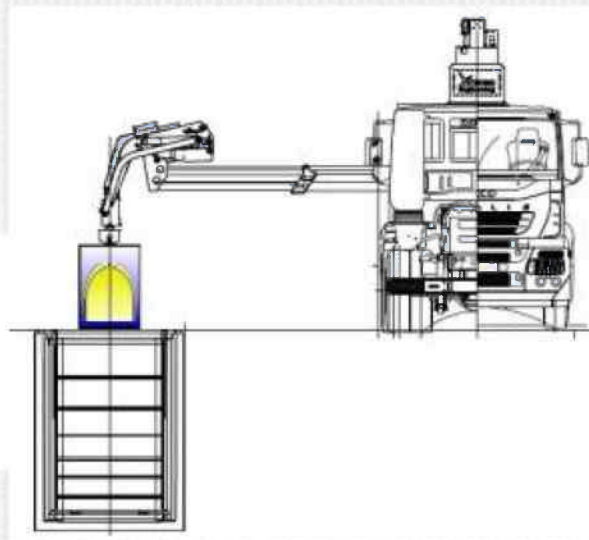
<u>Collection</u>	Service	Frequency	t (2014)	t (2011)	Δ
Paper & Cardboard	(1)	6/7	2.548,1	2.176,1	17,1%
Plastic, Metal, Glass	(1) (2) (3)	7/7	1.494,1	850,2	75,7%
Organico	(1) (2) (3)	7/7	1.611,1	1.619,5	-0,5%
Bulky waste e Vegetables	(5)	On demand	99,0	127,7	-22,5%
Other	(6)	On demand	1,1	3,9	-71,7%
Mixed waste	(1) (2) (3) (4)	7/7	1.545,7	2.180,9	-29,1%
Total			7.299,1	6.958,3	4,9%
Separate Collection					
%			78,8%	74,6%	4,2%

The technical solution for collection in Florence Center: Underground bins

In the historical center of Florence, the high concentration of economic activities, the small size of the roads and the high number of tourists most of the year, don't allow to place an appropriate number of road bins for the different waste fractions.

The integrated model of recycling for the city of Florence provides the different solutions

Underground stations for domestic and non domestic users



The technical solution for collection in Florence Center: Underground bins

some underground stations built in the historic center of Florence



solutions for urbanized area: the “Up-Loader” System and access control

Use of electronic access control for unsorted waste

The access control system is a deterrent for users to throw unsorted waste.

It consists of a metal cap installed on the cover bin (in the case of locked bins Side Loader) intended for unsorted waste. The volume of the shell is predetermined (usually of c.ca 20 liters). The opening of the cap occurs through the use of a **personal electronic key**, previously delivered to the users. The key allows the opening of the device and the conferring of unsorted waste. The contribution of other components of separate waste, destined for recycling, is rather free in other bins installed in the “ecologic station”.



solutions for small towns and hilly areas

local little bins collection

collection system involves placing little wheeled bins close to small towns and isolated hilly areas all dedicated to separate waste fractions:

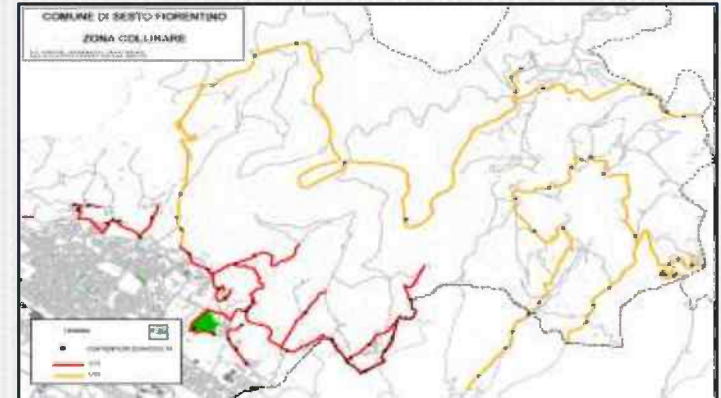
paper

organic

Multimaterial (glass, plastic, metal cans, tetrapak)

Unsorted waste (UnW)

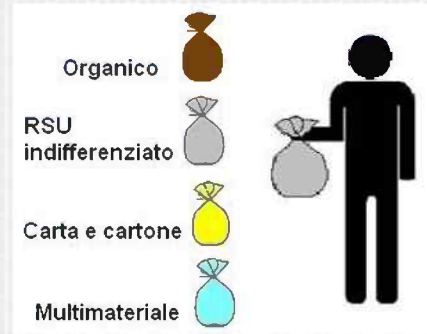
Collection is made by light compactor vehicles conducted by a driver and one operator



solutions for center of town with narrow streets

Collection *door to door*

Door to door collection is made by leaving waste in front of homes in a specific time slot, according to a weekly schedule prepared at the start of the service



Raccolta porta a porta
Campi Bisenzio - Centro

GIORNO	TIPOLOGIA RIFIUTI	ICONE
LUNEDÌ	ORGANICO	
MARTEDÌ	Imballaggi in VETRO - PLASTICA - LATTINE - TETRAPACK	
MERCOLEDÌ	CARTA - CARTONE	
GIOVEDÌ	ORGANICO	
VENERDÌ	Imballaggi in VETRO - PLASTICA - LATTINE - TETRAPACK	
SABATO	ORGANICO	

Il materiale deve essere esposto sulla soglia del proprio numero civico tra le ore 7.00 e le ore 8.30. La raccolta sarà effettuata a partire dalle ore 8.30. Il servizio è attivo nei giorni feriali e festivi intrasettimanali escluso il 1 gennaio, 1 maggio, 15 agosto, 25 dicembre e la Domenica. Gli utenti residenti nelle strade private e nelle corti dovranno depositare i sacchetti sulla strada principale più vicina.

NON mettere i rifiuti in strada fuori orario di raccolta.
NON usare sacchetti di altri tipi, ma solo quelli forniti.
NON abbandonare i rifiuti ingombranti!

Chiama il numero 055 3906666

solutions for industrial areas

Collection “door to door” in industrial areas

The service provides for the collection of waste, similar to urban, through the placement of several bins in the areas of relevance of every industrial user.

Collection is done according to a given schedule which provides weekly collections for packaging, organic waste and the unsorted waste similar to domestic production.



SERVIZIO PORTA A PORTA OSMANNORO

I rifiuti vanno esposti dalle ore 7.00 alle ore 08.30 sulla soglia del proprio numero civico secondo il calendario seguente:

LUNEDÌ	ORGANICO TRACCANTI - FILM PLASTICI
MARTEDÌ	CARTA ORGANICO
MERCOLEDÌ	MULTIMATERIALE ORGANICO
GIOVEDÌ	RESIDUO CARTA ORGANICO
VENERDÌ	ORGANICO
SABATO	ORGANICO

La raccolta porta a porta NON SARÀ EFFETTUATA nei giorni: 1 gennaio, 1 maggio, 15 agosto, 25 dicembre.

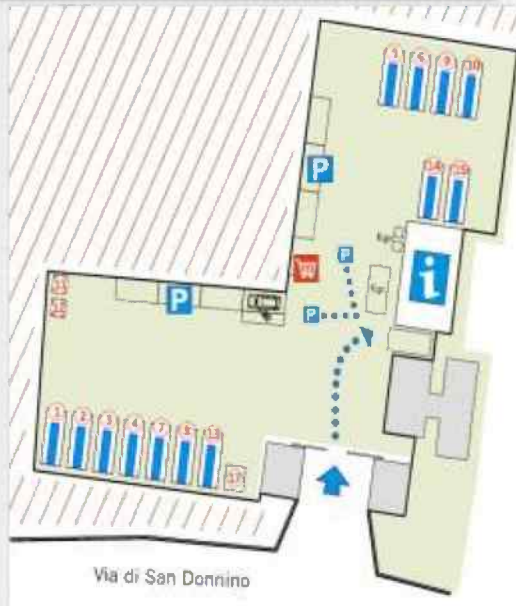
Through this system it is possible to eliminate the road bins, thus avoiding the trap of “special waste” or improper dropouts from different areas.

The “eco-stations

7 Eco-stations/ Collection centers

- Calenzano via del Pratignone
- Firenze via San Donnino
- Scandicci via Charta 77
- San Casciano V.P. Via Cassia
- Tavarnelle V.P. Via Michelangelo
- Sesto Fiorentino Querciola
- Bagno a Ripoli Campigliano

The “Eco-stations” and “Collection Centers” allow to increase recycling, by conferring directly from users, all type or size of separate waste that are not compatible with the road waste collection. In this year serviced more then 60,000 users



Distributed Services

“Eco-stage”, “Eco Van” and “Micro - collection”



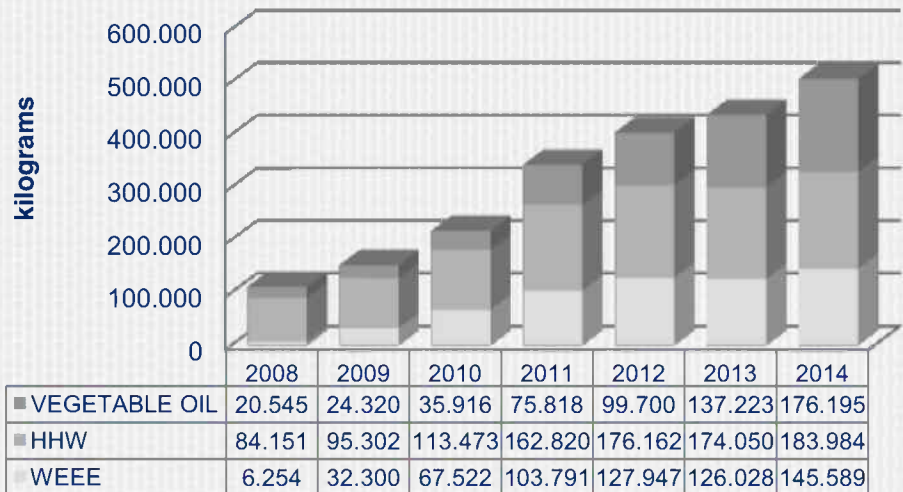
Eco-stage is located in a private place for public use, with an agreement with the owner. The location is equipped with appropriate and adequate bins for the conferral by domestic users of specific types of waste that are not assignable to the normal collection system (Municipal Regulation).



Eco-van is an equipped vehicle to give a moving collection point to the place where citizens usually go; it stations at weekly local markets, according to specific time slots and calendar.

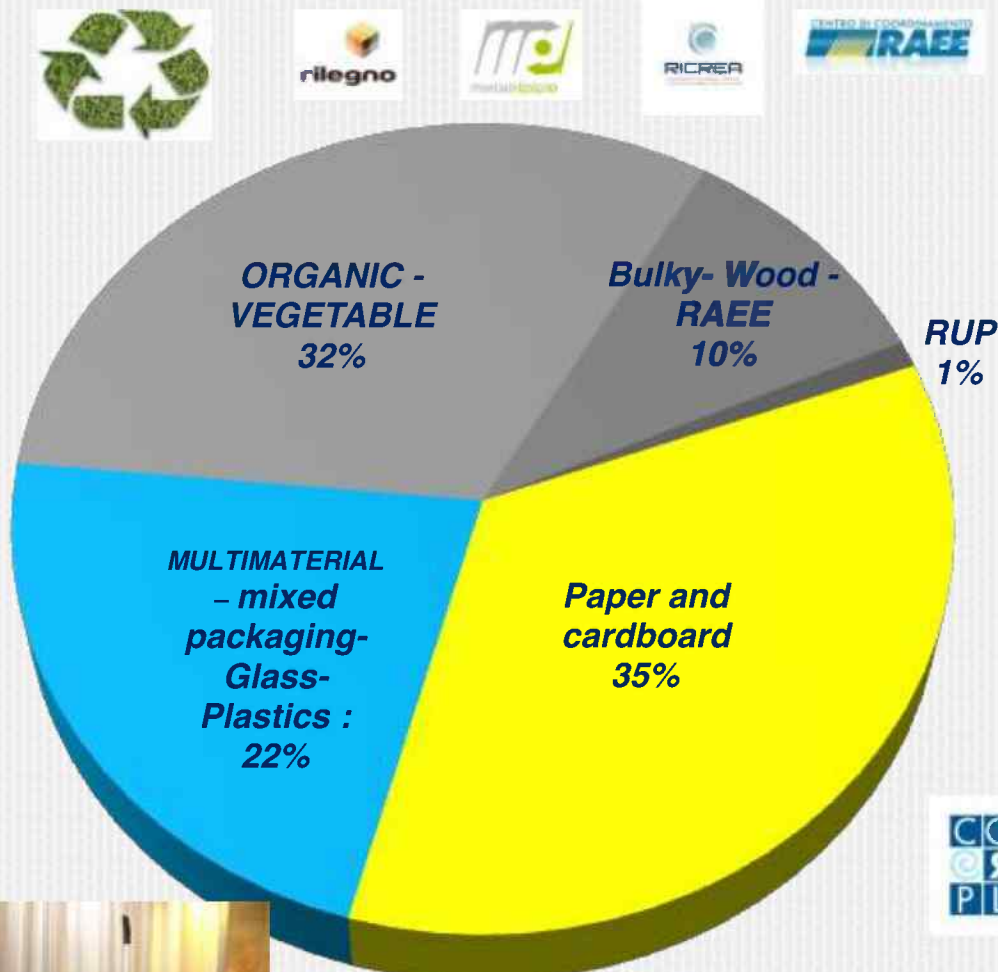
Since 2008 the network “Eco-stage – Eco-van” has been developed, up to now, in the presence of:

- **48 “Eco-stage”** installed;
- **33 local markets** served by Eco-van”;
- **1,111 individual collection points** for batteries, expired drugs, small electric and electronic appliances (WEEE).



outcomes

SC	M tons
2009	163,1
2010	175,4
2011	177,9
2012	172,0
2013	185,5
2014	201,5
2015	209,2



**Consortium of industry
and paper mills**

the Cycle and the plant System



Selection - Storage - Pretreatment

- Treatment and transfer pole
- MBT (mechanical biological treatment)

Collection

- Road collection
- Door to door
- Eco-stations, Collection Centers
- Ecotappe – Eco-van
- Micro- collection
- Collection call

Waste

Treatment -Recovery

RAEE: Coordination Centre

Wood: Supply Chain Consortium RILEGNO

Ferrous Materials: Recovery of matter

Multimaterial: REVET SPA, Sector Consortia: COREPLA, CNA, CIAL, Coreve

Biodegradable: Composting Plant

Textiles: material recovery and reuse

Paper and cardboard: Supply Chain Consortium COMIECO

RUP: Consortia Filiera, COBAT.

C & D waste: treatment plants

Print Cartridges: 3 Recovery

Vegetable Oil: Recovery of Matter / cogeneration

Mixed packaging and plastic packaging: Recovery of matter - energy recovery.

UnW: Waste to Energy