



# **RESIDENTIAL FOOD WASTE COLLECTION IN A DENSELY POPULATED EUROPEAN CITY: THE CASE STUDY OF MILAN**



## FOREWORD

This short case study has been prepared by the promoting committee "Milano Recycle City", formed by Amsa SpA (the municipal company managing the waste collection in Milan), CIC (the Italian Compost and Biogas Association), Novamont SpA (Italian producer of compostable polymers) and COMIECO (the national paper and cardboard recycling consortium).

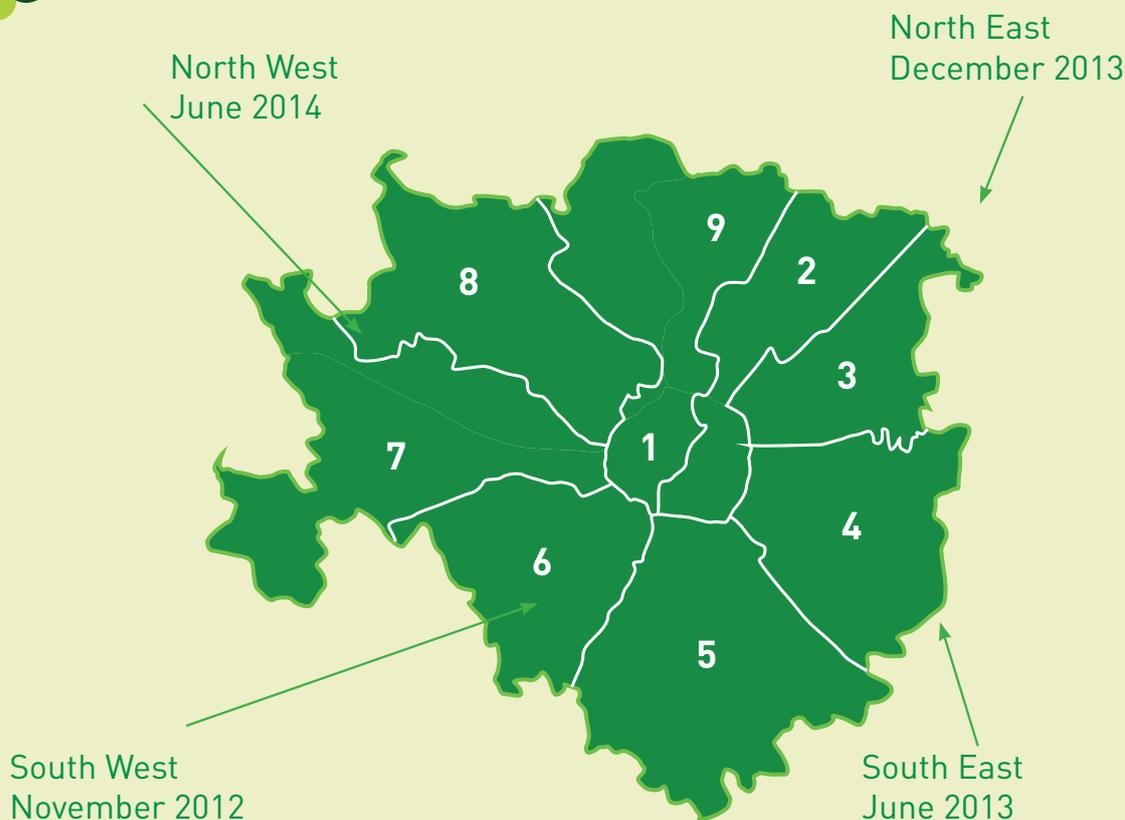
Goal of the committee is to support the city of Milan in promoting best practices and communication of separate collection to the citizens and other stakeholders. Up to now, besides the organization of several visits and study tours to the source separation system of Milan, the committee has been involved in the organization of two international conferences. The 1<sup>st</sup> one was held on 6 June 2014 with the participation of representatives from the cities of Berlin, Gothenburg, Ljubljana, New York and the Dutch National Waste Management Association. The 2<sup>nd</sup> was held on 1 October 2014 with the attendance of many international members of the C40 Cities Climate Leadership Group. The activities of the committee are on-going and meant to spread information and knowledge about the best practices already in place in Milan, besides helping the city in achieving

increasingly higher recycling targets in a near future. This short report presents the source separation results achieved by the city up to now.

## THE CONTEXT

Milan is Italy's 2<sup>nd</sup> largest city. The municipality alone, excluding the larger metropolitan area, has 1.34 million inhabitants, with a population density above 7.000 inhabitants per square kilometre, and more than 80% of the households located in high rise - multi-family buildings.

In 2011, Milan had an overall recycling rate of 34,5%; made of mainly dry recyclables like paper, glass, plastics and metals collected separately at the curbside. Food waste was only being collected from commercial sources such as restaurants, supermarkets, hotels and schools. The newly elected city government considered this to be an unsatisfying performance and as a main action decided to introduce the source separation of residential food waste to be sent to an anaerobic digestion and composting facility for biogas and compost production. On January 2015 the total separate collection rate achieved was 53,5%. The projection on an annual basis for 2015 is 52%.



Division of Milan into 4 logistic zones for the AMSA waste collection service

AMSA, part of A2A Group, is Milan waste collection and street cleaning company, responsible together with A2A Ambiente for managing the integrated waste cycle, street cleaning and other essential urban hygiene services. In 2012 AMSA was asked to plan and implement residential food waste collections covering the whole city by June 2014. The city is divided in four collection areas, each including around 320.000 inhabitants. After the planning phase, the collection started in November 2012 in the south-west quarter, adding the south-east area in June 2013 and the north-east in December 2013. Finally it was extended to the north-west in June 2014, reaching the full coverage of all households in Milan.

Every household received a 10lt vented kitchen bin along with a roll of 25 compostable bags made of the bioplastic Mater-Bi, certified according to the European standard for biodegradable and compostable packaging EN13432. After this first supply, householders can either purchase new bags sold in the stores or use the compostable shopping bags available at Italian supermarkets (Italy enforced a ban on non compostable single use plastic bags, therefore only compostable or reusable shopping bags can be sold in the retail). Once the bags are full, the bagged food waste is placed in 120lt bins which are exposed twice a week on the curbside by the property manager or the property cleaning service in the early morning of the collection day.



Source separation tools for food waste in Milan: 10 lt vented bins for the kitchen, compostable bioplastic bags certified according to the EN 13432 standard, 120 lt wheeled bins on the curbside

## LOGISTICS AND ECONOMICS

Collections are carried out twice a week from all households and every day for commercial sources and from schools with significant productions. To minimise the impact on city traffic, the collection schedules have been set between 5.30 am and 11.30 am, with the city centre being served before 8.00 am.

In each of the four operational areas, the overall set up of collection vehicles and waste operators was reviewed, reducing those dedicated to collection of residual waste and establishing suitable teams for the collection of organic waste.

Waste is mainly collected using single-operator (driving and collecting the food waste) vehicles without compaction powered by methane or biodiesel, along with a smaller number of larger-capacity compaction vehicles operating in the outskirts. The food waste is delivered to two transfer stations, from where it is transported on the same day to an anaerobic digestion and composting plant 60 km far from the city.

Considering a market price of about 70€/tonne for the treatment of the food waste and an average disposal cost of 100€/tonne of the residual waste, every tonne of diverted food waste gives not only an environmental benefit but also a financial one.



Vehicles used by AMSA to collect kitchen waste. Top, a 6-7 m<sup>3</sup> vehicle without compaction. Bottom left, 8-10 m<sup>3</sup> capacity compactor vehicle. Bottom right, 20-23 m<sup>3</sup> capacity compactor vehicle.

## EXTENSIVE COMMUNICATION AND EDUCATION CAMPAIGNS

A major factor in the success of any consumer affecting programme is the use of effective communication and education initiatives. Given the important changes to waste and resource management in the City, community engagement through communication and education were seen as a high priority.

AMSA's in house team of dedicated communication experts planned and implemented a widespread and multi-faceted communication campaign on waste management and recycling. Where necessary, external experts were consulted on aspects which presented specific

and new challenges, e.g. the correct use of compostable bags for collecting food scraps. After six months of planning, the delivery of customer-facing part of the programme began in each area four weeks before the new scheme was introduced and recalls are on-going.

A number of communication tools and materials were developed incorporating the new branding and specific messaging which included: leaflets, bin stickers, posters e.g. for use at bus stops and in public buildings and collection calendars. The multi-media aspects involved a dedicated (free) smart phone app, new website, newspaper articles as well as radio and television advertisements. Milan is a cosmopolitan City so the multi-cultural and multi-lingual needs of the

residents were addressed as far as possible. A toll-free information hotline was established and promoted. Examples of the different tools are pictured below.

Public outreach meetings were held in each area to introduce and explain the new system and help address any concerns. Property managers of multifamily and commercial buildings were contacted and all householders received written communications (letters). Further awareness raising and education took place on a face-to-face basis during the free delivery of the vented kitchen caddies, compostable liners, leaflets and calendars. The new approach to food waste in the City has been incorporated into the existing

AMSA schools education programme.

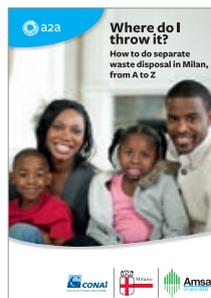
To help maximize the efficacy of the new approach to resource management, separate collection is mandatory and to encourage reluctant citizens, a mechanism of fines has been put in place to help reduce contamination and maximize recycling. A dedicated crew of inspectors perform a rapid visual check on an extensive sample of buildings in the early morning just 1 hour before the collection, giving fines if there are impurities e.g. plastics in the food waste bin or if the other recycling fractions are contaminated. Additional awareness activities are held for those areas where quality is lower than average.



PuliAMO, the smartphone app developed to explain separate collection



Leaflets



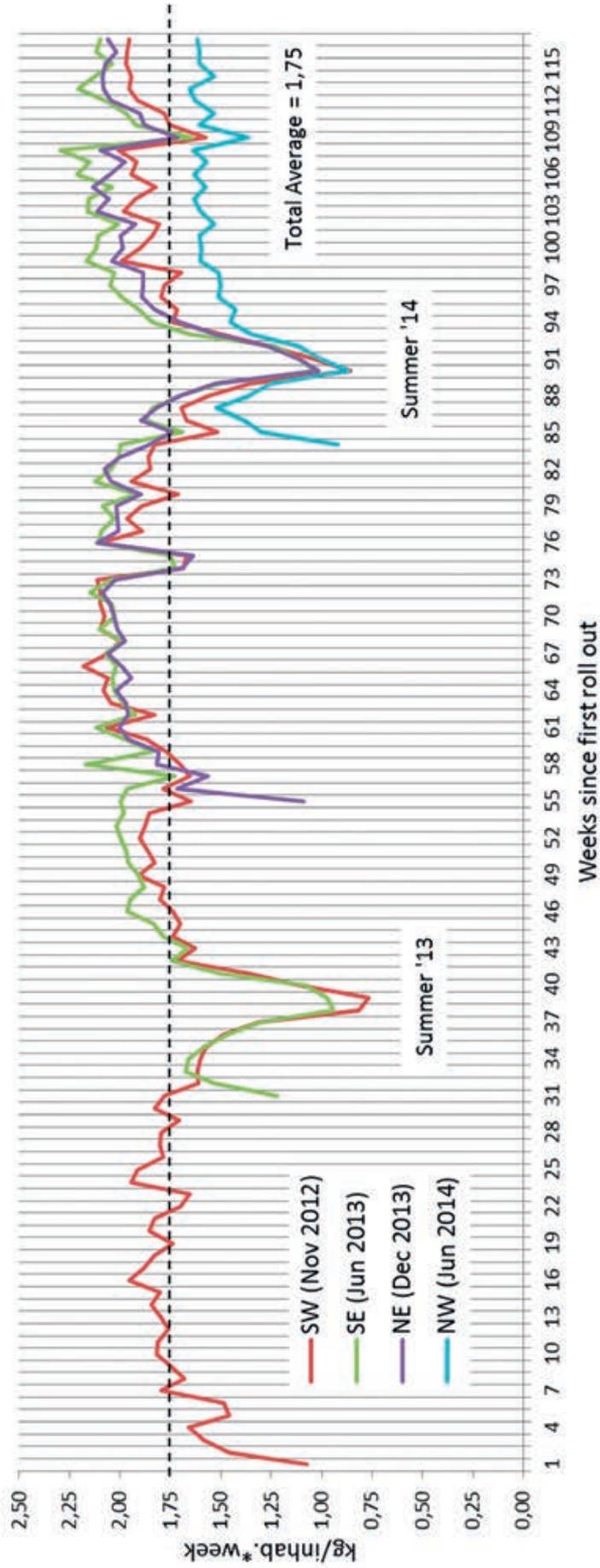
Multilingual education campaign

## FOOD WASTE COLLECTION RESULTS

Since November 2012 Milan has been collecting an average of 1.75 kg of food waste per inhabitant per week with an annual average of about 90 kg per person, which is very high compared to other European cities, taking also into account that it doesn't include garden waste. About 25% of this amount comes from the commercial sector and schools whilst the main part is residential. Note

that the data does not include green waste from parks and gardens. Green waste cannot be put in the container for collecting food waste and must be delivered to municipal collection centres; given the urban structure of Milan, the quantity of green waste is quite low, equal to 0.5 kg per person in 2014. In total, about 130.000 tonnes of the city's residential and commercial food waste are now being collected separately and sent for organic recycling saving 8,760 t of CO<sub>2</sub> /year<sup>1</sup>.

<sup>1</sup> Calculated by CIC, the Italian Composting and Biogas Consortium based on the Defra UK calculation tool, 2011



Weekly amounts (in kg) per inhabitant of food waste collected in the 4 waste management zones of Milan (South West, South East, North East, North West) in the period November 2012 - February 2015

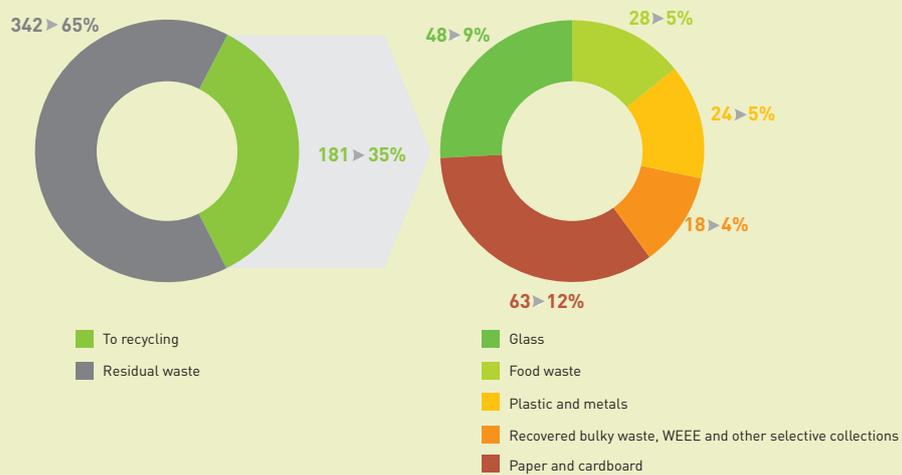
## IMPACT OF FOOD WASTE COLLECTION ON OVERALL RECYCLING RESULTS

Beyond food waste, Milan had already in place a curbside collection of paper, glass, plastics and metals long before November 2012. Up to then, the largest recyclable fraction was paper and cardboard. To get a clear evaluation of the global effect of the new scheme, data from 2011 (i.e. a

whole year of data, before the new system) is compared with data from Jan 2015, when the food waste collection has been rolled out in the whole city. Whilst in 2011 the source separation rate was at 35%, by Jan 2015 Whilst in 2011 the source separation rate was at 34,5%, by Jan 2015 it had reached 52%, and the main contribution is given by food waste, of which about 95 kg/inhab.\*year are captured (projection on 2015).

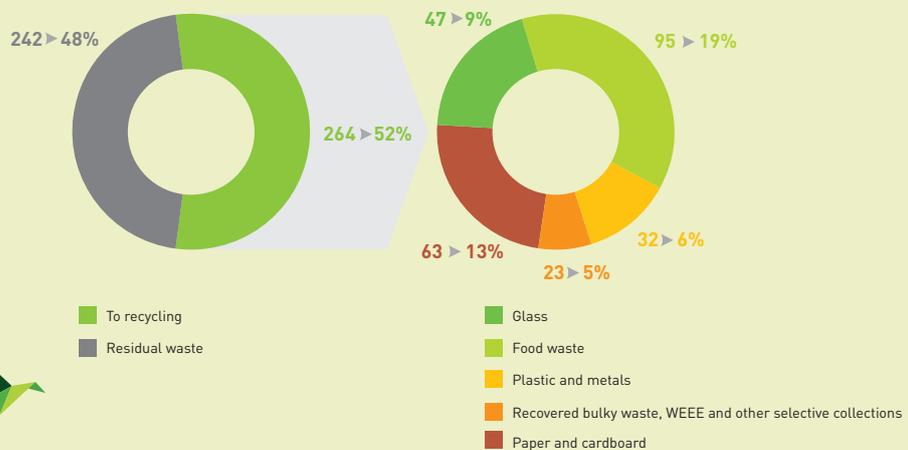
### BEFORE THE INTRODUCTION OF RESIDENTIAL FOOD WASTE COLLECTION (2011)

Data in kg/capita/year



### AFTER THE COMPLETE INTRODUCTION OF RESIDENTIAL FOOD WASTE COLLECTION (JAN 2015)

Data in kg/capita/year



## QUALITY OF THE COLLECTED FOOD WASTE

AMSA is constantly monitoring the quality of the collected food waste through waste characterization analyses performed by technical staff of the Italian Compost and Biogas Association (CIC). Samples coming from the 4 collection areas are analysed every 6 months.

The 93 analyses since the first roll out of the scheme show that the collected organic waste is almost exclusively made of food waste, with a negligible presence of paper, cardboard and garden waste (less than 3%). They also show an average content of non compostable materials of 4,06%, with a slight decrease in time i.e. in the areas where the collection is running since 18 months or more, the contamination has become less reaching an average value of less than 3,5%.

Social housings tend to have higher contamination and require additional education and outreach, including information about correct disposal of e.g. nappies, which have a significant impact when they are present.

AMSA informs the householders to use compostable bags certified in accordance with the European standard EN 13432. These can be bags designed specifically for the collection of food waste, which can be purchased from supermarkets, or shopping bags made from compostable bioplastics. These carrier bags are sold in Italy by all the major supermarket chains following the implementation of a national law banning the sale of single-use shopping bags which cannot be reused or which are not biodegradable or compostable according to EN 13432. The waste analyses show that half of the compostable bags used to collect the food waste in Milan are shopping bags.



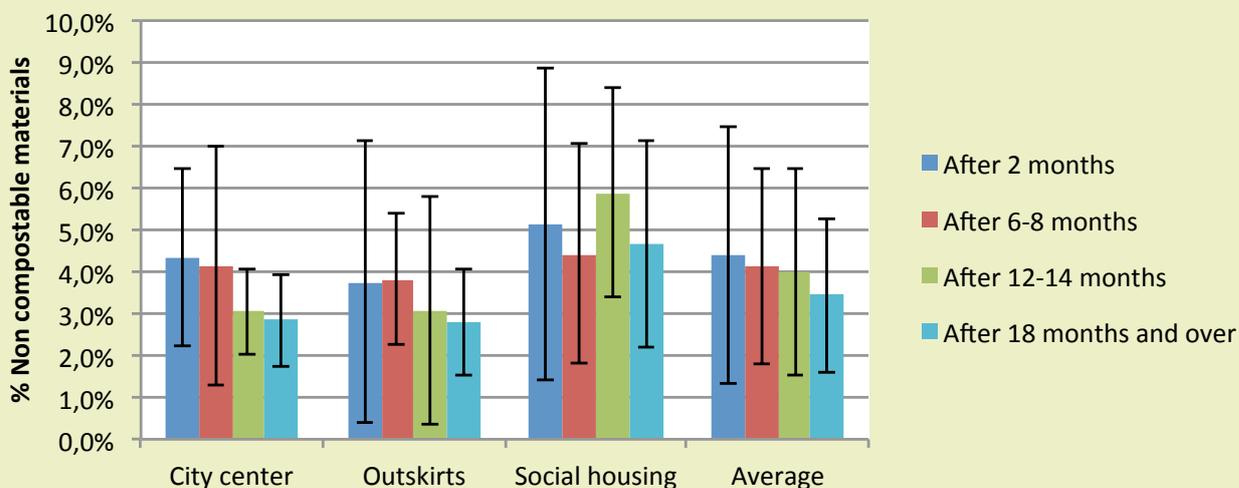
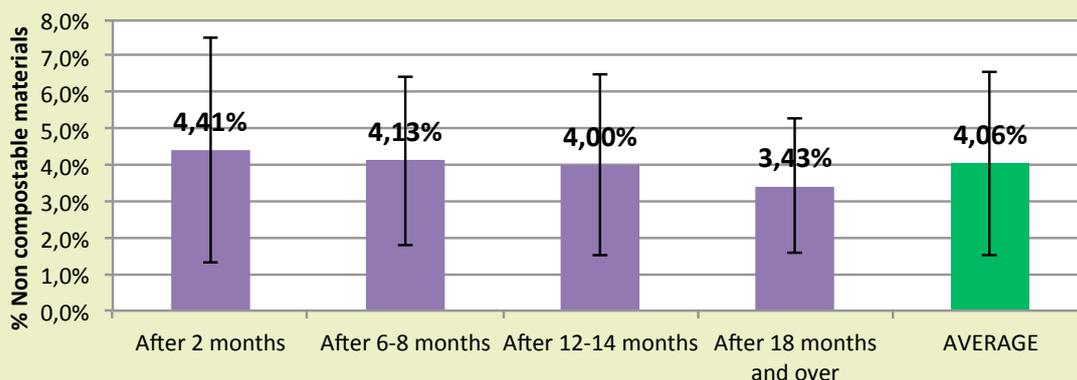
Opening of a compostable plastic bag during a waste analysis with besides a compostable shopping bag.

In conclusion, in Milan the average share of non-compostable materials in the collected food waste is constantly below 5% with a positive reduction trend, CIC considers this contamination value fully compatible with the subsequent phase of recovery in industrial anaerobic digestion and composting plants operating in Italy.

At present, the food waste collected in Milan is transported every day to the private anaerobic digestion and composting plant of Montello, for production of biogas and subsequent composting of digestate. It is based 60 Km away and has a capacity of around 300.000 tonnes/year.



## Non compostable materials - average trend



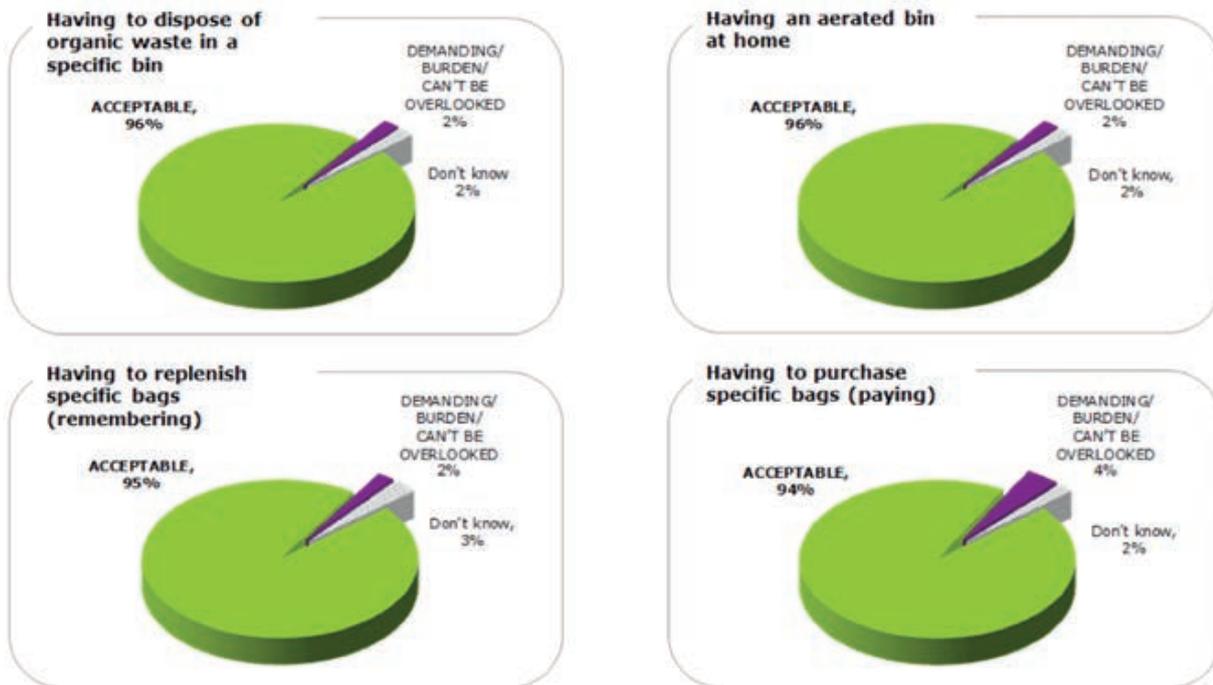
Quality of the food waste collected in Milan (% non compostable materials). The vertical bars represent the standard deviation from the mean values.

## HOUSEHOLDER SATISFACTION

A householder satisfaction survey commissioned by the Municipality and conducted by ISPO has shown that 90% of the citizens already involved in the program were

satisfied by the new collection scheme and actively participated. Interestingly enough, also citizens who during the roll out still hadn't yet received the collection tools, expressed a high motivation in participating to the program.

Overall evaluation of demand/burden for each characteristic examined



Daily recycling of wet waste-in effect or imagined

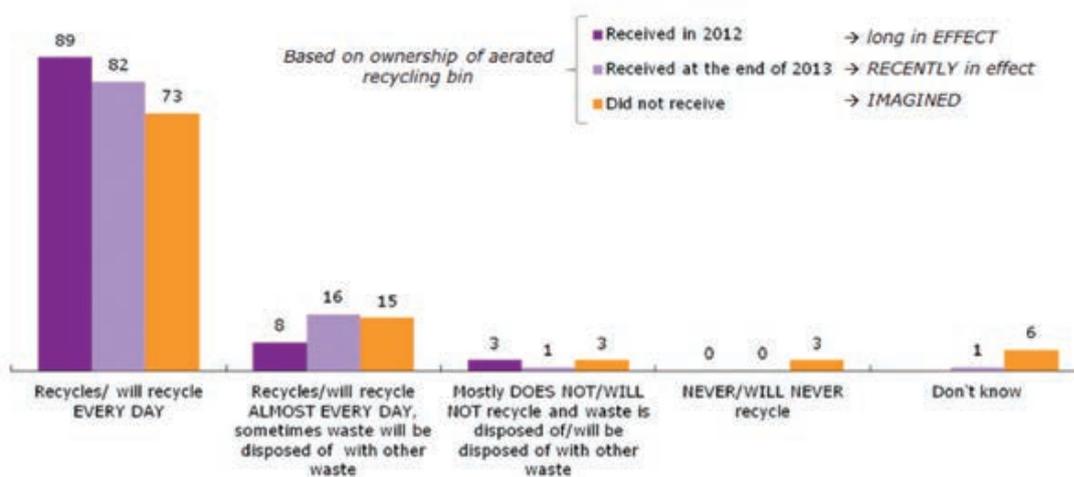


Figura 4 - source: ISPO survey, 2014

The complete roll out has taken about 18 months (1 quarter every 6 months), hence food

waste collection has remained a topical issue for quite a while in the city.



## CONCLUSIONS

Key challenges were the distribution logistics of the collection tools at the beginning and the communication and outreach to the citizens. According to householder satisfaction surveys a large majority of the population is regularly participating in the scheme; citizens regularly buy single use compostable shopping bags in supermarkets, hence there have been no major complaints about the need to purchase specific compostable bags. The main lesson is that intensive source separation of food waste can be introduced with excellent results in large cities and high population density areas, capturing large amounts of material with a good quality which

makes it suitable for an efficient organic recovery process by means of anaerobic digestion and composting of the digestate. A full engagement of the Municipality and the waste management company has been a key aspect for the success of the program. To further increase the overall performance of the collection and recycling program in Milan additional actions are being considered targeting e.g. public markets, offices, stations. The committee of Milano Recycle City is putting a constant effort in making it possible for Milan to achieve increasingly higher goals in source separation and recycling, become a circular economy best practice case and act as a role model for other large cities.



ORGANIZING COMMITTEE:

