



# RETHINK WASTE



## PAYT and KAYT Catalogue

Collection of experiences about  
pay as you throw (PAYT) and  
know as you throw (KAYT)



The RethinkWASTE project has received funding from  
the LIFE Programme of the European Union  
under grant agreement n° 18 GIE/IT/000156





**RETHINKING MUNICIPAL TARIFF SYSTEMS  
TO IMPROVE URBAN WASTE GOVERNANCE**

<b>Action:</b>	A1 - Definition of KAYT concept and tools to integrate variable fares (PAYT) goal
<b>Task:</b>	A11- Capitalization of international approaches and definition of a joint operational methodology
<b>Beneficiary:</b>	all project partners
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# LIFE REthinkWASTE compilation of pay as you throw and know as you throw practices

Addressed to waste management practitioners active at the local and regional level, this publication is a compilation of a dozen recent practices in **differentiated taxation** (pay as you throw or PAYT) and **awareness raising** (know as you throw or KAYT) to improve the separate collection of municipal waste. The source of inspiration for this collection was [a workshop hosted by the partners in the LIFE REthinkWASTE project in Brussels in February 2020](#). The event gathered experts from different European countries, who discussed how the cities and towns in their regions were able to incentivise residents to separate their waste more and to prevent waste.

Spanning three years (2019-2022), the entire [LIFE REthinkWASTE project](#) will explore the topic of information and fiscal instruments to improve municipal waste management. Behind it is a consortium of partners who represent municipalities, regional waste management companies, and consultancies; and who want to understand what are the practices that work best and that can be implemented in other countries and regions.

The partners of LIFE REthinkWASTE:



Image by Niko Lienata from Pixabay

## HOW TO READ THIS PUBLICATION

The catalogue contains 12 factsheets related to good experiences about pay as you throw (PAYT) and know as you throw (KAYT) schemes that have been implemented across Europe. In order to frame these experiences in a broader context, a set of 9 cluster projects has been selected and described in boxes.

Each factsheet follows a similar structure highlighting the main aspects in terms of:

- scheme design: how the new system has been introduced in the time;
- communication: the main activities that took place to involve citizens and businesses in the transition;
- advantages: the positive aspects that helped and fostered the introduction of the new system;
- challenges: the problems that had been overcome thanks to the PAYT/KAYT scheme;
- costs: the specific costs needed for the introduction of the system;
- benefits: the results achieved in terms of economical saving and the sorting rate;
- contact: useful links and email addresses to get more information.

Each cluster project is related to one or more good experiences in terms of the topic analysed as follows in the table of contents.

## LIST OF ACRONYMS

<b>BW</b>	Biowaste
<b>DtD</b>	Door to door
<b>IoT</b>	Internet of Things
<b>LP</b>	Light packaging
<b>PMD</b>	Plastic, metal and drink cartons
<b>RFID</b>	Radio-frequency identification
<b>WEEE</b>	Waste Electric and Electronic Equipment



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## WHY TAXATION AND INFORMATION?

The European Union has set ambitious targets for its member countries insofar as waste management is concerned. The revised **Waste Framework Directive** calls on member states to reduce the amount of landfilled waste to a maximum of 10% of the total waste by 2030; to increase the overall rate of separate waste collection to 70% by the same date; to start collecting bio- and food waste separately and process it into high-quality compost or digestate by 2023; and to reduce food waste by 50% by 2030 compared to 2014. In order to attain these targets, the EU recommends that member states use economic and regulatory instruments like pay as you throw, extended producer responsibility schemes, and incineration and landfill charges.

However, since waste management is largely overseen at a local and regional level, the situation across the bloc is heterogeneous. For starters, it is difficult to compare different member states because of the **diversity of data collection and classification methods**. In the midst of such diversity, a few practices carried out at the local and regional level have emerged as being particularly effective at improving the management of municipal solid waste. Among them is PAYT, which has long been hailed as an efficient instrument to motivate people to **take responsibility** for their environmental impact. A reflection of the polluter pays principles, PAYT schemes have been used for decades and have been shown, by different studies, to render better waste separation and waste prevention results compared to flat waste fees. Generally implemented at the local level, though often as a result of or in line with regional or national policies, such schemes are quite widespread in countries like the Netherlands, Flanders in Belgium, Germany, and, increasingly so, in France. Their success has inspired municipalities from other European countries (and not only) to follow suit. Among them are LIFE RETHINKWASTE project partners Bitetto, Veneto and Varese in Italy and Sant Just Desvern in Catalonia, Spain.





Image by robinsonk26 from Pixabay

But a recent project – [Waste4Think](#) – has explored a different approach. Instead of taxing polluters, it set out to test how the use of emerging technologies to manage waste collection data and engage with residents on an ongoing basis fared. The project was inspired in part by the experience of the Italian municipality of Seveso, which carried out a long-term awareness campaign among its residents between 2004 and 2013 and saw its separate collection rate increase by 15 percentage points to 70% as a result.

LIFE REthinkWASTE builds on the knowledge developed during this and other projects and suggests a holistic integration of information campaigns and data management about waste, on the one hand, and fiscal instruments on the other. Why? A growing body of literature on the **social acceptance** of waste taxation indicates that this aspect plays an important role in how taxes fare. Furthermore, PAYT schemes have, on occasion, been perceived to be unfair towards certain demographic groups. Without widespread support, they have also had undesirable effects, like increases in waste dumping and waste tourism.

What if, instead of directly taxing their residents, cities and regions engaged with them first? What if they studied their behaviour and then shared their findings with their residents? Would the results be as successful as in Seveso? And would information help address the side effects of taxation mentioned above?

## WHAT THIS PUBLICATION COVERS

The following chapters lay out a dozen case studies on the use of taxation, information, and technology to improve separate waste collection and prevent waste. These case studies are as diverse as can be. The cities we cover range from municipalities with a few thousands inhabitants like Argentona in Catalonia and Miglianico in Italy to medium-sized cities like Parma and Bergamo and to European metropolises like Berlin.

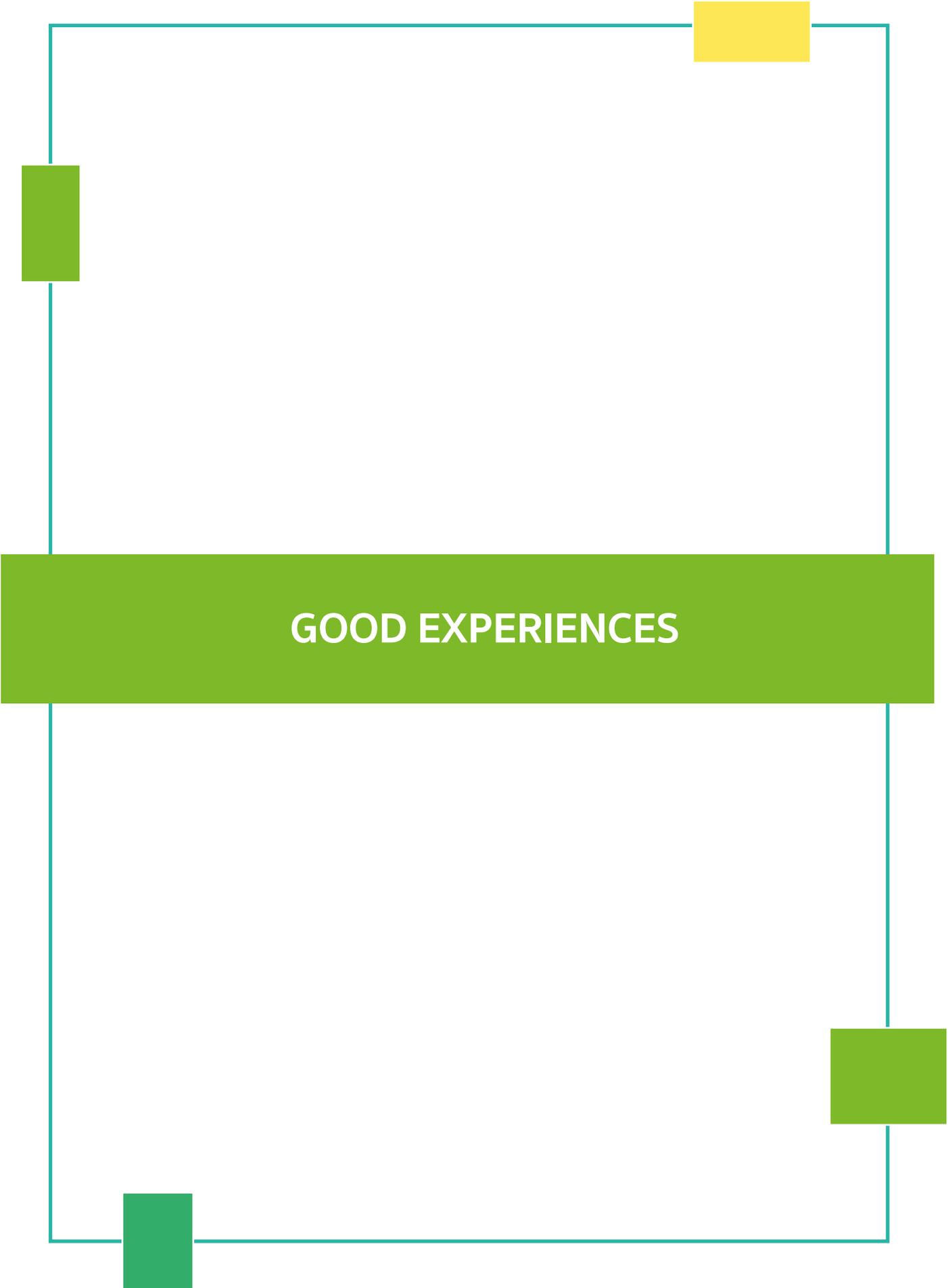
Some of the practices covered in this manual are established and have proven to be successful, while others are about to be launched at the time of writing. However, all case studies are interesting in their approach and could serve as a source of inspiration for other municipalities interested in the topic. For that reason, at the end of each case study, readers can find the contact information of the contributors who so kindly shared the information with us in order to explore the topic in greater detail, should they wish to do so.

## WHAT IS OUTSIDE OF THE SCOPE OF THIS PUBLICATION

Municipal solid waste management is a complex system that is frequently dealt with using a multitude of instruments, strategies, policies and approaches in a longitudinal manner. Capturing this complexity in a concise publication is impossible. Therefore, in order to facilitate your reading experience, the authors of this publication have left out a series of topics that are nevertheless very important to the success of the case studies. For instance, national policies and schemes – such as landfill bans and taxes or EPR schemes -- play an important role in the performance of local PAYT schemes. However, we were unable to consistently cover this topic at the level of detail it deserved. We invite you to consult some of our sources, such as the [Quantification of costs and benefits of separate waste collection report](#) published by the Horizon2020 funded project [COLLECTORS](#) in 2020, for more details about this topic.

Also outside the scope of this publication is the specific design of the messages and information shared with the residents of all the municipalities under study. This aspect was left out because the content of the communication campaigns was in different languages and addressed to demographics that had differing socio-geographical contexts and determinants.





**GOOD EXPERIENCES**

The good experience factsheets have been divided into four main categories, in relation to the main aspect developed by the action. Together with the general PAYT and KAYT scheme, the rewarded as you throw system has been inserted to highlight a different methodology that focuses on behaviours rewarding.



## **PAY AS YOU THROW**

The action focuses on schemes that 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 (as defined in DIRECTIVE (EU) 2018/851)



## **KNOW AS YOU THROW**

The action focuses on schemes based on diverse information, communication and nudging actions to make the users aware of their waste prevention and sorting performances.



## **REWARDED AS YOU THROW**

The action focuses mainly on rewarding the citizens that adopt virtuous behaviors, finding synergies between waste management and promotion of local businesses and products.



## **MIXED SYSTEM**

The action takes into consideration both the strategies PAYT and KAYT to achieve an effective and sustainable waste management.



# Pay as you throw in Argentona

## Catalonia, Spain

**Key words:** light-packaging, organic fraction, pre-paid bags

Argentona introduced door-to-door (DtD) waste collection in 2004 and decided to apply a PAYT scheme for citizens and businesses starting in 2010.

The initiative has evolved according to the needs of the municipality and in order to avoid undesirable consequences like waste tourism and a tax deficit and ensure part of the tax collection. The door-to-door and PAYT system were expanded to all the adjacent suburban areas around Argentona in 2016.

### SCHEME DESIGN

The PAYT scheme relies on the introduction of pre-paid standard bags for residual waste (red) and light packaging (yellow) — see figure 1. The latter were initially introduced for both businesses and households, but were discontinued for non-commercial activities in 2013. The PAYT is also applied for the organic fraction (food and kitchen waste) produced by businesses.

The household tax comprises 1. a progressive fixed part that is modulated depending on the number of residents/ household and 2. a variable part that is a function of the number of residual waste bags used.

Initially, users bought all the bags. In 2012, the system changed; the municipality provides a number of bags that are included in the fixed part of the tax (1, 2 or 2.5 packs depending on the number of household members). Additional bags have to be purchased at collaborating shops at a cost of 0.65€/17L bag.

Similarly, businesses have to pay a fixed tax that is calculated based on the surface of their premises and the type of activity they carry out; and a variable part based on the number of standard bags used for residual waste (2.5€/65L bag) and light packaging (1€/100L bag).

### COMMUNICATION

The communication campaign has consisted of the following elements:

- Stakeholder consultation (Oct 2008 - Sept 2009);
- Information campaign (Sept - Oct 2009);
- Test period (Oct 2009 - Feb 2010);
- Implementation (March 2010 - present day);
- Before the expansion of the DtD to the whole municipality: stakeholder consultation to select and set up the collection system and communication campaign (2016-2017).

On an ongoing basis, a designated educator has been visiting households and communities; and information has been made available at the environmental information office and website.



Figure 1. Yellow bags used for the collection of light packaging in Argentona

## ADVANTAGES

Between 2008 and 2018, the amount of waste generation/inhabitant/day decreased by 26% to 1.27 kg (figure 2). During the same period, the rate of separate waste collection increased from 52.8% to 87.6% (figure 3). Residual waste dropped by 15% between 2009 and 2013 and packaging waste by 16% in the same period.

The quality of the separately collected waste has remained high. The use of the municipal collection centre has increased.

The system has been widely accepted by the majority of the population and was the subject of a broad political consensus.

Home composting has been promoted (109 households since 2007).

Very economical material using plastic standard bags (cost 0.03€), no need for costly technologies.

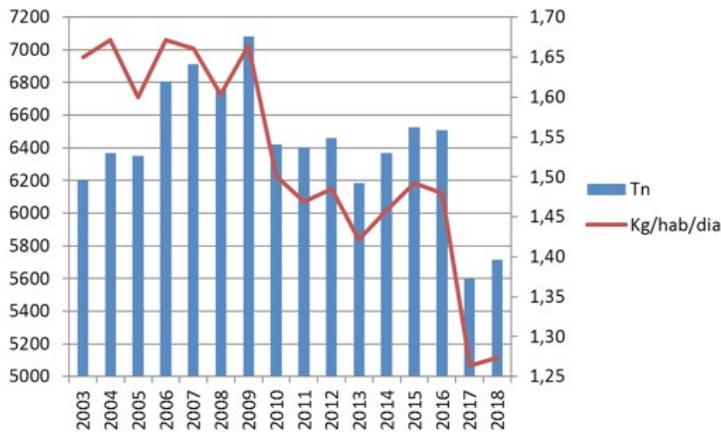


Figure 2. The amount of waste produced in Argentina between 2008 and 2018 (blue blocks represent total waste production in tn/year; red line the rate per resident per day)

## CHALLENGES

The variable part of the tax was initially overestimated. The tax calculation, which counted the cost of a pack of bags in the fixed part, had to be amended to avoid a deficit. Then, a set of challenges has to be faced:

- the high cost of the system for annual distribution of the packs of standard bags to households;
- the lack of sanctioning for infractions (illegal disposal of bags or littering) in certain neighbourhoods;
- the incorrect use of the emergency area, which led to the area being transferred to the municipal collection centre (access hours restricted);
- the incorrect disposal of waste at kerbside containers;
- the phenomenon of waste dumping.

## GENERAL INFORMATION

Population	12,295
No. of households	5,411
Density	474.4 inh/sq km
% multi-family homes	48%



## THE PAYT SCHEME

Introduction year	2010
Waste stream(s)	Residual waste; light packaging; food and bio-waste (only for businesses)
Scale	Municipal
Target	All residents + 290 businesses
Measurement	Per volume

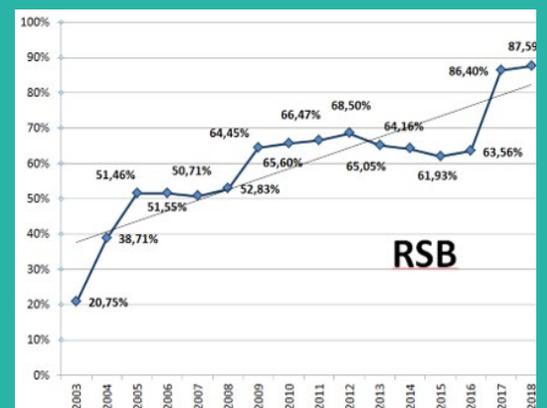


Figure 3. The rate of separate waste collection increased from 53% in 2008 to 88% in 2018



## COSTS

There is no data available about the cost of implementing the scheme. However, the cost per capita of waste collection and treatment dropped from 63€ to 49€/resident/year between 2008 and 2018 (figure 4). Below is a timeline of the evolution of the fixed and variable fees for households:

- **2010** Fixed fee: 95€. Variable part: number of standard bags used for residual waste -0.65€/unit of 17L; for light packaging -0.35€/unit of 35L bag (bought in partner shops in the municipality).
- **2012** Fixed fee: 3 categories of costs according to the number of residents per household (119€, 129€ and 139€). Variable part: number of extra standard bags used for residual waste -0.65€/unit of 17L and light packaging 0.35€/unit of 35L (bought in partner shops in the municipality).
- **2013** Same as in 2012, but the PAYT for light packaging for households was eliminated.

For businesses, the fixed part of the tax was calculated based on the type of activity and the surface of the premises, plus the number and volume of organic containers used (see figure 5). The variable part of the tax was a function of the number of standard bags used for residual waste (2.5€/unit of 65L bag) and light packaging (1€/unit of 100L bag).



Figure 4. Net cost of collecting and treating waste dropped by 29% between 2008 and 2018



Figure 5. the variable cost that businesses pay per organic waste container per year (€/l'any stands for €/year)



## BENEFITS

The treatment costs per capita have been reduced and savings occurred from residual waste landfilling and the landfill tax (figure 6). Revenues per capita increased when the door-to-door and PAYT systems were extended to the entire municipality in 2017-2018, because the revenues from plastic, glass, and light packaging from EPR increased, as did the revenues from the landfill tax refund.

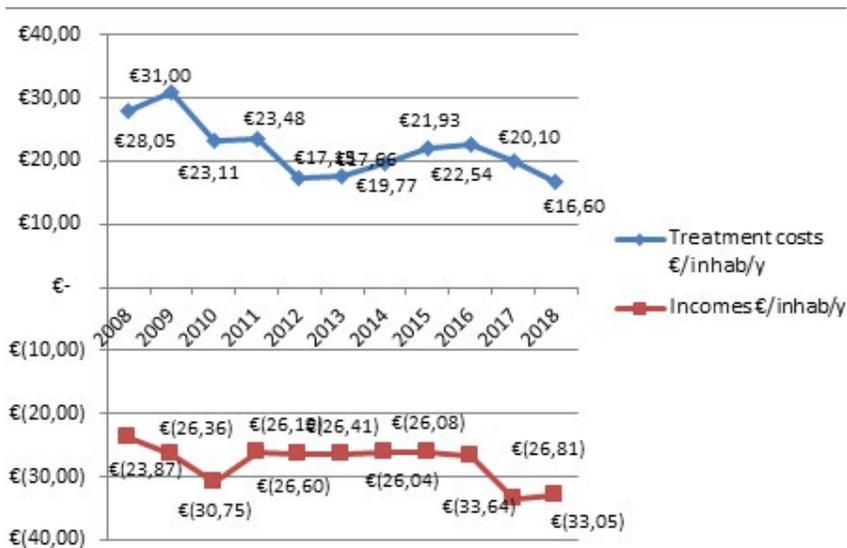


Figure 6. The evolution of costs and revenues from the PAYT scheme

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# KAYT with vending machines

## Bergamo, Italy

**Key words:** residual waste, mobile app, pre-paid bags

The municipality decided to first sensitise residents to the issue of waste management with a view to introducing PAYT at a later stage. The practice was designed based on a preliminary study supported by ARS Ambiente and approved by the City Council in March 2019.

The innovative KAYT system is to be introduced by A2A in late 2020 and will be based on vending machines that sell waste bags. When purchasing a roll of bags, residents receive information displayed on a large screen about their performance in terms of waste generation.

### SCHEME DESIGN

Bergamo's residents were used to disposing of their residual waste in transparent standard bags. The new system will obligate them to purchase the bags at designated vending machines located in each district. The machines dispense the bags only after the customer looks at the screen for a few seconds.

In the call for tenders for the vending machines launched in November 2019, bidders were asked to adapt the machines to the new KAYT system. That is, to equip them with a display that interacts with the waste tax software that counts the number of bags dispensed per user.

The machines, which users can access with their health insurance card, have a 7-10" bright display to make the messages more visible. The information will be displayed before the roll of bags is dispensed in order to make users read the information about their waste disposal.

To ensure that each user will access information regularly at the vending machines, the bag rolls were designed to contain only 10 bags of 40L each. In this manner, it is estimated that residents will use the vending machine two or three times a year.

Each user receives personalised messages based on the behaviour of their neighbours from the same district (see figure 7).

### COMMUNICATION

The new system was announced in advance through local newspapers, the ARS Ambiente website, and at conferences related to the [Waste4Think](#) project.

The information displayed on the vending machines is adapted every week or month to send specific messages to every user group. For instance, the machines may give positive messages about the high sorting rate reached by the district to encourage users to keep sorting their waste.

Figure 8 illustrates an example of a message based on a practical tip to improve the quality of personal sorting waste.

After the introduction of the new system, some operators will be supporting the citizens in the initial use of the vending machines.



Figure 7. Personal message from the machine



Figure 8. 'Tip of the day' kind of message

## ADVANTAGES

The Bergamo municipality wanted to improve the awareness of its residents before introducing economic instruments to nudge behaviour. The KAYT system is an innovative way to provide ongoing, bespoke feedback to individuals so they can correct their behaviour, when necessary.

The fact that people feel monitored is, in itself, an incentive to change their behaviour. The use of private messages means that not only those who are already sensitised to the topic are reached, but also those less engaged in waste reduction.



Figure 9. Infographic. Source ARS Ambiente

## CHALLENGES

Being the system new, the learning curve will likely be steep at the beginning.

The kind of machines needed does not exist on the market yet, so they need to be designed and built.

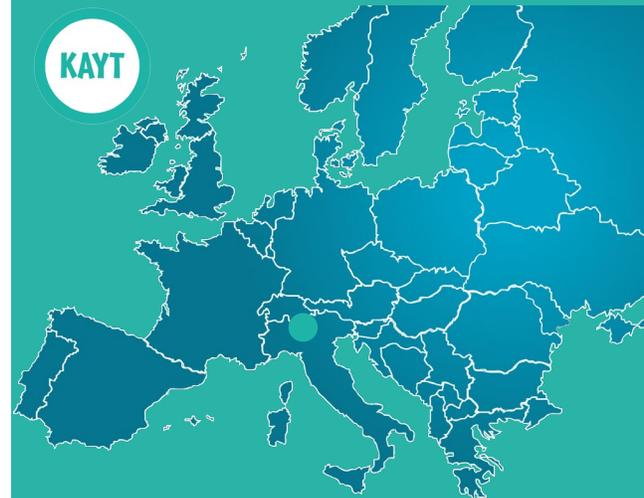
The citizens could see the obligation to purchase standard bags (40L) as a barrier. In the case of Bergamo, residents are used to receiving individual rolls of bags for free every November, so the new system will require a change in habits.



Figure 10. Each bag will have a chip. Source ARS Ambiente

## GENERAL INFORMATION

Population	121,639
No. of households	59,174
Density	2,754 inh/sq km
% multi-family homes	34.8%



## THE KAYT SCHEME

Introduction year	2020
Waste stream(s)	Residual waste
Scale	Municipal
Target	All residents
Measurement	Per volume



Figure 11. Source ARS Ambiente



## COSTS

The cost for managing the new system is very low. It has been calculated that the production and assistance of the machines, spreaded in 5 years, will cost 0,50€ per capita, each year.

## BENEFITS

The system proposed comes after a study conducted by Michele Giavini (ARS Ambiente), which highlights the importance of espousing individual responsibility through information. After the implementation of the KAYT system, the recycling rate is expected to increase by 5-10%.

The municipality of Bergamo decided to follow the example of other cities that have implemented the KAYT concept in their waste management policies and improved their recycling rates by 2-3 percentage points as a result. For instance, the Municipality of Cremona, after implementing a basic KAYT control system, saw its separate collection rate increased from 72% to 88% in only three months.

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**Name:** WASTE4think - Moving towards life cycle thinking by integrating advanced waste management systems

**Partnership:** Deusto Tech Energy, Zabala Innovation Consulting, Zamudio, Aclima, Green Technologies, EnBio Ltd., National Technical University of Athens, University of Patras, Halandri, Serious Games Interactive, ARS ambiente, Comune di Seveso, Legambiente, Softline, MOBA Mobile Automation, Cascais Ambiente, BCN Ecologia, Virtualware, Engineering.

**Funded by:** European Union's Horizon 2020 research and innovation programme under grant agreement 688995 (2016 - 2020)

**Description:** The Waste4think project seeks to design solutions based on the use of information and communication technologies that would enable the improvement of all waste management stages, adopting a global approach and particularly focusing on citizen participation in order to build more sustainable, eco-friendly cities. The main objective of Waste4Think is to move forward the current waste management practices into a circular economy motto demonstrating the value of integrating and validating 20 eco-innovative solutions that cover all the waste value chain.

The solutions include technological and non-technological approaches. The benefits of these solutions will be enhanced by a holistic waste data management methodology, and will be demonstrated in 4 complementary urban areas in Europe: Zamudio (Spain), Halandri (Greece), Seveso (Italy), and Cascais (Portugal).

**Key words:** PAYT, awareness-raising campaigns, eco-innovative solutions

**Website:** [www.waste4think.eu](http://www.waste4think.eu)

# Consolidating waste streams

## Berlin, Germany

**Key words:** residual waste, PMD, distance collection points, bin size

In 1990, Germany became the first country to introduce a dual collection system — Der Grüne Punkt, which obligates producers to take back sales packaging. Over the years, this has resulted in a significant reduction in the amount of municipal waste generated all over the country. In the capital city Berlin, between 1992 and 2012, there was a 43% drop in the amount of waste generated according to the [Berlin Senate](#).

Aside from prevention, the German capital uses a mixed collection system to deal with its waste that comprises the door-to-door collection of separate and residual waste, as well as a network of 15 civic amenity sites for recyclables. Almost 80% of the municipal waste is generated by households; while the remainder 20% by businesses and industry.

Building on previous initiatives, in 2013 Berlin became the first German federal state to introduce a new model for waste separation, which consolidates the disposal of plastic, metals and drink cartons (PMD), as well as of objects made of similar materials (e.g.: toys, metal pots), into a single, yellow bin. This system came to replace three previous types of bins (the yellow bin, the yellow bin plus, and the orange bin).



BSR employees pushing residual waste bins of different sizes. Source: BSR

## COST AND WASTE FEE CALCULATION

The municipal waste company, [BSR](#), is responsible for the collection of all the waste from private households in Berlin. In the case of packaging waste (light packaging, paper, cardboard, and glass), it collects and recycles it on behalf of Der Grüne Punkt. The door-to-door collection of certain streams (like PMD) in Berlin is free under certain conditions, while other streams - residual waste, paper and cardboard - are subject to a pay as you throw fee scheme.

Berlin has a PAYT system with a fixed fee. Every quarter, each household that is part of the general collection scheme pays a mandatory base fee ('Ökotarif') of 6.39€ (2018). Residents then pay a fixed quarterly fee for residual waste depending on the container fee: e.g. 60L - 55.38€; 240L - 82.30€. In addition, there is a cost structure in place that takes into consideration the distance and steps a waste collection worker has to take to get to the waste bin. For example, for a distance of 50 - 100m or 16 - 20 steps, an additional fee of 33.80€ per quarter is charged. The collection of recyclables (plastic, metal and drink cartons packaging) is free of charge. The collection of glass at bring points is also free. The collection of paper and cardboard costs 2.38€ per 120L container.

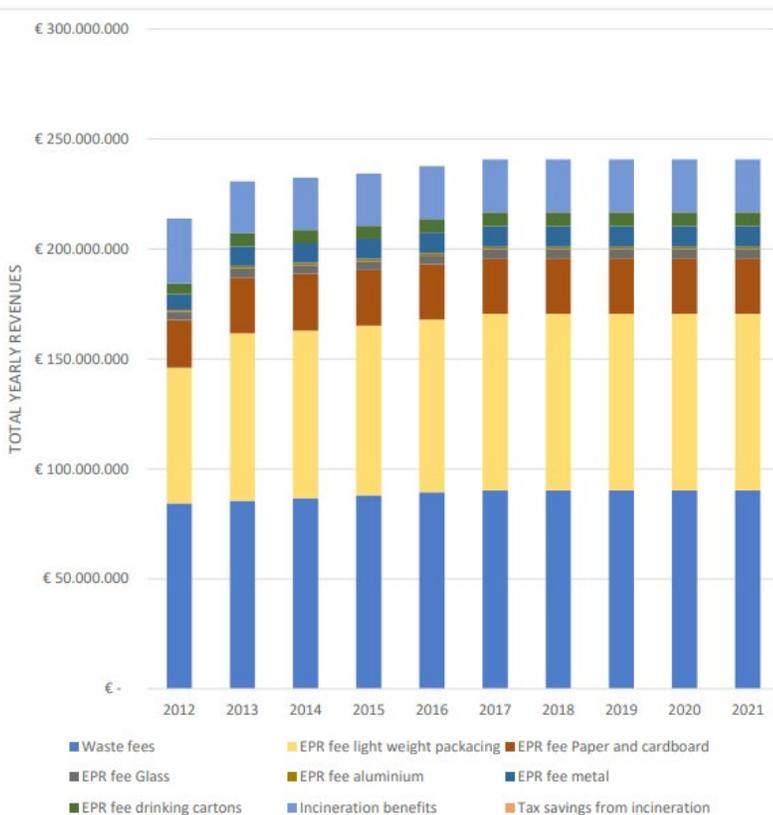


Figure 12. Overview of total revenues per year from waste management in Berlin. Source: [COLLECTORS - Waste collection systems assessed and good practices identified](#)

## GENERAL INFORMATION

Population	3.6 million
No. of households	1.8 million
Density	3,944 inh/sq km
% multi-family homes	>50%



## THE TAX SCHEME

Introduction year	2013
Waste stream(s)	PMD and residual waste
Scale	State-wide
Target	Residents & businesses
Measurement	Flat initial fee based on the volume of the disposal container purchased, variable fee based on the distance between the street and the waste containers. Collection itself is free.

## ACRONYMS

**PMD:** Plastic, metal and drink cartons



According to municipal waste company BSR, city residents paid EUR126 on average per person per year for waste collection in 2015/2016. Regional laws constrain fee increases to up to 1.9% per year until 2020. However, the waste fee had a relatively low contribution to the total revenues derived from waste management in Berlin, which were complemented by sizeable EPR fees (see figure 12).

The information regarding the costs and set up of Berlin's new waste collection system was derived from the research and cost-benefit analysis (CBA) carried out by Twan van Leeuwen of PNO Consultants under the Horizon2020 COLLECTORS project. No investment costs for the city's switching to the new collection system were found during research. Since Berlin continued to use bins that were already in use, it was assumed that there were no upfront investment costs.

The above-mentioned report made a series of other assumptions regarding fees and costs due to the unavailability of data. For instance, the cost of treating residual waste in Berlin was assumed to be 70.8€ per inhabitant per year for all the years under study, although data was only found for 2016, and to correspond to the waste fee for residual waste. Likewise, for paper and packaging, the other waste stream subject to PAYT, the costs of collection were assumed to be the same as those of a large Dutch city at 102€/tonne.

## BENEFITS

Like other German cities, Berlin already had a high rate of separate waste collection before the introduction of the new system in 2013. Case in point, its separate waste collection rate stood at 81% in 2012. However, the introduction of the new system led to a significant drop in the amount of waste generated per inhabitant, from 324 kg/person/year in 2012 to 229 kg/person/year in 2017. At the same time, the rate of separate waste collection spiked to 94% in 2013 before leveling off at 90% in 2016-2017 (see figure 13).

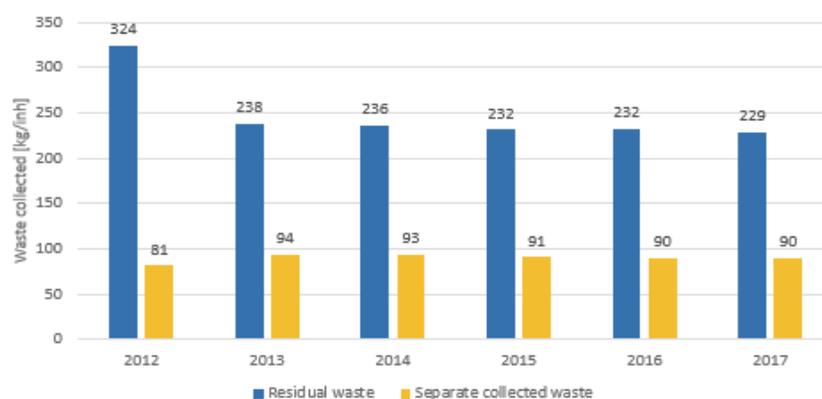


Figure 13. the amount of waste generated and separately collected waste in Berlin (2012-2017). Source: idem

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**Report in English:** [https://www.berlin.de/senuvk/umwelt/abfallwirtschaft/downloads/siedlungsabfall/Abfall\\_Broschuere\\_engl.pdf](https://www.berlin.de/senuvk/umwelt/abfallwirtschaft/downloads/siedlungsabfall/Abfall_Broschuere_engl.pdf)



## COLLECTORS

**Name:** COLLECTORS - Waste collection systems assessed and good practices identified

**Partnership:** PNO Consultants, Ramboll, Universiteit Leiden, Vito, VTT Technical Research Centre of Finland Ltd., ACR+, Eurocities, WEEE Forum, Zero Waste Europe.

**Funded by:** European Union's Horizon 2020 Research and innovation programme under grant agreement No. 776745 (2017 - 2020)

**Description:** COLLECTORS aims to identify and highlight existing good practices of waste collection and sorting. It focuses on three waste streams: paper and packaging, waste electrical and electronic equipment (WEEE), and construction and demolition waste (CDW).

To reach this goal, COLLECTORS will work in three phases:

- **Inventory:** map, harmonize and disclose existing information on waste collection systems throughout Europe for packaging and paper waste, WEEE, and CDW. The resulting inventory will be disclosed on a web-based platform to help decision-makers find systems that are in line with their needs;
- **Assessment:** assess the overall performance of waste collection systems in different geographical areas based on comparable data for twelve case studies (four per waste stream), using life-cycle assessments and cost-benefit analyses;
- **Implementation:** stimulate successful implementation of better-performing waste collection systems by providing implementation guidelines. COLLECTORS will also provide policy recommendations on aligning the different policy levels involved.

**Key words:** waste management data, best practices, policy recommendations

**Website:** [www.collectors2020.eu](http://www.collectors2020.eu)

# Receive as you throw in Lousada

## Porto District, Portugal

**Key words:** recyclables, civic amenity site, rewarding

In 2015, Lousada embarked upon a mission to pave the way to its sustainable development by embedding the sustainable development goals in its municipal strategy. At the time, this northern Portuguese municipality was grappling with a series of challenges that included water pollution, forest fires, invasive plant species, habitat and landscape degradation, and biodiversity loss. To tackle these issues, Lousada focused on environmental education and scientific literacy; research and nature conservation; social engagement; and resource efficiency as a way forward.

Waste management posed a series of issues for its residents, which generated large amounts of waste (363 kg/inh in 2016), and separated little (the rate of separate waste collection stood at a low 8%). Furthermore, residual waste was disposed of at a nearby landfill located on a hilltop. Treating the leachate from the landfill to avoid poisoning the groundwater was costly and the installation was quickly filling up. Lousada was also falling short of reaching the national separate collection target.

Fast forward to November 2019, when Lousada received ICLEI's 2019 Transformative Action Award for its efforts, beating other high calibre finalists like Leuven (Belgium) and Berlin (Germany) to the prize. Its strategy had worked.



Figure 14. Paper and cardboard temporarily stored at the Lousada EcoCentre. Source: Milene Matos

### INCENTIVE SCHEME SET-UP

In order to incentivise residents to recycle more, Lousada policy-makers devised a simple, yet effective approach: paying people for separating their waste. In order to do so, Lousada officials used the existing civic amenity site (the EcoCentre) in the municipality, which had previously been used largely for the disposal of less common waste streams (bulky waste, garden waste), as a receiving point for all recyclables.

Through the new scheme, when a resident delivers separated waste, a municipal employee weighs it at the site and records the information. Residents are then reimbursed 0.1€/kg of paper and cardboard; 0.15€/kg of plastic and metal; and 0.05€/kg of glass.

The sums are not paid directly, but rather discounted from residents' water bills. The reason for this arrangement is that, in Portugal, waste and water bills are charged together. On average, households in Lousada pay between 8-10€/month for waste collection. The separate waste fractions are then temporarily stored at the civic amenity site, before being forwarded to recycling plants for processing.

Residents also have the possibility to separate waste using the municipal bring points that are placed throughout its territory. However, this system had failed to incentivise inhabitants to separate waste, as illustrated by the low recycling rate at the beginning of the Receive as you throw scheme.



Figure 15. Land degradation is one of the main environmental issues that Lousada Municipality sought to address with its new sustainability strategy. Source: Lousada Municipality

### ACHIEVEMENTS AND COSTS OF THE SYSTEM

The amount of separate waste that Lousada's EcoCentre processes increased from 16 tonnes/year in 2016, before the new system was put in place, to 467 tonnes/year in 2019. In total, between July 2017 and January 2020 inclusive, the EcoCentre received 768 tonnes of separate waste that would otherwise have gone to landfill.

In 2019, the municipality exceeded Portugal's national target of 32 kg of sorted waste/inhabitant/year by 19%. In comparison, in 2016, the average Lousada resident separated 18 kg of waste.

### GENERAL INFORMATION

Population	46,815
No. of households	NA
Density	487 inh/sq km



### THE INCENTIVE SCHEME

Introduction year	2017 (July)
Waste stream(s)	Glass, paper & cardboard, metal, plastic
Scale	Municipal
Target	All residents
No. of participating households	>1,600
Measurement	Per weight of waste delivered to civic amenity site



Figure 16. Glass (left) and bulky waste (right) temporarily stored at the Lousada EcoCentre. Source: Milene Matos



Exact financial information about the reimbursement scheme is not available. However, according to Milene Matos, Environmental Education and Nature Conservation Coordinator in Lousada, the scheme is profitable. The amount of money collected from recycling plants and saved from the landfilling of waste is higher than the amount reimbursed to residents. Local authorities are therefore looking into the possibility of increasing the financial incentives for separate waste collection.

## COMMUNICATION

Lousada has received national and international media coverage and recognition for the progress it has made towards sustainability. The success of its strategy was covered by various national broadcasters and press outlets in Portugal. In addition, the municipality won the Europe-wide competition Transformative Action Award 2019, which was organized by ICLEI in collaboration with the City of Aalborg (Denmark), the Basque Country, the European Committee of the Regions, and the European Investment Bank.

At local level, the municipality acted following a set of communications channels, such as:

- a letter from the Mayor explaining the project and its benefits for each household;
- municipal magazine;
- social media;
- a press release.

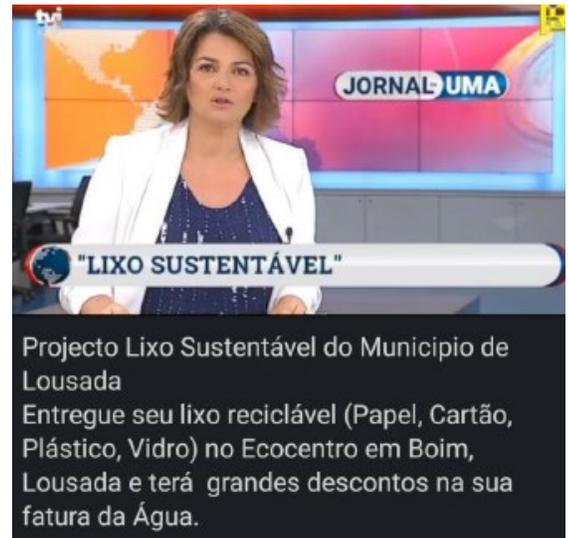


Figure 17. Lousada's success story was featured on national television in Portugal. Source: Lousada Municipality



Figure 18. Bring points where Lousada residents can dispose of their residual waste and recyclables. Source: Milene Matos

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# LIFE ReWaCO

**Name:** LIFE ReWaCo - Reversed Waste Collection

**Partnership:** Municipality of Arnhem

**Funded by:** Co-funded by the EU LIFE Programme with the reference LIFE12 ENV/NL/000792 (2013 - 2016)

**Description:** The main objective of the LIFE ReWaCo project was to demonstrate a new, more efficient and cost-effective household waste collection system, called Reversed Waste Collection (ReWaCo), in three different neighborhoods of Arnhem: a low-income neighborhood, a mixed neighborhood with both low-rise and high-rise buildings, and a neighborhood with only low-rise buildings.

The aim was to offer a series of incentives to the local population, to encourage people to separate valuable household waste (e.g. paper, plastics, and organic kitchen and garden waste), through improvements in waste collecting. At the same time, the aim was to discourage the disposal of large quantities of residual waste, by making it necessary for it to be taken to communal underground waste collection points.

Finally, the project aimed to implement a monitoring system to assess the environmental, social and financial results of the pilot scheme, and to disseminate recommendations to help implement the concept in other European municipalities.

**Key words:** awareness-raising campaigns, separated waste collection, urban area

**Website:** [https://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n\\_proj\\_id=4734](https://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=4734)

# Combining technology and PAYT

## Miglianico, Italy

Key words: all waste fractions, block-chain, RFID tags



This small municipality on Italy's Adriatic Sea coast has chosen a multi-pronged approach to tackling its waste that involved differentiated taxation, awareness raising, and technology. As a result of its efforts, between 2015 and 2019, Miglianico increased its separate waste collection rate by 20 percentage points to over 84% while reducing the waste fee paid by its residents by 7%.

### SCHEME DESIGN

In 2015, Miglianico paved the way to the introduction of a PAYT scheme by securing its waste collection data using blockchain. The blockchain contains information such as the (geo-referenced) location data, the date and time of the collection.

Next, in 2016, the municipality expanded its collaboration with technology company Partialia to introduce bins equipped with sensors (RFID tags) and wearable bracelets for its waste collection staff called Discovery Mobile. Collection staff records information about the picking (user, date, etc.) by a bracelet interacting with the sensors on the bins. The waste fee for residents is modulated based on how much waste they generate, according to estimations by volume.

Together with its educational efforts, the introduction of the technology-based PAYT scheme has contributed to a jump in the rate of separate waste collection in the municipality from 63.5% in 2015 to 85% in 2019. During the same period, the average waste fee per inhabitant decreased from 145.5€ to 135.5€.

In order to reward its residents for their compliance, the municipality distributed a special card that allows each family to receive 1L of water a day for free. The measure is meant to further reduce the amount of plastic waste.

The next step for Miglianico was to pilot the use of a smartphone app called Trashunter in May 2020 in order to reward citizens for returning their used Nespresso capsules to designated bins.

This solution involves the use of sensors and Internet of Things (IoT) for the detection of the capsule, which can be read using a QR code scanner before disposal, and blockchain for securing the data and reimbursing the users.

#### ACRONYMS

**IoT:** Internet of Things

**RFID:** Radio-frequency identification

## WHAT IS BLOCKCHAIN?

The blockchain is a ledger or a register that contains information that is verified by multiple parties (dubbed blockchain miners). Once the information is verified and added to the blockchain as a "block", it can no longer be altered or tampered with. Since security is embedded in its DNA, blockchain obviates the need for third-party certification. For example, two strangers can exchange monetary assets without the need to go through a traditional bank to validate the transaction.

## ADVANTAGES

Using blockchain and IoT to record waste collection data in Miglianico has been fairly seamless. The new technologies have not added extra steps for waste collection staff, who needed a minimum of training to learn how to use the Discovery Mobile bracelets. Furthermore, the use of blockchain can be helpful in settling disputes between residents and waste collection operators, when they arise. Since the information is clearly and accurately recorded and stored, it can be easily made available upon request. There are also potentials to improve the transparency along the recycling routes, helping the local authorities and citizens to have a clearer picture about the steps after the collection stage.

## COMMUNICATION

Concurrently with its efforts to use technology and taxation to improve waste collection, Miglianico has also resorted to education and awareness raising to engage with its residents.

Thus, since 2015, the municipality has involved schools in an environmental education programme to educate students about recycling and waste prevention. Furthermore, a series of informative seminars has been organised to sensitise adults to the importance of sorting and recycling the municipal waste.

For those who do not sort their waste properly, the municipality has introduced a label that is attached on the waste bin to inform residents of their mistake and ask them to correct it.

## COSTS AND FINANCING

The cost to run such a system, according to the estimation provided by Partitalia, is around 5,000€/year in addition to a starting lump-sum fee of around 1,500€ (the figures have to be taken as a rough estimation, since there are many factors influencing the final price for the municipalities). The record unitary cost (e.g. reading one picking and block the information) is around 0.01€.

## GENERAL INFORMATION

Population	4,900
Density	217,6 inh/sq km



## THE PAYT SCHEME

Introduction year	2017
Waste stream(s)	All waste
Scale	Municipal
Target	All residents
Measurement	Volume



Figure 19. Discovery Mobile

## CHALLENGES

The use of novel technologies in waste management and other sectors brings a series of challenges.

Among them are:

- uncertainty about the outcome of these efforts;
- upfront investment costs;
- making the business case for the use of technology (investment costs may exceed savings/revenues and/or the return on investment may be negative);
- social acceptance - people may resist embracing the new technology.

## BENEFITS

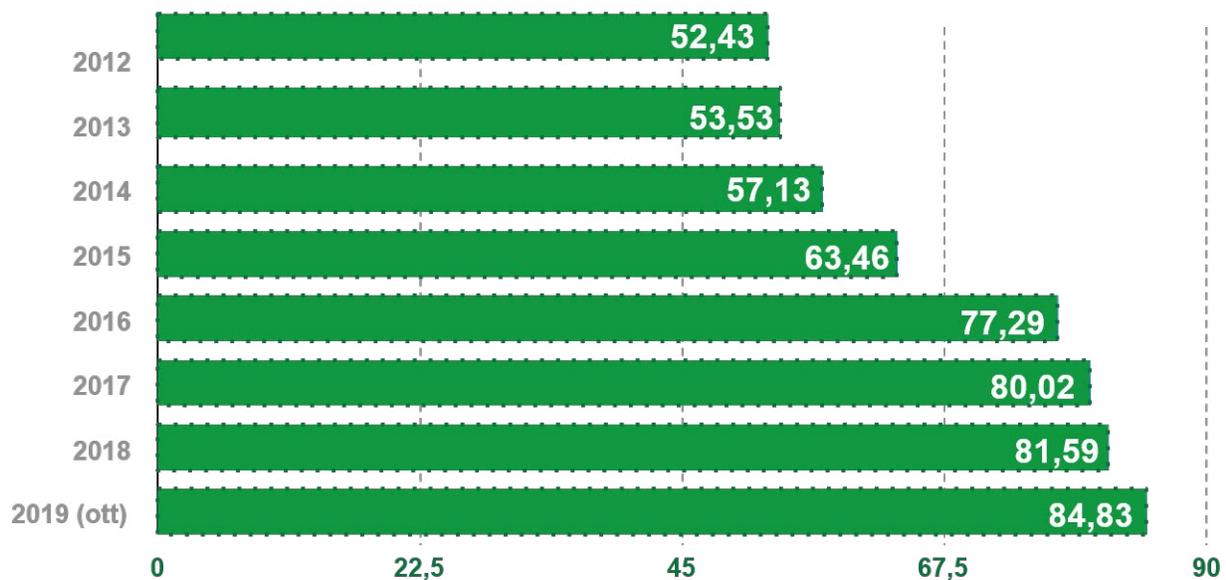


Figure 20. The separate collection rate in Miglianico. Source: Partitalia

Since the introduction of the new bins, the separate collection rate increased of 10% compared to the previous years. Thanks to the new system, the separate collection increased from 52% in 2012 to 83% in 2018, reaching even picks of 90%.

Furthermore, the quality of the collection has increased, reaching an average decrease of 4 kg per household of residual waste.

The system generated an indirect result related to 100,000€ of tax evasion, meaning 20,000€ per year of taxes to regain for the municipality. This is related to another interesting result on the service tax price, which highly decreased, providing a relevant economic saving for the citizens.

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**Name:** WINPOL - Waste Management Intelligent Systems and Policies

**Partnership:** Emulsa, ACR+, City of Antwerp, ERA, Region of Crete, Municipality of Heraklion, SNAGA, Drobeta Turnu Severin City Hall, Mehedinti County Council.

**Funded by:** European Regional Development Fund (2018 - 2022)

**Description:** The WINPOL project aims to improve regional and local waste management processes by promoting intelligent equipment and innovative planning derived from it in order to minimise waste generation and increase the efficiency of waste management processes.

Intelligent equipment and systems for waste disposal, collection and management bring about the opportunity to improve policies because the detailed information produced makes it possible to develop individual and accurate taxation policies in line with the “who pollutes pays” principles. They also lead to improved resource efficiency in the collection routes, to highly targeted campaigns that address critical groups of waste producers who have been identified thanks to data collected and, in general, to better strategic waste management planning at urban level as well as to cost optimization in the mid-term.

**Key words:** capacity building, innovative solutions, waste reduction

**Website:** [www.interregeurope.eu/winpol](http://www.interregeurope.eu/winpol)

# Pay as you throw in Miravet

## Catalonia, Spain

**Key words:** light-packaging, residual waste, pre-paid bags

This scheme was conceived by the Municipality of Miravet, Consorci per la Gestió dels Residus Municipals de les Comarques de la Ribera d'Ebre, el Priorat i la Terra Alta and Agència de Residus de Catalunya, with the technical support of ENT Environment and Management.

The PAYT system allows to assign to each user a cost according to the actual amount and type of waste generated. Therefore, it does not only represent a fairer system, but also generates an incentive for residents to reduce and recycle waste.

### SCHEME DESIGN

In 2004, Miravet started the door-to-door collection of residual and bio-waste.

Four years later, in 2008, the municipality commissioned studies to design the implementation of a PAYT system. Before the adoption of the new system, the door-to-door collection system was extended to include also packaging, paper/cardboard, and glass.

On 27 December 2010, a two-week testing phase started and the full implementation of the system began on 11 January 2011.

With the new system, the rate is divided into two parts: a fix part, which is charged annually; and a variable part, which is paid in advance through the purchase of standardised bags for residual and packaging waste.

In order to ensure the taxation of the packaging fraction, reduce the risk of fraud, and minimise the amount of improperly disposed waste, the door-to-door collection was expanded from two to five fractions together with the implementation of the new PAYT system.

### COMMUNICATION

The communication campaign for the implementation of the new system began on 13 December 2010.

For two weeks, from 27 December 2010 to 9 January 2011, a test phase took place. The Municipality distributed standardized bags to citizens and businesses. During these two weeks all the bags were collected, even if incorrect bags were used to dispose of the waste.

On 10 January 2011, the use of standardised bags became mandatory, so incorrect bags were no longer collected and users were asked to use the correct bag. Also the dissemination through the municipal channels was very important.



Figure 21. Yellow bag for light packaging

In March 2010, the municipality warned about possible sanctions for users that have repeatedly delivered incorrect bags. After the test phase ended, labels were placed on the incorrect bags informing residents of the fact.



Figure 22. Label left on the incorrectly separated waste bags

## ADVANTAGES

The system received attention from the local administration. The mayor's political determination played an important role, as well as the support of the Catalan Waste Agency. An important success factor was also the fact that the population was already used to door-to-door collection.

Although the recycling rates were already quite high prior to the introduction of the PAYT scheme, they increased even more with the new system. At the same time, not only did the share of residual waste decrease, but so did the overall amount of waste generated, from over 250 tonnes (2007) to less than 200 tonnes (2012).



Figure 23. The new collection system has been applied also to the local businesses

## CHALLENGES

Being one of the first municipalities to implement PAYT in Spain, Miravet experienced some challenges in the communication with residents, particularly to explain the concept of pre-paid bags.



Figure 24. Red bag for residual waste

## GENERAL INFORMATION

Population	900
No. of households	296
Density	22 inh/sq km



## THE TAX SCHEME

Introduction year	2011
Waste stream(s)	Residual and packaging waste
Scale	Municipal
Target	100% coverage
Measurement	Unit (bag): 17L for residual waste and 35L for packaging waste

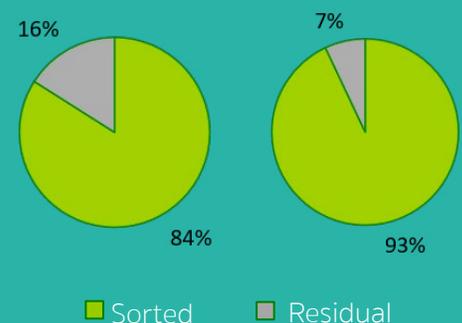


Figure 25. The sorted and residual waste before and after the introduction of the new system



## COSTS

According to the Catalan Waste Agency, the implementation of the new system costs 89,328.64€. Until 2010, all residents paid a single annual fee. With the new model, the rate is divided into two parts: one is set and equal for everyone, the other is variable and paid in advance through the purchase of standardised bags.

The table below illustrates the changes in the fixed part:

	OLD SYSTEM	NEW SYSTEM
HOUSEHOLDS IN THE CORE AREA	60€	40€
SCATTERED HOUSEHOLDS	40€	35€

Regarding the price of the bags: the 17L bag for residual waste is charged at 0.70€/unit, whereas the 35L bag for packaging waste costs 0.30€/unit.

For businesses, a more comprehensive classification by categories was established, which is included in the respective local ordinances.

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[Taxes vinculades a la generació de residus](#) (Catalan), Catalan Waste Agency  
[The case of Miravet y Rasquera](#) (Spanish), Dr. Ignasi Puig Ventosa and Maria Calaf Forn  
 (ENT Environment and Management)

[The Miravet case](#) (Spanish), Catalan Observatory of Waste Economics.



## BENEFITS

The municipality was able to save money due to increased separate waste collection. Specifically, Miravet saved 47.10€/tonne corresponding to the regional landfill tax existing in Catalonia.

After the implementation of the PAYT system, the results have been significant in terms of sorted waste collection, increasing from 84% to 93%. Furthermore, the percentage of the collected packaging increased from 6.9% to 8.8%.

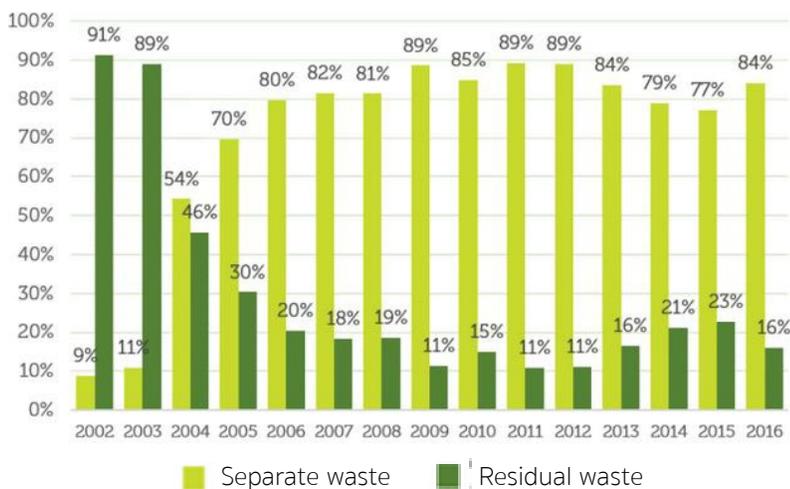


Figure 26. Evolution of the percentage of the separate waste collection compared to the residual waste

In terms of waste reduction, there is insufficient data to present global results. Before the implementation of the new system, the average amount of waste production per person in 2010 was around 0.82 kg/inhabitant per day, quite below the Catalan average of 1.54 kg/inhabitant per day.

In conclusion, even if the PAYT system in Miravet is still in a consolidation phase, the partial results show that it has been well accepted by residents and that the level of separate waste collection in the municipality has increased.

# A container to reduce residual waste

## Midden-Waasland, Belgium

**Key words:** residual waste, container, weight system, mobile app

MIWA is the public waste management company servicing Belgium's Midden-Waasland region, which comprises five municipalities. The company operates door-to-door collection of waste and has observed that about 40% of the residual waste collected in this manner could be separated. In July 2019, MIWA introduced a grey container for residual waste, aiming to reduce residual waste by 25% by 2022. Residents pay based on the amount (by weight) of residual waste they generate. As MIWA has it, "if you sort well, you pay less".

### SCHEME DESIGN

Each household is given a grey container for the disposal of residual waste. The containers come in three sizes: 40L, 120L, or 240L and are made of hard plastic to protect the waste from wild scavengers. They also come equipped with handles and wheels to facilitate their moving. Depending on the composition of the household, MIWA proposed the following container distribution:

FAMILY COMPOSITION	CONTAINER SIZE
1 person	40 liters
2-4 persons	120 liters
5+ persons	240 liters

Households receive an invoice by post twice a year. The invoice contains information about the amount of waste the household had generated in the previous six months and how that amount compares to similar households in the region.

To better communicate with the public, MIWA has created a mobile app that provides real-time insights into household waste generation and the related charges. The app is a great example of how PAYT taxation can be combined with information and awareness. The app enables residents to check the waste calendar, access a waste sorting guide, and the citizens can also be part of a game, gaining points if producing less waste.

### COMMUNICATION

The PAYT or differentiated taxation (Diftar) system has been extended also to some schools in order to encourage students and staff to pay extra attention to the production of waste within the school premises.

A clear description of the new system, with a FAQ section is available on MIWA website. The citizens are guided along the process through an user-friendly infographich (figure 27).

The MIWA app also makes all the information easily accessible (figure 28).



Figure 27. Diftar infographic. Source: MIWA's website



Figure 28. MIWA My waste app

## ADVANTAGES

Aiming to reduce residual waste production, MIWA initially focused its efforts on increasing the price of the garbage bags and on awareness-raising campaigns. However, the efforts did not produce the expected results. With the introduction of the new container and system whereby households pay per kilogram of residual waste they dispose of, a large part of the responsibility was placed on the residents themselves. The cost of their residual waste disposal is a function of their individual behaviour.

Furthermore, the container does not spread odor, does not leak, and keeps away the cats. Finally, the three sizes available are adapted for any kind of household.



Figure 29. Diftar infographic.  
Source: MiWa's website

## CHALLENGES

In its new implementation plan for household and industrial waste, the Public Flemish Waste Agency (OVAM) has set stricter targets for Flanders for 2022. The current production of residual waste within MIWA's territory is 161.3 kg per inhabitant, above the stated target amount. In 4 years, that figure has to drop to 143 kg.

So far, MIWA has not met OVAM's environmental performance target for residual waste. Too many recyclable fractions are still thrown away together with the residual waste. Early signs are promising. After the introduction of the PAYT system, the amount of residual waste decreased by over 25%.

## THE WEIGHT SYSTEM

MIWA purchases new pick-up trucks for the diftar system, equipped with an on-board computer (directly connected to the chip), loading system and an automatic weighing system, which is calibrated according to European legislation.

The weighings take place at two intervals of the emptying cycle. During the upward movement, the gross weight is determined, and the tare weight during the downward movement. The net weight is then calculated from the difference of these two first measurements and sent directly to the on-board computer.

## GENERAL INFORMATION

Population	156,000
No. of households	65,000



## THE PAYT SCHEME

Introduction year	2019
Waste stream(s)	Residual waste
Scale	Inter-municipal
Target	All residents
Measurement	Per weight



Figure 30. Diftar infographic.  
Source: MiWa's website



## COSTS

The current cost of collecting and processing residual waste is 0.21€/kg. The introduction of the new system means an extra reward for residents who sort well and avoid waste: for the first 100 kg of residual waste produced (per year and per family member), a rate of 0.18€/kg is charged. For additional amounts, the rate increases to 0.25€/kg.

To determine the tax, the household's performance is evaluated on two reference dates, namely on 1 January and 1 July of the tax year. The first container is free.

Every time the grey garbage container is offered for emptying, a fixed fee is paid, depending on the size of the container.

CONTAINER SIZE	FIXED FEE
40 liters	0.15€
120 liters	0.30€
240 litres	0.60€

**OOK JÉ PORTEMONNEE  
PROFITEERT MEE...**



Figure 31. Diftar infographic.  
Source: MiWa's website

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**Name:** LIFE PAYT - Tool to Reduce Waste in South Europe

**Partnership:** Coimbra Polytechnique, University of Aveiro, National Technical University of Athens, Municipality of Aveiro, Municipality of Lisboa, Municipality of Condeixa, Municipality of Vrilissia, Municipality of Larnaka.

**Funded by:** Co-funded by the EU LIFE Programme with the reference LIFE15 ENV/PT/609 (2016 - 2021)

**Description:** The project LIFE PAYT – Tool to Reduce Waste in South Europe - aims to change waste management strategies, tackling present obstacles and contribute to transform decision makers (elected officials; tech. staff) mind-set and eliminate misconceptions regarding PAYT. Local authorities will be exposed to innovative methods, technologies, and actions primarily targeting waste prevention, reuse, and separate collection, empowering them to pursue different practices and financing them. LIFE PAYT has four main objectives:

- Reduce residual waste from household and commerce;
- Increase separate collection rates for packaging materials;
- Demonstrate that PAYT is feasible, changing local decision makers, tech. staff mind-set, in Southern European Municipalities, resulting in benefits and contributing to the implementation of EU environmental strategies and targets;
- Promote the replication of the concept to wider regions with the same problem.

**Key words:** PAYT, waste reduction, decision-making process

**Website:** [www.life-payt.eu](http://www.life-payt.eu)

# From door-to-door towards PAYT

## Parma, Italy

Key words: light-packaging, residual&organic waste, RFID tags, mobile app

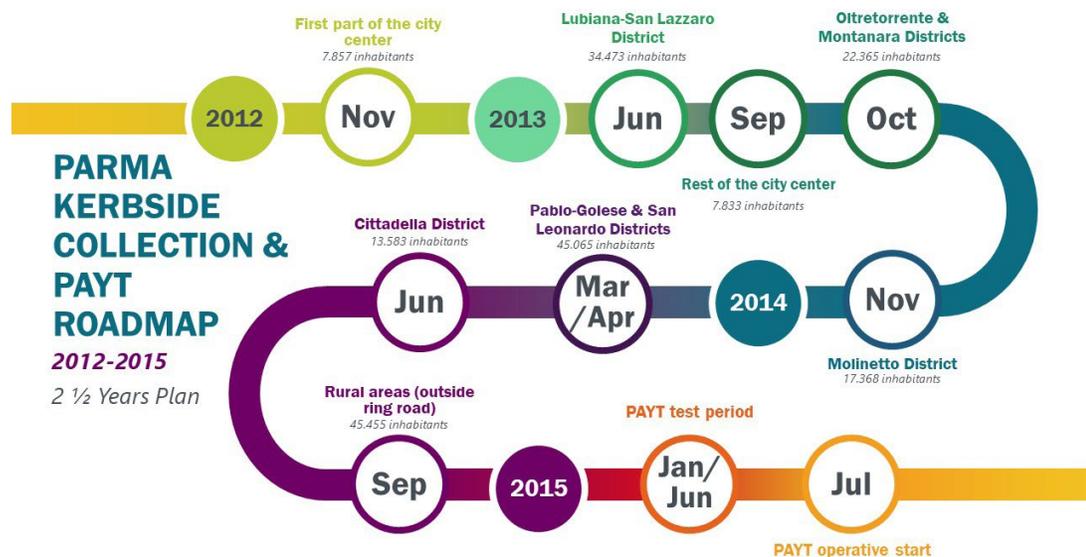


Figure 32. Parma PAYT roadmap. Source: Gabriele Folli, Municipality of Parma

### SCHEME DESIGN

Before the introduction of the new system, the rate of separate waste collection in Parma stood at 48%. The collection system consisted in bring banks. The new municipal waste collection system was introduced in the cities in Parma Province in 2012.

The process started with a pilot project targeting the historical centre in Parma with a progressive scaling up involving the surrounding areas, reaching the complete coverage of Parma in 2015.

Over the scaling up of the pilot project, several awareness-raising actions were implemented to explain to residents the door-to-door system as a step in paving the way for the introduction of the PAYT scheme. Indeed, in 2015, the PAYT scheme was finally introduced.

The bags or bins used for the collection of residual waste are equipped with a RFID transponder associated to the user. The less residual waste is generated, the less the user pays.

After the complete introduction of the door-to-door system, the municipality set up eco-stations in the urban area. They allow some flexibility in what can

be a rigid scheme like the door-to-door system, which has fixed collection time and days. Indeed, the eco-stations can be accessed 24 hours a day and 7 days a week to meet different households' needs.

### COMMUNICATION

To support the citizens in adapting to the new system, the municipality developed a smartphone app, which, beside giving information about the services, offers information like recipes and tips to avoid food waste. The app also allows users to forecast their waste fee based on their current waste generation.

Aside from the app, a series of initiatives to help citizens with special needs were carried out. Among these was the free collection of nappies for households with babies and toddlers (up to 30 months) and for the elderly, disabled, or medically impaired residents.

Another initiative is the delivering of an eco-card based on a points system that enables users to reduce their waste tax by up to 20%. This bonus scheme is applied to citizens that properly deliver waste to the civic amenity sites or to the eco-stations.

## ADVANTAGES

Acting together in a harmonised way with neighbouring municipalities has minimised rebound effects such as waste tourism and illegal dumping. The process was supported by a regional legal framework with a specific regional law incentivising the implementation of the door-to-door collection system and PAYT schemes.

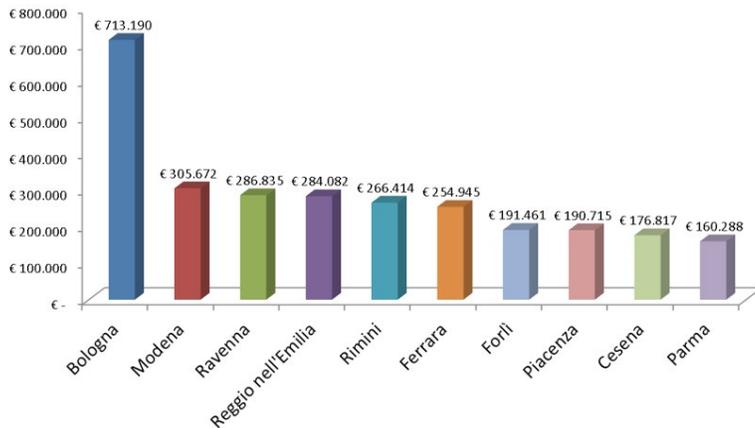


Figure 33. Amount paid by the cities of the region in relation to the residual waste produced. Source: Gabriele Folli

## CHALLENGES

Monitoring plays a key role since the illegal disposal of waste continues to be an issue. The municipality is addressing this problem with different strategies that range from the installation of cameras to the involvement of civil society organisations and volunteers acting as environmental guards.

Another effective instrument has been the involvement of the neighbourhood committees to tailor solutions and get people directly involved in the problem-solving process with a bottom-up approach. Residents can make the difference and improve the performance, so it is important to keep them strongly involved in the process. Awareness-raising and educational campaigns involving schools are critical to continuously improving the performance of the system.



Figure 34. Source: Parma municipality's website

## GENERAL INFORMATION

Population	200,000
No. of households	96,000
Density	769 inh/sq km



## THE KAYT SCHEME

Introduction year	2012-2015
Waste stream(s)	Paper and packaging, plastic, organic, residual
Scale	Municipal
Target	Citizens
Measurement	Volume

## COSTS

The municipality invested, on average, 418,000€ in communication activities and the distribution of new containers between 2012 and 2017, according to the COLLECTORS project deliverable titled [Waste collection systems assessed and good practices identified](#) (p. 49).

Furthermore, the municipality set up eight regular eco-centres and five mini ones. The cost of a regular facility is approximately 40,000€. Overall, the new system started to become profitable in earnest in 2016 (see figure 35). Between 2012 and 2015, costs were either equal with or exceeded (in 2014) the revenues.

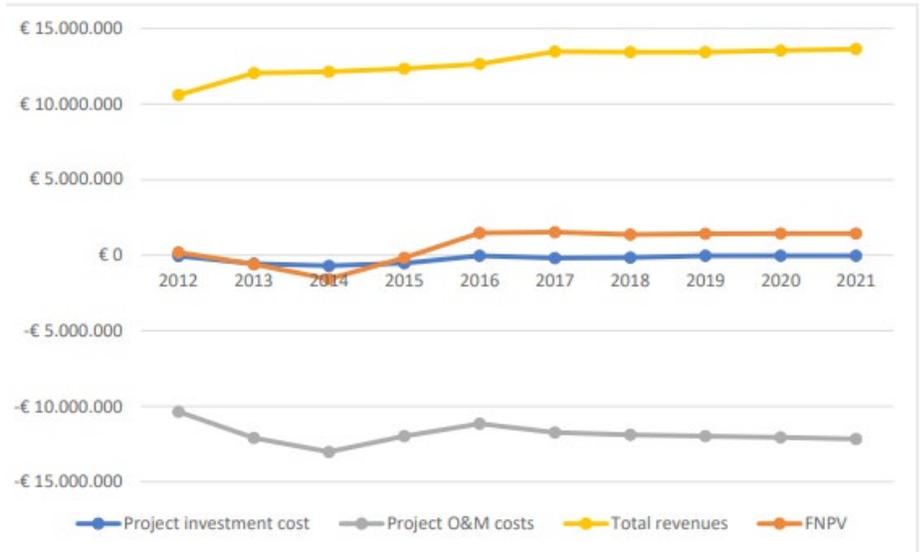


Figure 35. The project investment (blue) and operational (grey) costs; revenues (yellow), and financial net present value (brown). Source: COLLECTORS Deliverable [Waste collection systems assessed and good practices identified](#)

The cost-efficiency of the system is an outstanding result considering the high-quality level of the service delivered. The municipality offsets the increase in the costs to deliver such services through two main sources:

- The first is the Italian EPR scheme implemented by the CONAI Consortium;
- The second are regional incentives aimed at supporting the municipalities achieving the best performances in separate waste collection.

Comparing the waste management tax (“TARI” in Italy) of Parma with the one of other relevant cities of the region, the cost that citizens of Parma have to pay is one of the lowest in the territory (figure 37).

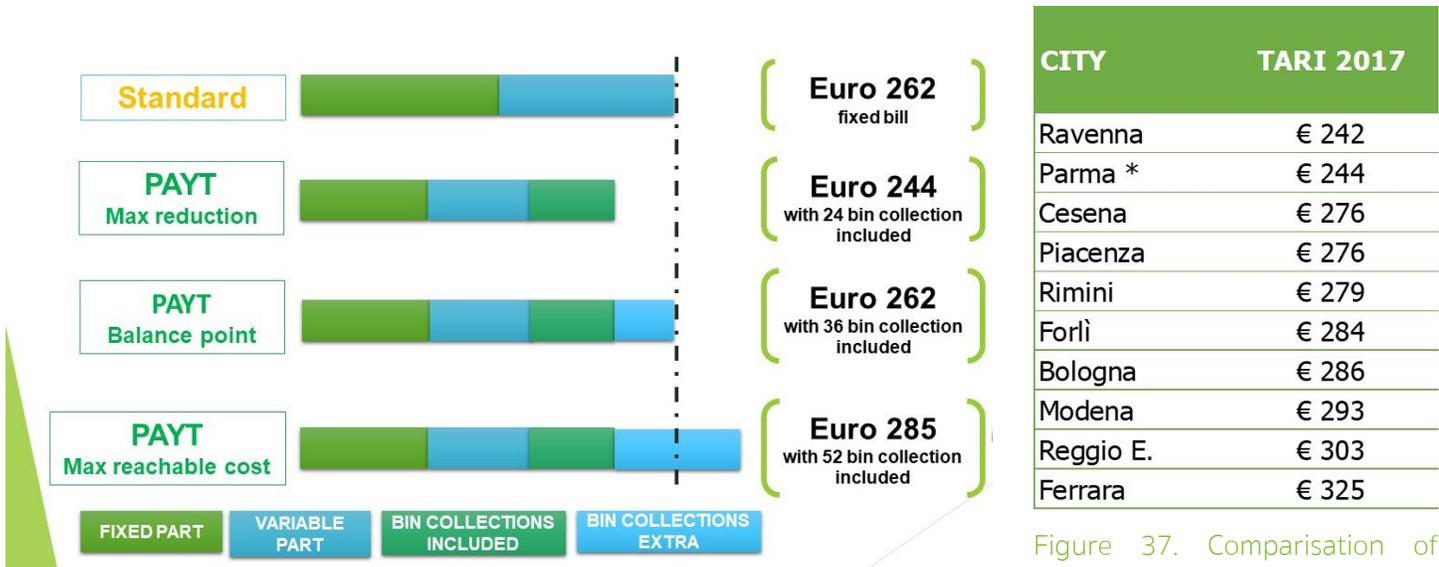


Figure 36. The waste bill before and after the introduction of the PAYT system, in a 100 sqm apartment with three people residents

Figure 37. Comparison of waste bills of capital cities in Emilia-Romagna considering the bill for a 100 sqm apartment with three people residents



Figure 38. Waste collection in Parma. Source: Gabriele Folli

## BENEFITS

In 2018, the municipality achieved an 81.2% separate waste collection rate, which took place simultaneously with a 65% drop in residual waste generation.

Currently, the only fractions collected via the bring bank system are glass and biodegradable waste coming from parks and gardens. A relevant change has been implemented regarding the separation of the streams (plastic, glass and metal packaging). In 2012, the municipality decided to separate the collection of glass from the one of plastic/metal. This action, not only improved the quality of the collected waste reducing the amount produced but it also generated a great increase (+340%) in terms of incomes from the EPR Conai consortium. The glass reached the 33€/tonnes, while the income became 106€/tonnes for the stream plastic plus metal.

The municipality calculated a total of 800.000€ of economic benefits thanks to the separation of the streams. Furthermore, the new system generated an economic saving in terms of incineration costs up to 3,5 million euros.

The system has allowed to significantly reduce the generation of residual waste, which stands at 110 kg/inhabitant, while maintaining waste fees stable.

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Take a look at the recording of the **Thematic seminar** that took place on February in Brussels:

# The Treasure Ecological Island

## Campania, Italy

**Key words:** light-packaging, bulky waste, civic amenity site, rewarding

Penisolaverde is the public waste operator managing the selective collection in the municipalities of Sorrento and Piana di Sorrento, in Campania Region. Before introducing a PAYT system, the municipalities chose to first incentivise their residents through rewarding activities. Since 2015, the Treasure Ecological Island has been implemented in the territory with the aim of increasing the percentage of sorted waste collected door-to-door and promoting local producers.

### SCHEME DESIGN

The Treasure Ecological Island initiatives are carried out at civic amenity sites (CAS). After delivering source separated waste to the CAS, citizens are rewarded with credits that can be used to receive discounts in some local shops.

As part of the initiative, 4-5 times a year, there is a specific action concerning vegetable oil waste: every 10L of delivered used oil are rewarded with fresh vegetable oil from local producers.

Besides the 95 tonnes of source separated waste, there are more than 22,500L of vegetable oil waste and 8,000 WEEE items (e.g. small items such as mobile phone, chargers, mice and big items like fridges, washing machines, etc.) yearly delivered to the CAS under the Treasure Ecological Island initiative.

Since 2018, a new feature of the Treasure Ecological Island have been introduced, getting the “island” moving to different locations of the territory to include more remote hamlets. This action has been welcomed by the residents living in remote areas, who often feel forgotten by the local political agenda.

#### ACRONYMS

**CAS:** Civic Amenity Sites

### COMMUNICATION

At the end of the year, the most virtuous citizens are rewarded with different kind of prizes. For instance, the person who most properly delivered source separated waste to the CAS in 2016 was rewarded with a recycled bike which had been manufactured out of 800 aluminum cans (figure 43).

Furthermore, part of the initiative are visits to local olive oil producers with the purpose of showcasing to residents the products they can receive as rewards for their positive behaviour (figure 40). Such activities create links between responsible behaviours related to waste management and the support of the local economy and businesses.



Figure 39. Local products promoted by the initiative



Figure 40. Tasting of the locally produced olive oil

## ADVANTAGES

The system focuses on the idea of prioritizing rewards, rather than fines or sanctions, which makes it easier to engage people.

With this strategy, the municipalities first introduce more services for the citizens and then add measurements to decrease the generation of residual waste and to fine negative behaviours.



Figure 41. Communication campaign. Source: Penisolaverde

## CHALLENGES

The main idea behind the new initiative is to link valuable local products with a challenging sector in the Campania Region, such as waste management. In fact, some of the organizations included in the project had to overcome difficult circumstances. For instance, the local strawberries produced by the biggest Italian cooperative were in the framework of the project. This cooperative is located in the "Terra dei fuochi" (Burning Land), which was named after a scandal involving the illegal burning of waste.



Figure 42. Promotion of local products. Source: Penisolaverde

## GENERAL INFORMATION

Population	around 30,000
No. of households	11,275
Density	1,700 inh/sqmt



## THE KAYT SCHEME

Introduction year	2015
Waste stream(s)	Packaging, glass, bulky waste, oil
Scale	Inter-Municipal
Target	All residents
Measurement	By weight and qualitative analysis



Figure 43. The recycled bike

## BENEFITS

Since 2008, when the door-to-door system was put in place, Sorrento's separate waste collection rate improved significantly, up to 65% (see figure 44). The progressive implementation of the reward initiative boosted that performance to 70% in 2019.

The exemplary results are even more significant if we take into consideration the fact that Sorrento is an important tourist destination that recorded roughly 3 million visitors in 2018 and 2019.

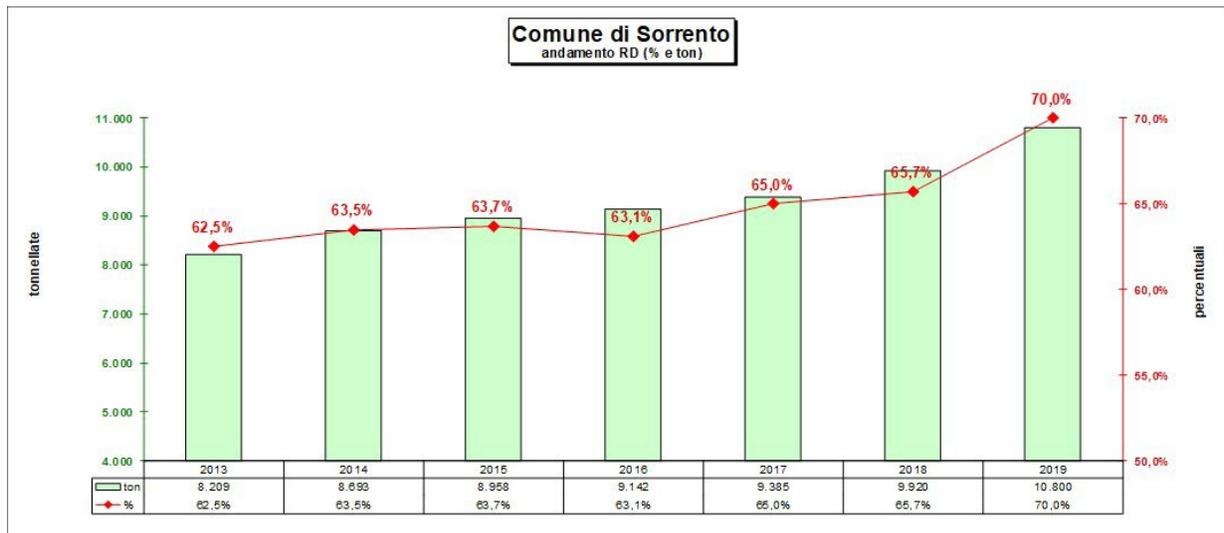
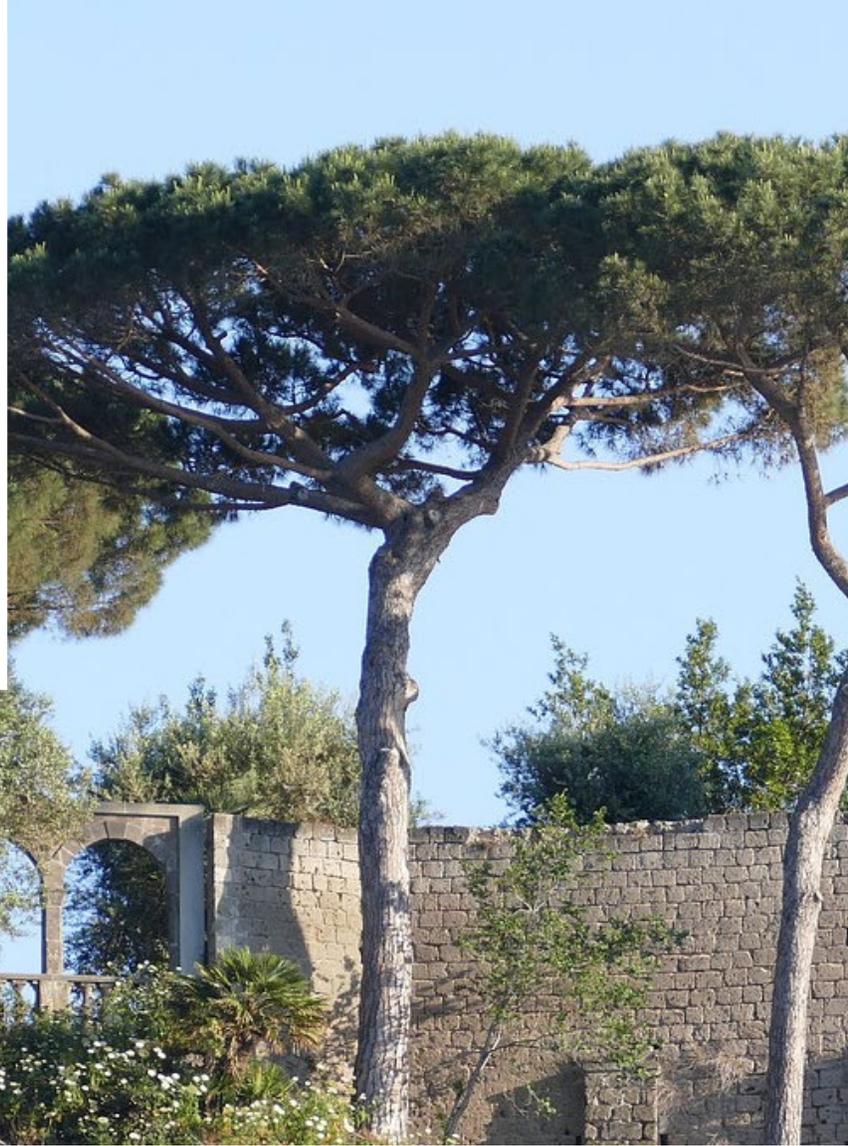


Figure 44. Separate waste collection in Sorrento by year. Source: Sorrento Municipality

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Penisolaverde S.p.A.



**Name:** European Week for Waste Reduction - EWWR

**Steering committee:** ACR+, A.I.C.A., A.R.C., Brussels Environment, EMWR, European Commission, European Committee of the Regions, Lipor, NLWA, VKU, WasteServ Malta.

**Funded by:** Since 1 July 2017, the EWWR is coordinated by the EWWR Steering Committee. The project was originally launched in 2009 under the European Commission's LIFE+ programme, which co-financed the project until mid-2017.

**Description:** The EWWR is the biggest Europe-wide initiative promoting the implementation of awareness-raising actions about sustainable resource and waste management during a single week. It encourages a wide range of audiences (public authorities, private companies, schools, civil society as well as citizens themselves) to get involved and organise waste reduction actions.

A broad variety of communication tools has been developed in order to help Coordinators and Action Developers to promote and implement actions in the scope of the EWWR. These tools are available on the EWWR website and include promotional posters, exhibition panels, web banners, shopping lists, a guide of good practices and much more! Targeted communication toolkits have also been designed to help reach specific target groups.

Additionally, each edition of the EWWR focuses on a particular theme. To encourage the implementation of actions on this topic, numerous tools are specifically developed, including various factsheets, support documents and a new poster.

**Key words:** awareness-raising campaign, 3Rs, waste reduction

**Website:** [www.ewwr.eu](http://www.ewwr.eu)

# Rewarding recycling with Tropaverde

## Galicia, Spain

**Key words:** recyclables, civic amenity site, rewarding, online platform

While the city of Santiago de Compostela has long provided bring banks for separate waste collection, a [survey](#) that the municipality carried out in early 2015 found that more than a third of its residents did not recycle because they were not used to it. Moreover, respondents cited the lack of information as a deterrent from taking environmental action. Technology company Teimas Desenvolvimento sought to address the issue by launching an online platform called Tropaverde that rewards recycling.

The solution was awarded the URBACT Good Practice Label in June 2017 and was selected to be transferred to other European cities in December 2018. Since then, Tropaverde has made its way to Greece (Pavlous Mela Municipality), Portugal (Guimarães), Poland (Opole Agglomeration), Hungary (Zugló Municipality), and France (Nice Provence Côte d'Azur).



## SCHEME DESIGN

The platform brings together municipal infrastructure, citizens, and private companies and sponsors. Upon the delivery of specific waste fractions (textiles, cooking oil, WEEE) to municipal civic amenity sites or Green Points, residents receive a voucher with a code. They then need to introduce the code on the [Tropaverde](#) website, where they are rewarded with a number of points. Those stars can then be used to purchase services and goods at local businesses ranging from restaurants to retailers and sporting facilities.



Figure 45. How Tropaverde works. Source: Teimas Desenvolvimento

The points are awarded regardless of the amount of waste delivered, so long as a certain minimum quantity is exceeded. The table below summarises the minimum quantity by waste stream.

Most frequently, users receive 30 or 50 points for their deliveries. The services offered on the website (meals, massages, tickets to events) cost a few hundred points, therefore encouraging repeated deliveries.

WASTE FRACTION	MINIMUM QUANTITY
Used cooking oil	1L
Paper and cardboard	1 large paper bag
Batteries	10 units
Toners	3 units
Clothes	6 large garments or 12 small garments
WEEE	0.5 kg
Plastic caps	1 full bag

## GENERAL INFORMATION

Population	96,405
No. of households	NA
Density	440 inh/sq km



## THE INCENTIVE SCHEME

Introduction year	2015
Waste stream(s)	All recyclables
Scale	Municipal
Target	All residents
Measurement	Per weight

## ACRONYMS

**WEEE:** Waste Electric and Electronic Equipment

An illustration of a green landscape with rolling hills, various trees, and a large group of diverse people walking and standing. Above the landscape, several green speech bubbles, each containing a white recycling symbol, are scattered across the sky. The overall theme is environmental awareness and community participation.

Figure 46. Miguel Varela, Teimas' CEO, describes Tropaverde as “an online gaming platform that aims to promote recycling and environmental responsibility among the citizens by rewarding good environmental practices”. Source: Tropaverde

## COMMUNICATION

In recent years, Tropaverde has organised a series of awareness campaigns to spread the word about resource management. Several schools in Santiago de Compostela took part in challenges and workshops to collect used cooking oil, electrical and electronic equipment, and used toys for donations as part of an effort carried out together with the Red Cross. Tropaverde also organised information points at various events in the city. Thanks to its activities, it was featured in regional media outlets, including TV shows and leading publications like La Voz de Galicia.

In order to scale up the initiative, Tropaverde took part in the URBACT programme, which has subsidised the transfer of this good practice to five other countries starting in 2018. The initiative is still being rolled out in and adapted to the new locations.

## COSTS AND FINANCING

According to the Tropaverde team, the investment cost for the platform can run between 10€ and 20,000€, while the cost of maintenance/year is around 3,000€ to 6,000€. In Santiago de Compostela the cost was supported by the municipality and municipal waste contractors. The URBACT programme is covering the costs of scaling up the initiative to other countries.

## RESULTS AND BENEFITS

The capital of Galicia, Santiago de Compostela, is an important tourist and pilgrimage destination in Spain and has, over the years, cultivated the image of an environmentally conscious city. Finding creative ways to foster sustainable behaviours is not only good for the environment, but is also important to supporting the city's image and its brand of tourism.

Since its launch, Tropaverde has engaged 3,900 users, 140 private sponsors and given out 25,000€ in awards and prizes. Concurrently, the activity at the 30 civic amenity sites in the city has increased. For instance, the amount of used cooking oil that the centres received in the first half of 2017 doubled year-on-year and the centres received 12% more traffic.

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# SMART WASTE

Interreg Europe



European Union  
European Regional  
Development Fund

**Name:** SMART WASTE - Innovation in Waste Management Policies

**Partnership:** Tuscany Resources Recovery Regional Agency, Municipality of Kolding, Klaipeda Regional Waste Management Centre, BAMEE, ACR+, Municipality of Apeldoorn.

**Funded by:** European Regional Development Fund (2019 - 2023)

**Description:** The SMART WASTE project aims at improving public policy instruments supporting innovation within waste management procedures, both in terms of new approaches and new technologies. The project looks at approaches applied in reducing, reusing, recycling and recovering waste. It looks at how regional policies have applied approaches that have emerged over recent years, such as the circular economy concept. It also looks at investments in innovative technologies to support these approaches. It looks at what new technologies have been tested and applied, thanks to public funding sources, and what impact they have had.

The project is divided into two phases. In the first phase of the project, regional project partners will evaluate innovation in their waste management policies and identify Good Practices and failures through interregional exchange events. Partners will then develop a two-part Action Plan with short and long-term measures to improve their policies. During the second phase of the project, they will implement their Action Plan and finally show their results during a high-level political event.

**Key words:** capacity building, innovation, waste reduction

**Website:** [www.interregeurope.eu/smartwaste](http://www.interregeurope.eu/smartwaste)

# Pay as you throw in Tubbergen

## The Netherlands

**Key words:** residual waste

This small municipality close to the Dutch-German border has set a very ambitious target for itself — that of reducing its residual waste generation to 50kg/inhabitant/year by 2030. In order to accomplish it, it rolled out a number of measures in 2015, including a pay as you throw scheme.

Tubbergen is serviced by waste management company ROVA, in which it is a shareholder together with 22 neighbouring municipalities. In implementing the PAYT scheme, the town focused its efforts on a communication campaign for its residents and on introducing new (electronic) waste containers, while ROVA bore the (limited) upfront investment costs for the scheme.

### SET UP OF WASTE COLLECTION SYSTEM

Waste fraction	Collection mode
Glass	Free of charge at bring banks.
Paper and cardboard	Free of charge. Door-to-door (monthly) and bring points (monthly), civic amenity sites.
Plastic, metal, drink cartons & composite packaging (PMD)	Door-to-door (monthly) and bring points (monthly), civic amenity sites.
Residual waste	Door-to-door (monthly) at a fixed rate of 100 €/year (2016) + 5.6€ per 140L container/ 9.2€ per 240L container. 0.24€/kg at civic amenity sites.

### COMMUNICATION

The municipality engages with its residents through multiple communication channels on an ongoing basis. Those include social media channels, articles in the local newspaper, letters in the mail, and the municipality's website. For instance, when the new system was introduced, guidelines were published in the local newspaper. In addition, a designated waste coach can help residents solve specific issues related to their waste management. Every year, Tubbergen also organises a trip to ROVA's waste management facilities and a workshop to explain to residents how their waste is managed, but has recorded little interest in this particular service.



Figure 47. Bring banks for residual waste and glass.

Source: PNO Consultants

Lastly, if citizens have concerns related to waste management, they can share them on ROVA's or the municipality's website and are guaranteed a response in less than 48 hours.

For more information, please contact **Twan van Leeuwen**

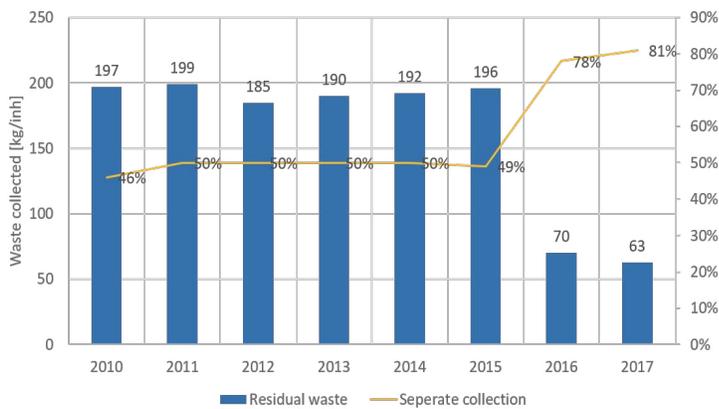
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## ACHIEVEMENTS AND COSTS OF THE SYSTEM

Tubbergen invested 8.3€/inhabitant in the new system. The reasons behind this modest sum have to do with the set up of waste collection and treatment in the region. Waste management company ROVA already had all the necessary infrastructure in place, therefore little additional investment was needed in costly equipment.

The introduction of the PAYT scheme resulted in several positive outcomes. Within a year, the amount of residual waste generated/inhabitant/year dropped by 64% to 70kg (see figure 48) and continued to decrease in subsequent years. Meanwhile, the rate of separate waste collection jumped from 49% in 2015 to 78% in 2016. Residents also reaped the benefits of the new system, with the average household paying a mere 121€/year for the disposal of residual waste in 2018, down from 146€/year in 2014. Since the collection of the other waste fractions was free of charge, this is the fee that households paid in general for waste collection and treatment.



Figures 48. The rate of separate collection in Tubbergen and the amount of residual waste generated/inhabitant/year



Figure 49. Containers for the door-to-door collection of paper and cardboard and lightweight packaging. Source: PNO Consultants

## GENERAL INFORMATION

Population	21,142
No. of households	7,876
Density	146 inh/sq km
% high-rise buildings	<19%



## THE TAX SCHEME

Introduction year	2015
Waste stream(s)	Residual waste
Scale	Municipal
Target	All residents & businesses
Measurement	Flat tax+ variable tax modulated depending on volume of waste container

# Pay per participation in Vilablareix

## Catalonia, Spain

**Key words:** light packaging, bio-waste, paper, glass, residual waste, containers

This Catalan municipality introduced door-to-door collection in 2013 and decided to apply a pay per participation taxation system in 2018 to reflect the extent of the use of the system. The objectives of the new tax are to further improve selective collection rates, take joint responsibility of proper waste management, and have a fair system based on the formula that, the more you recycle, the less you pay. To pave the way for the new tax, an information campaign was carried out to explain to residents how it would work in practice. Together with a smartphone app about separation at source, the outreach efforts boosted the uptake of the system.

### SCHEME DESIGN

	Households	Businesses
Waste streams covered by tax	Biowaste (BW); light packaging (LP)	BW, LP, paper, glass, residual waste
Type of collection system	Door-to-door for BW, LP, paper & glass, and residual waste. Bring points with access control for low density areas.	Door-to-door
Measurement system	Per no. of caddy deliveries	Per volume of container used
Tools needed	Caddies for BW (20L, brown) and LP (40L, yellow) with LF identification system	Containers/bins for each fraction
Frequency of pick-up	3 days/week for BW; 2 days/week for LP	3 days/week for BW; 2 days/week for LP
Fee	4 price ranges for each of 2 fractions; the rate increases when less annual deliveries are made	Tax is calculated based on the volume of the container used to dispose of the various fractions (price per unit x volume in liters).

### COMMUNICATION

Vilablareix ran a communication campaign for residents and businesses between October and December 2017. It consisted in the following activities: 1. an informative meeting about the new rate held in October; 2. information made available on the web; 3. information shared during a Catalan TV show (“En Directe” on 8tv channel) in October; 4. articles in the municipal magazine (October and December); and 5. letters sent to residents to let them know about the new app and rate (December).



In 2018, the campaign continued with quarterly letters detailing the content of the invoice and an article in the municipal magazine in December. Just like Argentona, Vilablareix appointed a permanent educator at the city hall to engage with residents and conduct visits and inspections. Its residents also have access to a customer service office that answers questions about the door-to-door collection system.

Figure 50. Vilablareix used a smartphone app to inform residents how to best make use of the new waste collection system and associated tax

## ACHIEVEMENTS OF THE SYSTEM

An important achievement of the pay per participation and door-to-door collection systems was that, between 2012 and 2018, the percentage of separately collected waste increased from 38.71% to 89.34%.

Other observed benefits have been:

1. an increase in the participation in the door-to-door system;
2. an increase in the amount of the separately collected fractions;
3. a drastic reduction in waste tourism;
4. an improvement in the quality of the selectively collected waste;
5. an eight-fold reduction in the residual waste generation between 2012 and 2018 down to 78.48 tonnes;
6. a reduction in the amount of total municipal waste from 1,034.67 tonnes in 2012 to 736.4 tonnes in 2018;
7. the involvement of 50 households (roughly 5% of the population) in municipal composting;
8. involving everyone in the collection system as a first step to put in practice the polluter pays principle;
9. there was no need to change the door-to-door collection system because the caddy identification technology used had been put in place from the beginning.

## BARRIERS AND CHALLENGES

The main barriers perceived are of two types:

1. the medium-term investment costs;
2. the difficulty in calculating the tax in a fair way for special cases like households that engage in significant waste prevention; and/or have a low production of LP and BW; households with only one inhabitant; and households that are only used for sleeping.

## COST AND WASTE FEE CALCULATION

The initial investment in setting up the new system was 55,846.2€ (around 20€/inh). The amount covered the following activities: a feasibility study prior to the implementation of the tax; integrating a new module in the existing data management application; the development of a web application; the interconnection with the water company; drafting a differentiated tax ordinance; informative material; and the communication campaign. The cost was partially offset through a 34,489.57€ (around 12€/inh) grant from the Catalan Waste Agency.

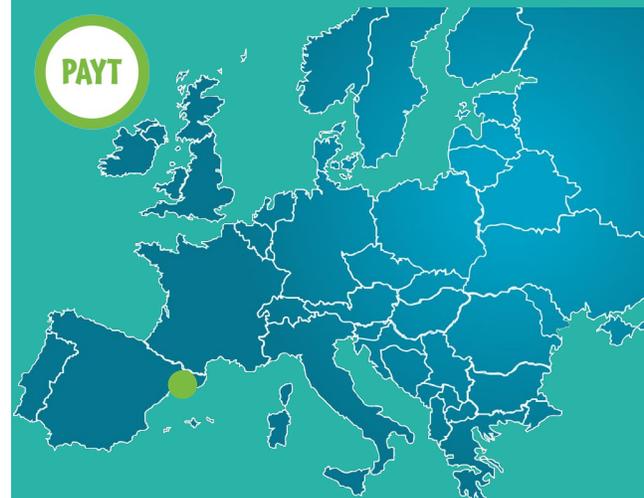
The maintenance cost of the system (data readers & data management platform) is 682€/year (around 0.25€/inh). All the activities have been performed by existing municipality staff

The average waste fee for residents evolved as follows:

Year	2013	2014	2015	2016	2017	2018
Fee (€/inh)	150.65	145	137.75	130	120	101.5

## GENERAL INFORMATION

Population	2,789
No. of households	985
Density	434 inh/sq km
% multi-family homes	25%



## THE TAX SCHEME

Introduction year	2018
Waste stream(s)	Bio-waste and light packaging (for households); additionally, paper, glass, and residual waste for businesses
Scale	Municipal
Target	All residents + 45 businesses
Measurement	Per number of disposals & volume of containers (businesses); per number of disposals (households)

## ACRONYMS

**LP:** Light Packaging

**BW:** Biowaste

The waste fee for residents is calculated based on a fixed fee that decreases as the number of disposals of light packaging and bio-waste increased.

Number of disposals of light packaging/year	51+	25-51	9-24	<9
Waste fee (€/inh)	30	50	80	120

Number of disposals of bio-waste/year	77+	41-77	13-40	<13
Waste fee (€/inh)	50	70	100	150

For instance, if a household generates 40 containers of light packaging and 52 of bio-waste in a given year, it will pay 50+70=120€ that year.

Using this system, households can pay as little as 80€ per year for the collection and treatment of the two waste streams if they are able to meet the minimum for the highest range; this represents savings of over 70€/year compared to what they paid in 2013, when households were charged a flat fee of 150.65€. Every quarter, all the households make a 20€ deposit, which they pay together with their water bill. During the last quarter of the year, their fee is adjusted based on their participation in the system.

The exceptions to this system are:

1. home composters pay the smallest fee for their bio-waste;
2. isolated homes without access to door-to-door collection pay a flat fee of 120€/year;
3. likewise, empty homes pay a flat fee of 120€/year.

The results thus far have been that 91.94% of the users, or 843 households, pays the lowest or second lowest fees for the collection of their bio-waste and light packaging, meaning that their yearly fee ranges from 80€ to 120€. Some 3.4% of users, or 31 households, pays between 120€ and 270€/year. And 4.7% of residents, or 43 households, pays 270€/year (the highest amount possible).

The fee for businesses is calculated based on the volume of the waste container they solicited for each waste stream. The overall fee is a sumation of the fees paid for each stream. The municipality establishes a minimum annual fee of 120€ and a maximum one of 2,500€.

Waste stream	Fee per volume (€/L)
Bio-waste	0.75
Light packaging	0/5
Paper and cardboard	0.5
Glass	0.5
Residual waste	1

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**Tax ordinance:** <https://seu.vilablareix.cat/SeuElectronica/ZonaPublica/Seu/Seu.aspx?idAccio=3&idDocument=335>



**Name:** CREWSOD - Waste Collection Rewarding System on Demand

**Partnership:** Consorzio Sociale AM, Consorzio Piomba Fino (Municipalities of Montefino, Castilenti, Castiglione Messer Raimondo, Arsita, Bisenti, Pineto, Atri).

**Funded by:** Co-funded by the EU LIFE Programme with the reference LIFE10 ENV/IT/000314 (2011 - 2015)

**Description:** The CREWSOD (Waste Collection Rewarding System On Demand) project's main objectives focused on the introduction of the PAYT as a new public participation approach to minimising the amount of waste that people produce. Specific aims were to survey participants to determine their waste management needs and behaviour; to set up and distribute customised collection calendars; to monitor the types and volumes of different wastes produced; to provide information to promote waste minimisation; and to consider imposing fines to prevent the misuse of the system.

The project team produced seven prototypes of communal computerised containers, called 'Eco-Houses', for the collection of separated waste, which, with a personal key card access system, enabled the automated weighing of separated wastes and the traceability of users.

During the CREWSOD demonstration, around 36 tonnes/year of separation waste was collected from around 8,000 users issued with access cards.

**Key words:** awareness-raising campaigns, PAYT, waste reduction

**Website:** [https://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n\\_proj\\_id=4118](https://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=4118)



## BIBLIOGRAPHY

ACR+ (2016). Cross-analysis of 'Pay-As-You-Throw' schemes in selected EU municipalities

ADEME (2019). Financement de la gestion des déchets : la tarification incitative. Accessible at <https://www.ademe.fr/sites/default/files/assets/documents/fiche-tarification-incitative.pdf>

Chiara Magrini, Filippo D'Addato and Alessandra Bonoli (2020). Municipal solid waste prevention: A review of market-based instruments in six European Union countries. Waste Management & Research

EUNOMIA-IEEP (2017). Pay-As-You-Throw schemes in the Benelux countries. Accessible at <https://ieep.eu/uploads/articles/attachments/84782562-17b9-4a16-b496-95dca4183fcf/BE-NL-LU%20PAYT%20final.pdf?v=63680923242>

Grantham Research Institute on Climate Change and the Environment (2016). Is taxing waste a waste of time? Evidence from a supreme court decision. Accessible at <http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/02/Working-Paper-227-Carattini-et-al.pdf>

H2020 Collectors – PNO (2020). ASSESSMENT OF SOCIO ECONOMIC AND FINANCIAL PERFORMANCE OF 12 SELECTED CASE STUDIES. Accessible at [https://www.collectors2020.eu/wp-content/uploads/2020/04/Deliverable3.2\\_COLLECTORS-project-1.pdf](https://www.collectors2020.eu/wp-content/uploads/2020/04/Deliverable3.2_COLLECTORS-project-1.pdf)

Hogg, D (2002). Financing and Incentive Schemes for Municipal Waste Management: Final Report to Directorate General Environment, European Commission.

IFEL (2019). Guida alla tariffazione puntuale dei rifiuti urbani. Accessible at [https://www.fondazioneifel.it/documenti-e-pubblicazioni/item/download/3423\\_9fe2c7cce1a8c1b6bbffab9ed4dca50f](https://www.fondazioneifel.it/documenti-e-pubblicazioni/item/download/3423_9fe2c7cce1a8c1b6bbffab9ed4dca50f)

ISWA (2011). How to design an appropriate waste fee. Principles, Practices and Applications of Waste Management Fees, ISWA guidelines, November 2011.

Mariaelena Bonelli, Luigi Bosio, Roberto Cavallo, Umberto Gianolio, Paolo Marengo (2016). Waste prevention impacts on small municipalities: Three experiences from northern Italy. Waste Management & Research.

Chiara Magrini, Filippo D'Addato and Alessandra Bonoli (2020). Municipal solid waste prevention: A review of market-based instruments in six European Union countries.



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