1. DATA MANAGEMENT PROVIDED BY WASTE COLLECTION SYSTEMS

The implementation of technology to convey pay as you throw schemes (PAYT schemes) or fair waste fees generates a lot of information that should be properly managed. It is important to follow a series of guidelines that make it possible to get the most out of the data and to apply the fair waste fee reliably and unequivocally. This chapter will introduce the essential aspects to consider when monitoring the behaviour of taxpayers and personalising waste charges according to the data collected.

1.1. Waste collection models linked with PAYT models (distribution of equipment needed)

The identification of the user of the waste collection service is the first step to develop a PAYT scheme, as it is the subject to whom the waste charge will be assigned. The material needed to identify and measure the participation of users must be distributed in advance of the approval and roll-out of the waste charge. Furthermore, this material should be managed and linked to the database that is used to calculate the waste charge individually for each user.

Depending on the waste collection model, different identification systems are recommended and, consequently, different materials need to be distributed:

- Systems with container identification (door-to-door collection systems).

These are used in individualised collection systems -such as door-to-door- where the bucket, bin or bag are identified by leaving them in front of the entrance of the household or business. Then, a tag or chip can be incorporated into each bucket, bin or bag that can be read by the technology carried by the truck or by the collection operators and it allows the number of deliveries made by each user to be digitally counted. In the case that technology (tags or chips) is not implemented, the most common way to convey a PAYT scheme in an individualised collection system is through a pre-payment system, where a standardized bag or bucket is paid in advance according to the volume and the collection frequency needed.

Pre-payment systems can work by standardized bag or by standardized bin or bucket with predetermined frequency. In these cases, the containers do not have information associated with the user.

In the case of pre-payment systems per standardized bag, the user of the service pays for each bag at the time of purchase. Bag prices vary by fraction and volume.

In the case of pre-payment per bin or bucket systems, the payment depends on the fraction, the volume required by each taxpayer and the pre-established collection frequency. Thus, the payment is independent of the uses. This case is more common in scenarios where applying payment for each delivery involves a high risk of waste tourism - for example, in the case of commercial collection that operates door-to-door in combination with open containers for households in the public space. It is also usually applied to the organic fraction for commercial activities in combination with residual post-payment PAYT schemes to not discourage the separation of this fraction. This pre-payment model per

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bin or bucket is also applied to domestic users in some countries such as the United Kingdom or Germany (Berlin is one example of that). In those cases, there are normally more than one volume per fraction offered.

In the case of Pay-per-bag (also valid for bag models with a tag), it is recommended that two types of bags are distributed per fraction, one domestic size and one commercial size. The recommended volumes for the residual fraction are generally 10-20 litres for households and 50-70 litres for businesses. In the case of packaging fraction, volumes of 30-50 litres and 90-110 litres are recommended, respectively. On the other hand, it is recommended that these bags have a distinctive logo. They should be translucent so that operators can verify that there are no inappropriate items and that the deposited waste corresponds to the fraction represented by the bag.

The organic fraction is not usually charged in the case of households to avoid discouraging its separation.

Diapers should have a special bag so they can stand out from the residual fraction. Diapers should generally be able to be collected more often and should not be charged for like the residual fraction.

The bags should be distributed by the municipality or by collaborating intermediaries such as stores with collaboration agreements. In cases where intermediaries distribute bags, no type of commission should be charged and VAT would not apply. There are also bag dispensing machines (without tags or with tags assigned to the user) with examples in Italy.

The post-payment option generally works with buckets with a chip, tag, or some other identifying element. This identification element of the bucket or bag includes information associated with the corresponding fraction, the volume of the bucket, and identifying information of the taxpayer to whom the bucket corresponds.

Payment can be by weight or by volume. While there are a few pay-per-weight experiences, pay-per-volume is more common for two reasons; 1) because it is easier to register; the weight needs a scale built into the truck to allow continuous weighing of the buckets, and 2) because the volume allows minimising the number of deliveries since taxpayers tend to deliver when it is full.

It is generally recommended to offer several distinct bucket or bin sizes because this allows users to get a size according to their general need, resulting in more correspondence between waste generation and payment.

The recommended volumes of the domestic buckets or bins in regular door-to-door collection schedules would range between 15 and 25 litres for the organic fraction, between 20 and 25 litres for the residual fraction, and between 40 and 50 litres for the packaging fraction.

Diapers should have a special identifying bag that should be delivered more often without supposing an extra charge for the taxpayer. To obtain these types of bags, the taxpayer should prove the condition that allows their use, such as, for example, the presence of babies in the home or elderly people with specific needs.

- Systems with user identification (collection in e-containers or smart containers).

These systems are installed in areas where shared containers are used. In this collection system, the containers of the monitored fractions can only be opened after the identification of the user (using a magnetic card or an equivalent system). The container can have a volumetric chamber that allows a

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maximum volume of waste to be dumped (pay-per volume) or it can have a weighing system incorporated (pay-per-weight).

Another option is to just count the number of openings of the container as a proxy (pay-per-use), although this can reduce the reliability of the fee charged to each taxpayer. For this reason, in this scenario, user incentives for properly separating waste fractions (participation) are usually proposed in the first instance, especially for the organic fraction.

User identification systems can be integrated into any type of container – including surface, underground, pneumatic and self-compacting containers. Normally, when smart containers are implemented, the management software allows restriction of which container can be opened by each user, so that users can only access one or two containers that have been allocated near to their residence. This makes it easier to control more precisely and identify the user(s) responsible for incidents or misuse.

1.2. Technologies for user or container identification

The diagram in Figure 1 summarises the electronic identification systems of the containers and the users, in the case that such identification technology is necessary to apply the PAYT scheme. Note that for pre-payment systems with standardised bags or buckets with a predetermined frequency, this technology would not be necessary.

There are different identification technologies:

- Radio-frequency identification (RFID) using electromagnetic cards.
- Near-Field-Communication – NFC, with smartphones.
- QR codes inserted on containers to be read by smartphones.

This identification can be compulsory or voluntary by the users, depending in the type of technology and systems implemented:

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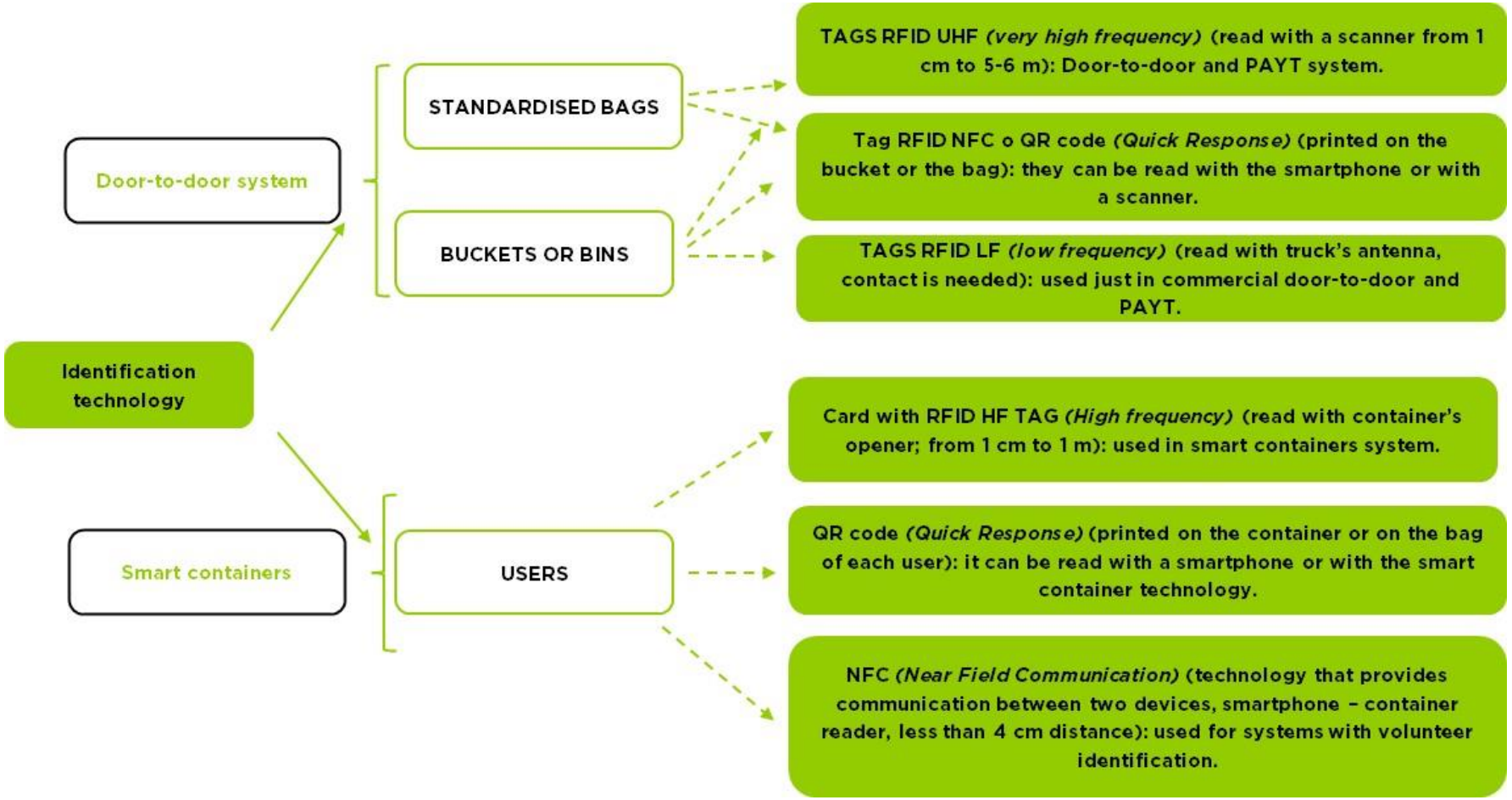
Figure 1. Diagram of the electronic identification systems used in door-to-door collection systems and smart containers



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1.3. Service management software (front and back office)

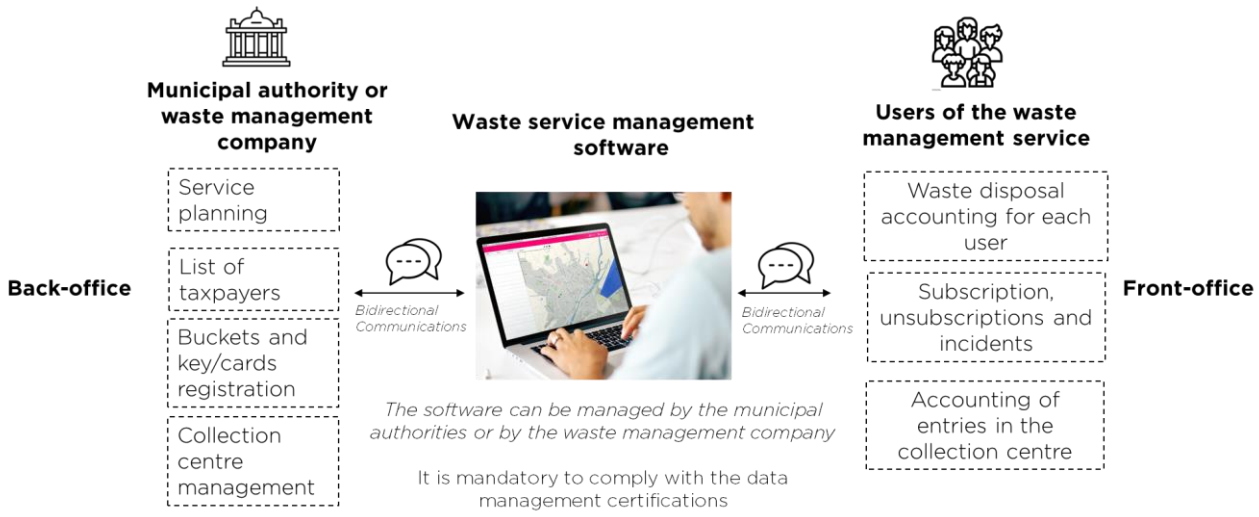
Generally, the information needed to calculate waste charges is managed using a software that handles the information reported by different Apps or web services. The local authority or the company in charge of the waste collection introduces the information necessary for the operation and planning of the service into the software, such as collection routes and schedules, containers or containers for door-to-door collection, closed areas, waste collected in rubbish dumps, operators, incidents that can be reported by operators, etc. Once all of this information is entered and managed through the service management software, the list of taxpayers must also be linked so that each user can be associated with their use of the service.

Each taxpayer must have bins with a chip associated with their personal information in the door-to-door case, or a card/key to open closed containers, to access emergency areas, or to register entries to the waste collection point. All information stored on the card/key or in the bins with a chip must be associated with a taxpayer (Back-office).

It is important to enable a communication channel for citizens to report incidents related to the service (Front-office), such as the breaking or any malfunction of the smart containers or the user identification system. When an incident communication channel is activated, users benefit from a quick response when an incident happens, and at the same time, it gives continuous improvement of the waste management service.

Figure 2 shows a diagram of how all this information is transferred to the service management software.

Figure 2. Structure of the information management in a waste management service software



1.4. Service monitoring and communication to citizens

The compilation of data by the technology makes it possible to generate indicators of the operation of the service with very diverse statistics such as, for example, percent of users participating in separate collection systems, number of average weekly deliveries per fraction, estimated level of filling of the containers, state of the batteries, openings per day or per week, percentage of waste selective collection, frequencies of access to closed areas, openings per time of the day, delivery frequencies per fraction, etc.

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All this information reported to the local entity responsible for waste management allows services to be adjusted optimally and aimed at achieving the objectives set by the legislation.

Figure 3. Examples of indicators delivered by a waste management software

In addition, the software generates personalised information for each taxpayer, such as the waste charge and how this charge has been calculated based on their use of the collection service. This space can serve as a way for citizens to communicate their concerns and improve the waste collection service, as well as to be better informed and incentivised to reduce waste generation and improve fraction separation.

1.5. Calculation and application of the waste charge

Once the information registration system has been structured as presented in the previous sections, it is important to understand well how this information will be managed and how it will be used in the calculation of each taxpayer's waste charge. The first thing to consider is that the information must be updated constantly. It is important to manually enter the subscriptions and unsubscriptions of taxpayers, as well as the registration of material (buckets, bins, bags, cards, and/or key rings).

All the variables that have been defined (charged fractions, bonuses, minimum deliveries required to access bonuses, etc.) to determine the waste charge of each taxpayer must be structured in a calculation formula and input to the software with an algorithm. Since the software will be linked to the database of service uses (with the established periodicity), the waste charge will be calculated automatically according to the participation reported by the calculation tool/software (which can be daily, monthly, quarterly, half-yearly, yearly, etc.). This information could be shown (or not) in the citizen app. Furthermore, invoicing periods must be defined, so that the waste charge is calculated for the specific periods that have been defined in the local waste ordinance.

Finally, the result of the waste charge calculated by the software should generate an output (an excel sheet with few columns: user code, the value of each variable determining the waste charge, and the final amount of the charge for the invoicing period) that can be linked with the database from the department of the municipality responsible for invoicing (or the entity in charge of invoicing in the case that it is externalized).

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2. TECHNICAL SPECIFICATIONS REGARDING THE PAYT APPROACH

The identification of the waste service user is mandatory to develop a PAYT scheme where the taxpayer contributes according to their performance (quantity of generation and quality of separation).

A starting point in the configuration of PAYT and KAYT (Know-As-You-Throw scheme[1]) is deciding which waste fractions will be monitored. The fractions to be monitored are those that will be used to calculate the charge of each user, either to charge them or to incentivize their separation or to report information in the KAYT system.

2.1. Technology for user identification and punctual measurement

The waste charge varies according to the amount of waste delivered for the fractions that are charged. The amount of generated waste of these fractions can be measured by volume, weight, or, less precisely, by the number of deliveries. In door-to-door systems, it is generally measured by volume. Hence, each taxpayer has standardised buckets or bins with a known volume, which is registered with each use. In the case of pre-payment systems using a pre-paid bag, the price of the bag also varies according to its volume. However, there is also the possibility of measuring by weight; in this case, a high-precision weighing system must be incorporated in the truck.

In closed smart containers, a volumetric chamber or drawer system can be installed. These chamber systems mainly consist of a rotating semi-cylindrical drum anchored to the lid of the container, with an opening system linked to user identification. The chamber system or the volumetric drawer has a limited disposal volume (e.g. 20, 30, or 50 litres), so every delivery represents the volume of the drum. These chamber systems may also incorporate a scale that weighs the delivered waste.

In closed smart containers without chamber system, only deliveries per user can be measured. With the number of deliveries per user, the information on the frequency of collection and the total container volume, it is possible to calculate the average volume per contribution and -if there is a limited amount of users that have permission to access each container- the average value delivered per user can be calculated.

2.2. Considerations about fractions to be measured

To decide which fractions to measure or include in the design of the new fair waste fee or PAYT scheme, the following must be considered:

- Charging the residual waste represents an incentive both to reduce residual waste and to participate in waste selective collection. For this reason, this is always a fraction to monitor and charge in a PAYT scheme. Some systems are only based on incentivising separate

[1] In parallel to PAYT schemes, KAYT schemes promote knowledge to the user of their behaviour (number of deliveries made of each fraction) and with this and the presence of prizes linked to good behaviour, an improvement of waste results wants to be achieved.

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collection of biowaste and recyclables to prevent impurities in these fractions, so prefer to leave residual waste unmonitored.

- The organic fraction represents the most important fraction by weight and is the priority to collect selectively.
    - At household level, it is not recommended to charge so as to not discourage correct separation. To achieve a correct separation, it is recommended to monitor and incentivize it with bonuses (PAYT).
    - On the other hand, in large commercial waste producers, it is suggested to charge organic waste (PAYT), since commercial generation varies a lot depending on the type of business, and for some of them the volume of generation requires high frequency of collection, thus increasing the cost of the service. Therefore, the organic fraction, in general, is proposed to be charged at the commercial level to differentiate the waste charge between the businesses that generate significant amounts of organic waste and those that do not.
- The packaging fraction can be significantly reduced through changing habits, and it is one of the most difficult fractions to recycle, so there are also reasons to charge it. Some municipalities have decided to apply incentives for packaging separation, but it is not highly recommended because it can have the unintended consequence of encouraging its generation. When it is charged (PAYT), the charge should be lower than the residual fraction to not discourage its proper separation.
- Paper, cardboard, and glass are fractions that are not worth charging so as to not discourage their selective collection. Furthermore, collection of these fractions does not represent a net cost for the municipality due to the income they can generate. Moreover, they are fractions that are already very consolidated and generally well separated.

2.3. Relating the tariff to the measurement

The fractions that should be charged or incentivised depend on the waste collection system in use (door-to-door, smart containers, or a combination of both). In this chapter, different demonstration cases are presented.

- In a door-to-door collection system, it is recommended to charge the residual fraction and, if necessary, the packaging fraction because these are the fractions that are highest priority to reduce. There is also the possibility of incentivising the organic fraction applying bonuses to encourage its separation.
- In a smart container collection system for households, a charge on residual waste fraction and a bonus for participating in the organic waste collection could be applied based on the number of deliveries. The residual fraction is recommended to be charged because it is the fraction that is highest priority to reduce. A chamber system is recommended to introduce for this waste fraction to measure the quantity of waste disposed of. The organic fraction bonus is recommended because it encourages proper separation, but also because it minimizes the risk of waste tourism or dumping. In addition, to avoid waste tourism or illegal dumping, it would be necessary to do thorough monitoring of the data to detect possible abnormalities among the taxpayers.

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- In mixed collection systems, where areas with door-to-door collection and areas with smart containers coexist, a similar system could be applied in both models in order to minimise waste tourism. For this reason, it would be recommended to apply a model that charges and bonuses equally in both areas of the municipality, such as, for example, a payment model according to the number of deliveries of residual waste fraction, and an incentive model through bonuses according to the number of deliveries of the organic waste fraction.

- In the case of a commercial door-to-door collection system, residual waste and packaging waste could be charged based on the volume and number of deliveries. Additionally, the organic waste fraction could be charged; however, this fraction could be charged through a pre-paid system and would be paid by the annual contracted volume to not discourage its separation. If the risk of illegal dumping to containers in the public space is high (the inappropriate use of containers from businesses under door-to-door collection systems) incentivisation of organic waste separation is recommended.

In contexts with door-to-door collection for both households and businesses, as there are no potential escape points in the public space, any commercial pay-as-you-throw model can work properly if it is appropriately planned and implemented. On the other hand, in contexts with household collection through open containers in the public space and with an exclusive commercial door-to-door collection, it is important to assess which model of pay-as-you-throw would be the most robust to minimise the leakage of commercial waste into the household circuit.

In these cases, businesses must use different models of containers from the ones that are used by households, to discourage fraud. The model of pre-payment per bucket with a predetermined frequency does not create incentives for fraud, since the amount is paid in advance; however, it does not create as many incentives for recycling and reduction. The commercial pay-per-bag model would be the most difficult to monitor and could have many system breakpoints and illegal dumping.

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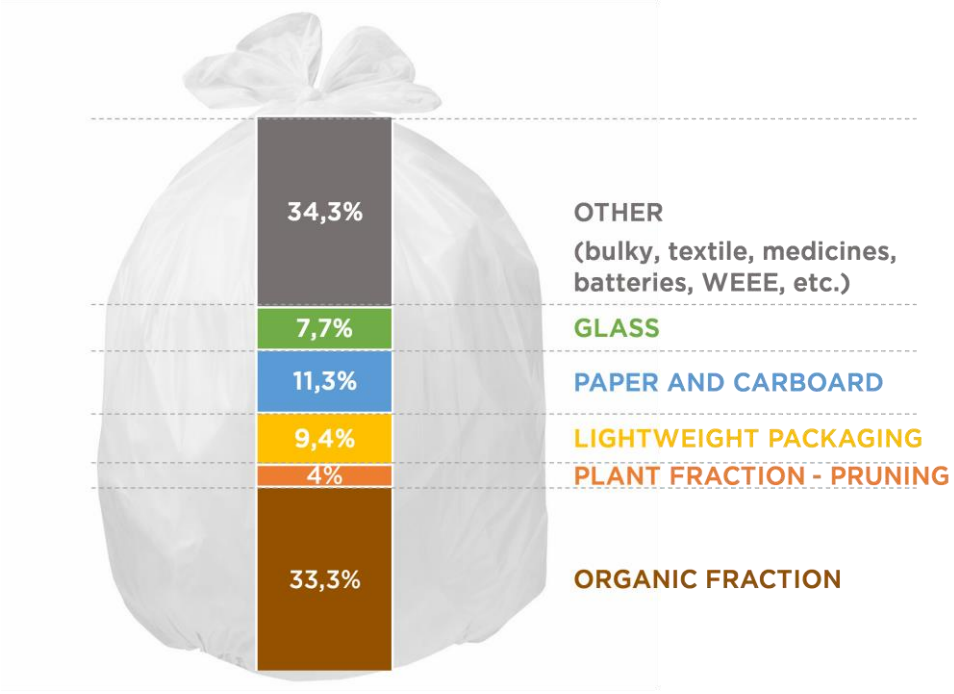
3. WASTE COLLECTION CENTRE

3.1. The key role of waste collection centres

A waste collection centre, also called recycling centre[2], is a public facility where products and municipal waste are separately taken for their subsequent treatments: reuse, preparation for reuse, recycling, recovery, and final disposal. Therefore, it is a key facility to achieve the established targets for separate collection, recycling, reuse, and preparation for reuse (PxR).

It should be noted that when implementing waste collection schemes with individualization and/or user identification, the residual waste is restricted and the fraction 'Other waste' generally emerges, appearing the need to collect them mainly through waste collection centres.

To guarantee an adequate use of these facilities and to promote their use among citizens, it is recommended to control access and identify users, to establish discounts in the waste charge related to the use of these waste collection centres, and to establish allowances and charges associated with the disposal of some materials.



Waste composition in Catalonia. Data source: General programme of prevention and management of waste and resources of Catalonia PRECAT20

[2] Other terms for referring to 'waste collection centres' are 'déchetterie' in French, 'punto limpio' or 'punto verde' in Spanish, 'centro di raccolta' or 'centro di raccolta rifiuti' in Italian, or 'Recyclinghof' in German.

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3.2. Access control and identification

To get enough information from waste collection centre users to implement discounts in the waste charge, specific technology is required to control access and identify users.

Users must be identified with a unique record in a database linked to the waste collection charge. In case there is not a unique identifier, it should be created at the time the materials needed for the logistics of the service (bins, RFID cards, etc.) are distributed to users.

However, technology should allow linking as many users as necessary to the unique identifier. For instance, a household might be unequivocally identified by a defined code, but all users living there would be associated to the same household.

It should be noted that there are different kinds of users in a waste collection centre that may be subject to different charges or discounts according to how they use the facility. Therefore, it is important that users are classified in one of these categories:

- Households: homes producing domestic or household waste.
- Commercial activities: shop, service, or industrial activities producing waste assimilated to household waste.
- Local Council services: services and departments of the local council using the waste collection centre.
- External users (households or commercial activities): users from other municipalities that may use a waste collection centre, if applicable.
- Social organisations: associations and organisations that may use a waste collection centre, particularly when they take part in some specific tasks such as the reuse of products and preparation of waste for reuse.

There are different methods and technologies for access control and identification in waste collection centres. Regarding technology used by waste collection centre workers when identifying and registering the user, we have:

- Smartphone or tablet (mobile terminal) with an App managed by the staff at the waste collection centre.
- Desktop or laptop PC software (or websites) managed by the staff. In this case, users may be identified by the address, the name of the commercial activity, the national identity document, the vehicle license plate, or by showing a user card with a unique code. All these identifiers must be linked to a particular household address or commercial activity within the database that can be accessed by the staff at the waste collection centre.
- *(Used directly by the users)* Touchscreen totems managed by the user. In this case, the user may be identified with any identifying element designated by the waste collection centre managing authority.

These technologies must allow user identification by means of the following identifying elements owned by the user:

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- Reading a magnetic stripe card
- Reading a physical or virtual user card with a bar or a QR code
- Reading a user card with NFC or RFID technology
- Apps installed on users' mobile phones requiring a QR code or other identifiers
- Other systems linked to ID cards, name and surnames of the user, or vehicle license plate recognition systems. In this case, care must be taken to ensure that these systems are linked to the waste collection charge database.

Examples of different identifying elements

Some of these options may be associated as well to a physical access control system composed by barriers, traffic lights, cameras, and a license plate reading system, among other items.

In any case, the user registration process, including the data modification and the cancellation of the user registration, must be planned, particularly in case of users not included in the reference database (e.g., external users).

The used technology must also allow to register inputs and outputs including a variety of information such as date and time, user information (identifiers, kind of user, address), and waste fractions and amount (weight, volume, units…) of waste disposed by each user. This log should also specify the associated charge and discounts, if applicable.

Documentary justification may be provided physically (printing a ticket) or virtually (sending an email or a WhatsApp message, with a push or an in-app notification, or a message on a web platform).

However, in some waste collection centres manual identification systems still predominate, with paper or carboard cards where a stamp is placed every time the user visits the centre. This method requires much more administrative work and does not allow neither an automatic charge discount process nor an integration with other services.

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3.3. Economic incentives for using waste collection centres

Establishing economic incentives for using waste collection centres aims at promoting the use of these sort of facilities, as well as good practices on selective collection. Basically, there are two types of economic incentives for using waste collection centres:

- Discounts on the waste charge: Different ranks may be defined according to the number of visits or waste items disposed of, and these are translated into different discounts on the local waste charge.
- Accumulated points: By disposing waste to the recycling centres, users get points that may be exchanged for other services or discounts in shops.

Examples of economic incentives for using waste collection centres in Valls (Catalonia) and Garennes-sur-Eure (France)

Regarding discounts on the waste charge, different criteria may be used to define them:

- Kind of user: discounts may apply only to households, or to both households and commercial activities, but with different intensities.
- Access vs use: one option is to reward access to the waste collection centre, regardless of the amount of waste disposed. However, this sort of discount may lead to generate more trips to the centre than necessary, since users tend to access the centre just to capture the discounts. To avoid this, it is recommended to establish a discount system based on the number of items or on the weight being disposed of.

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- Charge discounts on the contribution / waste fraction: the waste disposal is rewarded depending on:
  - The number of disposed fractions (more waste fractions, more discount). For instance, disposing 5 fractions would lead to a higher charge discount than disposing just 3 of them.
  - The number of disposed fractions according to weighted factors. For instance, disposing special waste would lead to higher charge discounts than disposing non-special fractions. Besides, some waste fractions may be excluded from the discount system, such as those that are already included in the household waste collection service.
  - The amount of waste disposed of (in terms of weight, volume, or number of items), establishing a minimum threshold to be considered for charge discount. For instance, the minimum amount might be 3 batteries, or 1 litre of used cooking oil.

Daily, monthly and/or annual thresholds may be considered when establishing economic incentives for using waste collection centres. In case of daily thresholds, just one access to the waste collection centre is considered for discount purposes, despite a user (or different users living in the same home) might visit a waste collection centre different times a day. An analogous criterion may be applied to monthly or annual thresholds, since once a user has reached the maximum discount, it is not possible to exceed it.

Economic incentives for using waste collection centres may be interesting to promote the use of this sort of facilities. However, before implementing these incentives, it would be recommended to evaluate their need based on a variety of indicators such as the number of users per inhabitant and year, the amount of waste disposed of per inhabitant and year, or the percentage of self-financing of the waste collection centre service.

In addition, it should be remarked that technology must allow to automatically apply discounts on the waste charge depending on the criteria and the thresholds previously established. It is also important to automatically integrate data from the use of mobile collection centres in the economic incentives.

Finally, in case the waste collection centre has specific spaces for reuse and preparation for reuse activities, additional economic incentives might be considered.

3.4. Thresholds and charges

Waste collection centres may establish thresholds on specific waste fractions that a user could dispose of during a specific period, as well as charges applied in case thresholds are exceeded. Different thresholds may be applied depending on the kind of user (household, commercial activities, etc.) and waste fraction, according to the municipal ordinance on waste collection or according to the regulation of the recycling centre. It is important to keep in mind which are the purposes for establishing these thresholds and charges:

- To avoid container overfill, mainly caused by some commercial activities. Since households do not generally cause these situations, thresholds are only recommended for commercial activities.

- To achieve the highest percentage of self-financing of the waste collection centre. In this case, it is important to differentiate between those fractions of waste that generate net revenues (paper and cardboard, batteries, metal, vegetable oils, etc.), and therefore user

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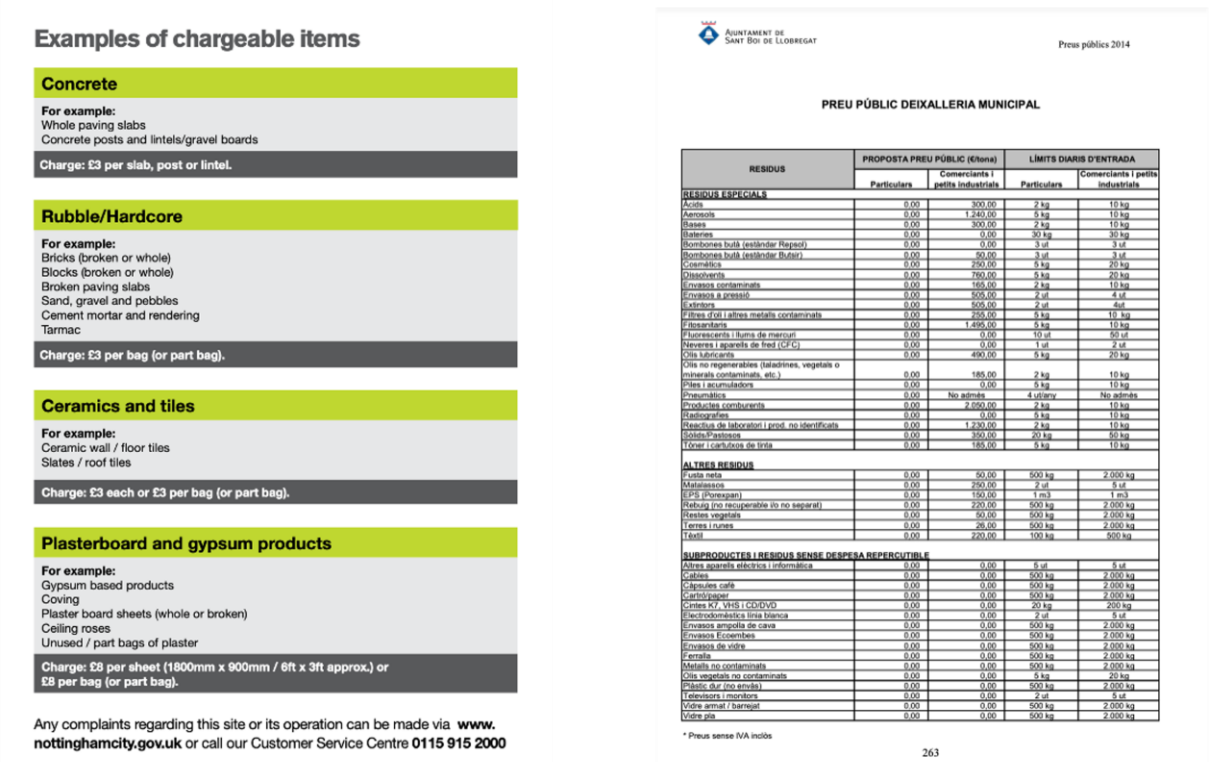
contributions may continue to be free, from those fractions that generate expenses (bulky waste, wood, construction waste, garden waste, etc.) so their cost should be supported by users. Once again, differences should be established between households and commercial activities. In the first case, lower charges would be recommended to prevent abandoned waste (next to container areas or close to the waste collection centre). On the other hand, commercial activities are for-profit activities, and therefore they should be able to entirely support the cost of the public services they use.

Values may be cumulative during the established period (day, week, month, or a year). Once a particular waste fraction is disposed of by a specific user, the following situations may occur:

- The amount of waste (in weight, volume, or units) does not exceed the threshold to be collected free of charge for that specific kind of user.
- The amount of waste exceeds the threshold, so then a waste charge is automatically calculated.
- The amount of waste exceeds the threshold, and it is therefore not allowed to dispose of such amount of waste.

Once a new period starts, the registration process restarts. To ensure a correct record of the quantity of waste deposited (in terms of weight or number of items) and the correct payment, besides the possibility to enter data manually, connection (via cable, Bluetooth or Wi-Fi) with weighing devices (vehicle scale and/or digital scale) is required.



Examples of chargeable items

Concrete

For example:
Whole paving slabs
Concrete posts and lintels/gravel boards

Charge: £3 per slab, post or lintel.

Rubble/Hardcore

For example:
Bricks (broken or whole)
Blocks (broken or whole)
Broken paving slabs
Sand, gravel and pebbles
Cement mortar and rendering
Tarmac

Charge: £3 per bag (or part bag).

Ceramics and tiles

For example:
Ceramic wall / floor tiles
Slates / roof tiles

Charge: £3 each or £3 per bag (or part bag).

Plasterboard and gypsum products

For example:
Gypsum based products
Coving
Plaster board sheets (whole or broken)
Ceiling roses
Unused / part bags of plaster

Charge: £8 per sheet (1800mm x 900mm / 6ft x 3ft approx.) or £8 per bag (or part bag).

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RESIDUS	PROPOSTA PREU PÚBLIC (€/tona)		LÍMITS DIARIS D'ENTRADA	
	Particulars	Comerciants i petits industrials	Particulars	Comerciants i petits industrials
RESIDUS ESPECIALS				
Àcids	0,00	300,00	2 kg	10 kg
Aerosols	0,00	1.240,00	5 kg	10 kg
Bases	0,00	300,00	2 kg	10 kg
Bateries	0,00	0,00	30 kg	30 kg
Bombones butà (estàndar Repsol)	0,00	0,00	3 ut	3 ut
Bombones butà (estàndar Butsir)	0,00	50,00	3 ut	3 ut
Cosmàtics	0,00	250,00	5 kg	20 kg
Dissolvents	0,00	760,00	5 kg	20 kg
Envasos contaminats	0,00	165,00	2 kg	10 kg
Envasos a pressió	0,00	505,00	2 ut	4 ut
Extintors	0,00	505,00	2 ut	4ut
Filtres d'oli i altres metalls contaminats	0,00	255,00	5 kg	10 kg
Fitosanitaris	0,00	1.495,00	5 kg	10 kg
Fluorescents i llums de mercuri	0,00	0,00	10 ut	50 ut
Neveres i aparells de fred (CFC)	0,00	0,00	1 ut	2 ut
Olis lubricants	0,00	490,00	5 kg	20 kg
Olis no regenerables (taladrines, vegetals o minerals contaminats, etc.)	0,00	185,00	2 kg	10 kg
Piles i acumuladors	0,00	0,00	5 kg	10 kg
Pneumàtics	0,00	No admès	4 ut/any	No admès
Productes comburents	0,00	2.050,00	2 kg	10 kg
Radiografies	0,00	0,00	5 kg	10 kg
Reactius de laboratori i prod. no identificats	0,00	1.230,00	2 kg	10 kg
Sòlids/Pastosos	0,00	350,00	20 kg	50 kg
Tòner i cartutxos de tinta	0,00	185,00	5 kg	10 kg
ALTRES RESIDUS				
Fusta neta	0,00	50,00	500 kg	2.000 kg
Matalassos	0,00	250,00	2 ut	5 ut
EPS (Porexpan)	0,00	150,00	1 m3	1 m3
Rebuig (no recuperable i/o no separat)	0,00	220,00	500 kg	2.000 kg
Restes vegetals	0,00	50,00	500 kg	2.000 kg
Terres i runes	0,00	25,00	500 kg	2.000 kg
Tèxtil	0,00	220,00	100 kg	500 kg
SUBPRODUCTES I RESIDUS SENSE DESPESA REPERCUTIBLE				
Altres aparells elèctrics i informàtica	0,00	0,00	5 ut	5 ut
Cables	0,00	0,00	500 kg	2.000 kg
Capsules café	0,00	0,00	500 kg	2.000 kg
Cartró/paper	0,00	0,00	500 kg	2.000 kg
Cintes K7, VHS i CD/DVD	0,00	0,00	20 kg	200 kg
Electrodomèstics línia blanca	0,00	0,00	2 ut	5 ut
Envasos ampolla de cava	0,00	0,00	500 kg	2.000 kg
Envasos Ecoembes	0,00	0,00	500 kg	2.000 kg
Envasos de vidre	0,00	0,00	500 kg	2.000 kg
Ferralla	0,00	0,00	500 kg	2.000 kg
Metalls no contaminats	0,00	0,00	500 kg	2.000 kg
Olis vegetals no contaminats	0,00	0,00	5 kg	20 kg
Plàstic dur (no envàs)	0,00	0,00	500 kg	2.000 kg
Televisors i monitors	0,00	0,00	2 ut	5 ut
Vidre armat / barrejat	0,00	0,00	500 kg	2.000 kg
Vidre pla	0,00	0,00	500 kg	2.000 kg

* Preus sense IVA inclòs

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Examples of charges and thresholds in Nottingham City (United Kingdom) and Sant Boi de Llobregat (Catalonia).

The REthinkWASTE project has received funding from the LIFE Programme of the European Union.

3.5. Communication

To raise public awareness of the waste collection centre service, a website with general information (location, contact, opening hours, economic incentives, thresholds and charges, waste fractions accepted, etc.) about the service must be launched. In addition, this website may include a virtual shop showing the available products from the Reuse and PxR activities developed in the centre.

Beyond the awareness campaign to promote the waste collection centre and the reuse site, tools need to be established for users to have access to data related to their use of the service (number of contributions and quantities), including long-term data, all supporting documentation and discounts received, among other information. To do this, there are different options:

- A user area on the website where users can log in to access to their data
- A dedicated App (Android and iOS)

3.6. Integration with other services

Economic incentives for using waste collection centres may be linked as well to other economic incentives for other services related to the waste collection service, allowing this to consider all data available to calculate a Fair Fee. For this reason, it would be necessary to assess the need to have an access control and identification system that could also be compatible with:

- User identification technology for locked containers
- User identification technology for emergency areas with restricted access in door-to-door collection models.
- User identification technology for community composting areas
- User identification technology for bins in door-to-door collection models
- Specific collection requests (bulky waste, garden waste, etc.)
- Visits and inspections to validate requirements to get discounts on the waste charge for those users doing home composting.
- Participation in waste prevention actions that may be considered for discounts on the waste charge, such as courses, conferences, repair workshops, shopping with reusable bags, etc.

  In any case, synergies can be generated with communication tools (user area on the website or App) where bonuses for the use of various services may be consulted.

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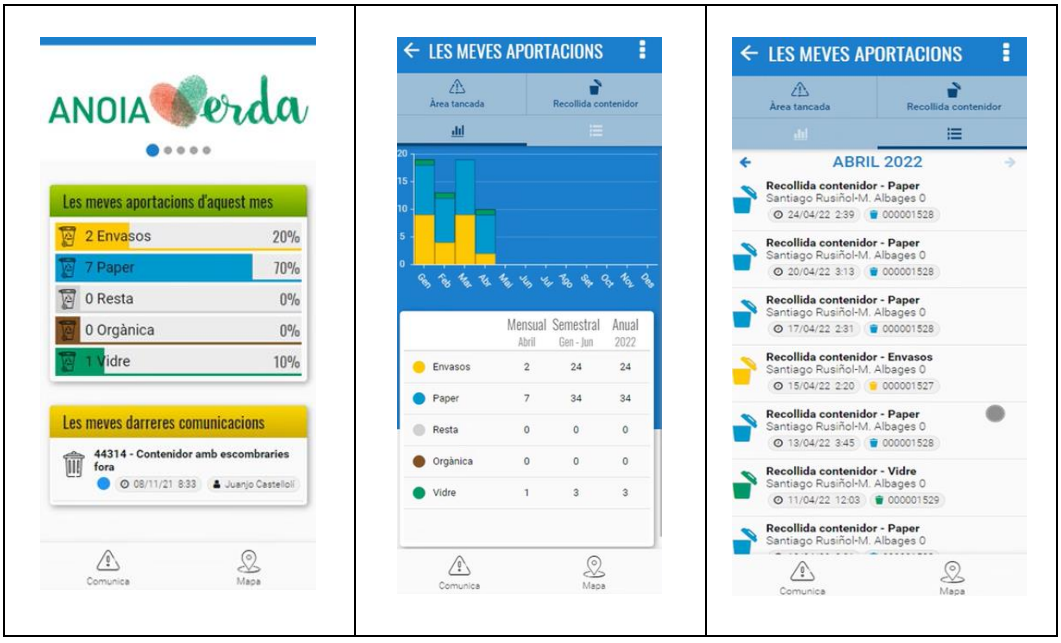
4. COMMUNICATION AND INFORMATION TOOLS CONCERNING THE TARIFF

The software for waste service management generates information that can be personalised for citizens, such as the number of deliveries of each fraction, eventual changes in the waste collection system, invoicing management, or personalised messages about how to improve participation in waste collection. All this information can be transferred to each user through a webpage service or an App. Users can receive continuous, individualised communication about the use they make of the services, how this use directly affects the amount of their charge, and how they can improve their performance.

Figure 4 shows some examples of the communications that can be reported to citizens through the communication Apps.

Figure 4. Example of an App interface to report and to communicate with citizens



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