

3. OVERALL ECONOMIC BALANCE

Below, are detailed aspects such as the waste and economic balance in PAYT Systems (section 3.1), the PAYT scheme and tax modulation (section 3.2), the actions to minimize tax circumvention phenomena (section 3.3) and tendering and tax regulation (section 3.4).

3.1. Pay as you throw, waste flows, economic balance and environmental externalities

As it is introduced in section **Error! No s'ha trobat l'origen de la referència.**, PAYT schemes usually influence waste flows by lowering the production of residual waste and increasing the collection of recyclable materials. This has a direct effect on the net costs because managing recyclables is generally cheaper, due to the potential value these materials have in the market. This effect is especially relevant when there is extended producer responsibility (EPR) schemes for the recyclable fractions that cover their management costs, or when there is a tax for landfill dumping or incineration.

Nevertheless, not in all municipalities or regions the reduction of residual waste necessarily reports a deep enough reduction of costs to ensure the economic sustainability of the PAYT scheme. Hence, it is relevant to combine PAYT waste charges with other tools that allow internalizing the environmental impacts of not properly separating waste. As an example, in Spain the effect of EPR usually provokes that the cost of managing paper, cardboard, or/and glass are generally null for municipalities because it is covered by the producers.

3.2. PAYT scheme and tax modulation

Fair tax's structure is composed by a general part and a variable part. The general part is independent from waste generation, and it is where social and environmental bonuses or discounts (such as the use of waste recycling centres, home composting, or green trade) are applied. In addition, some behaviours could not be measured in the variable part, such as the fact that some households only have 1 resident or that some households make some sort of packaging prevention. In those cases, some sort of reduction of the general or fix part could be taken into consideration.

The variable part may be structured in two parts:

1. A minimum part, which must be charged to all taxpayers (independently of their waste generation).
2. A variable part, which depends on each taxpayer individual waste generation. The variable part could represent between the 5-40% of the tax collection. It must be had in mind that a greater variable part leads to a greater incentive on preventing waste generation.

On the other hand, tax modulation must take into account the existing waste collection system. Therefore, tax modulation works under the assumption that taxpayers' use of the monitoring waste fractions is recorded.

Calculating the net costs of the waste service and tax's bonuses and discounts is the first step in the tax modulation process. To do that, the design of taxpayers' behaviour histograms is a must. These histograms should report information on waste fractions uses for each taxpayer typology. However, it must be considered that this estimation is subjected to statistical error, and taxpayers' participation could be increased once fair taxes are applied.

Once the taxpayers' participation has been estimated, the exact unit prices of each variable part of the waste charge can be calculated. These would permit the achievement of the tax collection target. In PAYT schemes, the assignation of a minimum range of uses (which is independent from taxpayers uses) is recommended. In the case of the participation bonus, it is recommended to establish minimum deliveries so that the bonus starts to be calculated on the variable part and a maximum number of deliveries from which the bonus would no longer be calculated to avoid fraudulent use.

3.3. Minimizing tax circumvention phenomena

When introducing a fair charge there are potential risks of non-payment of the variable part. This can exist in both door-to-door and smart containers collection systems, and they are detailed below:

3.3.1. Risks of fraud in door-to-door collection system

At door-to-door collection system, risks of fraud are related to:

- | Illegal dumping in bins, containers and/or nearby in open spaces. The inclusion of a penalty regime in the municipal ordinance can reduce these situations.
- | Waste tourism in nearby municipalities or in other neighbourhoods that operate with open containers placed at the public road. In this case, the bonus of some of the fractions of the fee (ex. bio-waste) can serve as a deterrent.
- | Risk of improper increase of the fractions that are not taxed. It is a medium risk, as the operator can make visual inspections during collection.

In addition, there can be mentioned some other specifications for door-to-door collection systems:

- | Diaper collection is a service that requires to define its users at the ordinance. It is recommended to limit it for homes with babies and/or elderly people with incontinence problems. Likewise, deliveries should be done in a standardized and translucent bag.
- | It is recommended that door-to-door collection system is designed, at least for 4 fractions (all except for the glass fraction). Likewise, contribution areas or open containers placed at the public road should be eliminated in order to prevent bad practices by the users. Alternatively, an entry price could also be established in those places where emergency areas cannot be eliminated. Furthermore, an emergency service could be established.
- | Application of a mouth reducer of the public waste bins. Its purpose is to avoid the delivery of waste bags inside.

3.3.2. Risks of fraud in smart containers waste collection system

At smart containers systems, risks of fraud are related to:

- | Illegal dumping (especially next to containers).
- | Malfunctions of the technology and/or errors in the closing systems that can lead to errors in the records of use.
- | Waste tourism. In this case, the application of bonuses on certain fractions (ex. bio-waste) can be a dissuasive tool.

- | Improper waste increment for unclosed fractions. To solve that, it is recommended to close as many fractions as possible, as well as reducing the volume of the entrance of those containers that are not closed. In addition, the possibility to introduce a bag with QR or alphanumeric code, or tag RFID could permit to control improper waste in charged fractions via subsequent inspections. Or another possibility could be to distribute users per container (not all users can use all containers, only 1 or 2 of them) and then make subsequent waste characterizations for charged fractions.

In addition, there can be mentioned some other specifications for smart containers collection system:

- | In those cases, where the residual fraction is subjected to PAYT schemes, nappy users should have an additional number of uses which shouldn't be subject to any additional cost. Alternatively, it could be placed, next to container areas, a specific closed bucket for diaper collection.
- | For businesses, it is important to carry out a more specific monitoring and to equip the containers with volume regulation, which should be adapted to that kind of users.
- | In the case of public waste bins, the risk is like door-to-door systems. Therefore, bins should be reduced and penalties should be implemented for their misuse.

3.3.3. Participation control

Once the users are identified, certain actions can be taken. For those users who participate regularly and that have installed the App, information related with their use of the service, kind and quantity of fractions delivered, and others should appear in the App of the service.

However, it should be noted that it is important to do a constant job of disseminating how the model works to those users who do not participate in the system. Below, more serious and customized actions are described that can be taken when taxpayers who are not using the service properly are detected:

- | For businesses, visits can be made directly to the establishment during opening hours. In addition, warning letters should be sent in case of recidivism.
- | For domestic users, warning stickers via door-to-door or informative warning letters should be sent, notifying that their behaviour is known and reminding them the obligation to separate properly their waste fractions in the current waste collection system in their municipality. Visits by environmental educators can be also contemplated.

In both cases it is important to establish the proper channels to inform constantly about the obligation to participate correctly in the waste selective collection, and the possible sanctions that can be received for not doing so. Finally, if it is considered that there had been enough warnings, the imposition of sanctions should be carried out.

3.4. Tendering and contract regulation

This section summarizes the legal aspects that municipalities must have in mind when establishing waste charges:

- | Waste charge collection: it can be articulated in different ways. It must be considered which is the organization that carries out the collection, who manages the information and how it is transferred to make the collection and the number of annual receipts, among others. When the objective is the fair charge implementation, there are some differences that should be considered. In the case of pre-payment systems, the variable part is transferred directly through the collaborating businesses



that sell the bags. On the other hand, in post-payment systems, the amount depends on the records identified through the identification systems.

- | Fiscal Ordinance and Economic Memory: The Fiscal Ordinance must include the new waste charge structure and its waste unit prices. Its modification and approval must be accompanied by an economic report showing clearly the balance of costs and incomes. c its structure must consider the following sections: introductory section with the legal context, service net costs, expected fee collection (with breakdown of costs attributable to domestic service and business service) and, finally, the justification that the tax is adapted to the principle of economic equivalence (arguing that the collection won't exceed the service net cost)
- | Municipal Waste Regulation Ordinance: Besides, it is necessary to draw up a municipal ordinance (or to modify it in order to properly regulate the form of waste delivery and the containers used). It is necessary to specify whether they have TAG and the description of standardized bags. The rights and duties of citizens, businesses and the municipality must be described as well as infringements and resulting penalties.
- | Consistency: Consistency between the municipal and the fiscal ordinance is fundamental. Besides, fiscal ordinances must consider some relevant issues, such as the specification to whom the tax is addressed, tax structure, tax rate, the way it is calculated the variable part, and billing frequency, among others.