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## Deliverable D6.2

# **State-of-the-art of communication materials and incentive methods**

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# **DECISIVE**

**A DECENTRALISED MANAGEMENT SCHEME FOR  
INNOVATIVE VALORISATION OF URBAN BIOWASTE**



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# A Decentralised Management Scheme for Innovative Valorisation of Urban Biowaste

## D6.2 - State-of-the-art of communication materials and incentive methods

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### ABSTRACT

This report focuses on communication activities and incentives targeting households, restaurants, and catering services in order to improve bio-waste management: food waste reduction and source separation of bio-waste for organic recovery. It aims at listing guidelines and good practices that can be replicated for the implementation of DECISIVE systems, especially the two demonstration sites. The report also presents benchmarking elements of the potential effect of various communication tools and incentives to be used for the upcoming D6.4 that will focus on simulation of the DECISIVE concept in ten specific case studies.

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# Executive summary

This report is DECISIVE deliverable D6.2: “State-of-the-art of communication materials and incentive methods”. It focuses on existing guidelines and good practices regarding communication and incentives aiming at improving bio-waste management of households, restaurants, and catering services. While it primarily focuses on ensuring that the DECISIVE units receive sufficient quantities of source-separated bio-waste with a proper quality, it also tackles food waste prevention, especially the reduction of food wastage, and on the issue of promotion and public acceptance of the DECISIVE treatment units. Finally, it presents benchmarking elements on the biowaste generation and composition, as well as the potential impact of several communication activities and incentives on biowaste management.

## General considerations

Communication activities and incentives mainly aim to enable the change of behaviour of waste producers so that they lower their food waste production and sort their biowaste in a proper way. To do so, they are designed to inform the waste producers on the proper behaviours, provide to them convenient ways to do so, and motivate them by providing evidences on the benefits of the required change of behaviours, by penalising bad behaviours or by rewarding positive ones. Incentives cover a wide range of action: the quality of the collection service offered, the pre-collection and collection material proposed to waste producers, the controls made to ensure a proper sorting associated with responses, financial instruments, and legal obligation. Likewise, communication activities are very diverse, ranging from very general advertisement campaigns to direct engagement of the population through workshops and training sessions.

The report focuses on three main target audiences: the households, the restaurants, and the collective catering services such as school canteens. For the two last categories, it is important to note that two main categories of target audiences are considered: the staff preparing and serving the meals, and the guests eating them.

## DECISIVE demonstration sites

Both DECISIVE demonstration sites (located in Lyon and Catalonia) primarily focus on commercial waste producers, namely restaurants and collective catering services; the demonstration site in Catalonia plans to involve the students on the UAB campus at a later stage, where the whole system will be implemented. Both demonstration sites share similarities, especially when it comes to the general lack of incentives available to promote biowaste separation (no PAYT system, little legal obligations for biowaste source separation). Some differences can also be noted:

- The type of waste targeted: in the Lyon case study, only vegetal food waste from meal preparation will be targeted in a first attempt, while in Catalonia all types of food waste is considered;
- The existence of a bio-waste collection system in Catalonia, while in Lyon it is currently limited to 2 restaurants;
- The identification of waste producers: for the Catalanian site, the targeted biowaste producers are well identified, while in Lyon the potential participants still need to be identified and approached.



## Guidelines and good practices

An extensive review of existing guidelines and documented good practices was conducted, focusing on municipal waste, commercial catering, and collective catering services.

Both food waste prevention and source separation can be enhanced by providing concrete information and instruments (pre-collection and collection equipment, collection service) that makes them comprehensive and convenient. Providing very concrete information and guidance on how to plan food purchase, store food, re-use leftovers, and store biowaste to avoid nuisances are necessary so that people can adapt their behaviours. This can be done through addressed communication and by developing training sessions. The preparation phase and first weeks of implementation are especially important to properly train the waste producers and correct the first mistakes.

On the other hand, it is important to provide motivation to do so, by highlighting the benefits for them (saving money thanks to the reduction of food wastage) or for the community (reducing landfilled waste, enabling the creation of local jobs, generating renewable energy and local fertiliser), hence making the proper behaviour meaningful.

The documented good practices allow highlighting the effectiveness of several incentives and communication instruments. It appears that good practices generally rely on a combination of instruments rather than one single instrument. However, the effectiveness of legal obligation, and more importantly of PAYT systems must be highlighted; they can be regarded as among the most effective drivers behind the implementation of source separation of biowaste.

The review of different cases focusing on decentralised composting tend to show that it is relevant to take advantage of the smaller scope of such system as well as of its more concrete outcomes to motivate waste producers. Organising visits and developing a sense of community can help improving the sorting behaviours.

Regarding acceptance and promotion of the system to local players, it is relevant to map significant stakeholders in terms of interest and potential impact on the system's success and approach them taking into account what their interest is. A special attention will have to be brought on the potential odours that could make the local players oppose the system.

## Recommendations for the demonstration sites

The report details various general recommendations as well as more specific ones targeting the two demonstration sites regarding the communication activities, key messages, and communication materials to be produced in order to involve waste producers and promote the system to external stakeholders. These recommendations will provide a basis for the DECISIVE partners in charge of implementing the case studies to shape their communication strategy.

## Abbreviations

AD	Anaerobic Digestion
D	Deliverable
DST	Decision support tool
GHG	Greenhouse Gas
mAD	Micro Anaerobic Digestion
NIMBY	Not in my backyard
PAYT	Pay-As-You-Throw
PCCC	Primary Community and Continuing Care
PET	Polyethylene terephthalate
SSF	Solid State Fermentation
WP	Work Package



# 1. Introduction: objectives and scope of the report

## 1.1 OBJECTIVES OF THE REPORT

In order to improve the resilience of urban areas, the DECISIVE project proposes to change the present urban metabolism for organic matter, energy and bio waste to a more circular economy. To do so, the DECISIVE consortium is designing eco-innovative, decentralised biowaste management systems relying on micro anaerobic digestion (mAD) plants and solid state fermentation (SSF) units to produce local energy and bio-products intended for urban and peri-urban farms. The project also aims to demonstrate the validity of its findings by setting two demonstration sites: one in Catalonia, Spain and one in Lyon, France. It will make its findings available to any territory through a Decision-Support Tool (DST) that aims at supporting the users in the selection of the most appropriate biowaste management option for a specific study zone.

The success of these demonstration sites will greatly depend on the involvement of the local players, especially the targeted waste producers whose biowaste will be processed in the mAD units. To promote this, relevant communication activities and incentives have to be identified, taking into account the local specificities, and based on previous experiences focusing on biowaste collection and treatment.

To define relevant incentives and communication activities and materials, this report proposes to provide an overview and analysis of various, previous experiences. The conclusions drawn from this overview will serve two main purposes:

- **The proposition of communication materials and activities** for the implementation of the two demonstration sites;
- **General recommendations for communication and incentives** for the implementation of DECISIVE systems;
- **The identification of benchmarking elements** related to the potential impact of various communication activities and incentives to provide input for the upcoming simulation exercises aiming to test the DECISIVE system in theoretical sites.

The findings of this report are based on the analysis of actual experiences, focusing on various parameters: local context, target audience, practical implementation, and resources allocated and quantitative impact. Special attention has been brought to the comparability of the data presented and to the transferability of results.

## 1.2 LINKS WITH OTHER DECISIVE ACTIVITIES

This report is D6.2: *state-of-the-art of communication materials and incentive methods and communication materials and incentives proposal*. It is part of WP6.1 (*selection of locations and associated incentives for demonstration implementation*) within WP6 (*Demonstration set-up*). It is included in the activity 3 of WP6.1, which will be called here task 6.1.3 (T6.1.3). It is based on the inputs provided by D6.1 (*report on the system simulation for the LYON and CATALONIA cases*), elaborated in the framework of WP6.1's activity 2: *Characterisation of the demonstration sites and simulation of the implementation of the methodology*.

As mentioned above, this report will support the implementation of the demonstration sites as foreseen in WP6.2. It will also provide quantitative data for WP6.1's activity 5, whose objective is to stimulate the implementation of the DECISIVE system on a set of theoretical sites by applying the Decision Support Tool, in order to assess the potential impact of the use of specific incentives and/or communication activities.

## 1.3 GOALS AND SCOPE OF THE STUDY

### 1.3.1 Goals and focus

As stated previously, the main objective of this study is to identify communication activities and incentives promoting biowaste collection and treatment. Considering DECISIVE's targets, the main focus will be put on collection and treatment of biowaste, namely:

- How to promote and optimise waste producers' participation, especially:
  - How to **optimise the capture** rate of biowaste;
  - How to **avoid impurities** in the biowaste stream (e.g. the sorting mistakes)
- How to **involve local stakeholders** (public authority, users of the by-products)
- **Acceptability** of the treatment units

However, it seems essential to also cover **waste prevention**, especially the reduction of food wastage, in order to limit the share of avoidable food waste in the collected biowaste.

In general, the key messages must be in line with the waste hierarchy, i.e.:

- **Strict avoidance**, e.g. by adopting adequate shopping and storing behaviours;
- **Reduction at the source**, e.g. by avoiding over-preparation;
- **Re-use**, e.g. by cooking leftovers or through food donation;
- **Recycling** thanks to source separation and organic recovery.

The documentation of previous case studies and existing guidelines documents aims at highlighting the following elements:

- Description of the communication/incentives
- Resources allocated for the activities
- Key factors of success (on both external factors and instruments implemented), e.g. which communication activities, incentives, or regulatory framework contributed to the success of the case study.
- Assessment of the effectiveness:
  - On sorted quantities
  - On the level of impurities
  - On waste producers' satisfaction
- Challenges and barriers (linked to external factor, regulation...)

A cross analysis of the different case studies is to be conducted, by collecting information of the impact of the different instruments highlighted in the case studies (comparing the performances

before and after the implementation of a given instrument) and by comparing the performances of various territories where different sets of instruments are in use. This contributes to:

- **Assess the effectiveness of different types of instruments** (e.g. what increase of sorting performances can be expected after implementing a door-to-door communication campaign) and thus identify effective instruments for the implementation of DECISIVE systems;
- **Identify good practices for the implementation of communication and incentives** (e.g. what key messages are relevant for the different target audience);

Recommendations will then be provided for the two demonstration sites, based on these findings and according to their outlines.

### 1.3.2 Scope of the study

The scope of the report was defined to be consistent with the demonstration sites and the requirements set for A6.1.5.

- **Scope for waste:** the project focuses primarily on “municipal waste”, i.e. household waste and similar waste (commercial waste, waste from public institutions...). More specifically:
  - Household biowaste (food waste and possibly garden waste);
  - Biowaste generated by the catering sector, including commercial catering and collective catering (school canteens, catering in healthcare establishments...)
- **Target audiences** of the communication material and incentives to be analysed:
  - **Waste producers:** households, restaurants, collective catering... More specifically, the target audiences also include the **staff handling waste** in the waste producers' premises: cooks, staff in charge of waste handling, managers, inhabitants, caretakers of buildings... Waste producers are regarded as the priority for this report.
  - **External stakeholders:** players that will be impacted by the DECISIVE systems will also be considered, e.g. potential users of the by-products (especially the users of bio-products and digestate), inhabitants and companies in the vicinity of the mAD units (which can be impacted by the odours, noise...), or any relevant stakeholders who could be interested or replicate the system.
  - **Collection and treatment organisers/operators:** local authorities in charge of waste collection and treatment, waste companies handling waste.

## 2. Communication and incentives: general considerations

Reducing food waste and separating biowaste requires a behavioural change. Several factors are recognised as necessary to trigger and sustain these changes: enablers (infrastructure, education...), encouragement (taxes, rewards...), and engagement (community involvement...), and be exemplary. (R.E. Timlett, 2007)

### 2.1 COMMUNICATION AND INCENTIVES

“Communication” and “incentives” encompass many different instruments that can be used by waste management systems to mobilise local stakeholders. These instruments serve primarily two purposes:

- **Information:** providing information is the first step for the involvement of waste producers. This consists in providing basic elements on how they are supposed to contribute to waste collection and treatment, e.g. sorting guidelines (what fractions they are supposed to sort and where to put them), the equipment to be used (for pre-collection and collection, e.g. must the waste producer use a specific type of bag...), the collection modalities (where and when to put the collection bin to be picked up)... Information can also cover other aspects such as good practices to limit food wastage, how to reduce nuisances linked with the storage of biowaste in the kitchen... and on the general system: where the waste is sent, the output of the treatment unit...
- **Motivation:** this consists in favouring positive behaviours leading to the success of the waste management system, i.e. promoting the prevention of avoidable food waste, proper sorting of biowaste and general compliance with the sorting guidelines. Both communication activities and incentives can impact motivation, by relying on specific drivers and interest of the target audience: highlight the benefit of adopting the right behaviour (on the environment, on local employment...), reward positive behaviours (by charging less the biowaste collection), penalising negative behaviours (e.g. fines when impurities are too high), or making sorting mandatory.

It is challenging to define a consistent terminology for communication activities and incentives, as these terms cover a large range of instruments. Establishing such terminology is however needed to conduct cross-analyses of comparable instruments.

Regarding **incentives**, the following categories are established:

- **Pre-collection equipment:** providing equipment (such as compostable bags and kitchen bio-bins) can be a way to promote biowaste separation; it can help users reduce the potential nuisance (flies, odours, leaks);
- **Collection system:**
  - **Collection service:** the quality of the service or the way it is organised can impact the participation of waste producers. For instance, for door-to-door collection, collecting more frequently biowaste than residual waste might make waste producers use the biowaste collection more so that they can get rid more frequently of their odorous waste.

- **Collection equipment:** several systems can be regarded as incentives for waste producers to sort their biowaste, such as nominative bio containers or transparent bags for residual waste.
- **Controls:**
  - **Control of the quality** of the biowaste: regular control of the content of the sorted biowaste can help to guarantee a certain quality.
  - **Control of the sorting:** control of the content of the residual waste bin can promote a higher capture rates.
  - **Associated response:** various degree of response can be associated with controls, from communication (signalling the mistake to the waste producer), to fines.
- **Financial incentives:** making sustainable behaviours more economically attractive is a common and effective instrument:
  - **Charging system:** incentivising charging systems such as pay-as-you-throw systems are likely to promote biowaste sorting.
  - **Financial bonus:** giving a financial bonus to the waste producer sorting its biowaste can also be considered (e.g. a waste tax cut...). Other possible retribution can be the free distribution of compost to inhabitants.
- **Legal obligation:** making biowaste separation mandatory is another incentive for biowaste collection. How this obligation is then enforced is equally important.
- **Incentives** targeting the waste collectors: several incentive systems can target the organisation managing waste collection (e.g. the public authority in charge of collecting municipal waste), for instance by providing grants or through taxes on landfilling and incineration.

For communication activities, different parameters will be documented to allow cross analyses:

- **Type of communication activity:** communication campaign, sorting leaflet, dedicated website, network of sorting ambassadors are all different types of communication activities with variable effectiveness.
- **Proximity with the target audience:** communication can be unaddressed (e.g. a website), addressed specifically to the target audience (e.g. mailed sorting guidelines), or interactive (door-to-door communication campaign, training session...);
- **Key messages:** how the communication is formulated, what information is prioritised and on which drivers it is based can all have an impact on the effectiveness of the activity.
- **Communication channels and media:** TV, radio, billboards, leaflets, website...
- **Organisation/people voicing and associated with the messages:** public authority, collection operator, local NGO, celebrity...

These different aspects are to be investigated to identify trends and possible gaps regarding the effectiveness of communication activities.

In D3.7 (Documentation of models for decentralised biowaste collection chains with a waste collection database for representative situations), the requirements regarding communication and incentives for DECISIVE systems were detailed. Indeed, “each decentralised scheme has to i) ensure high quality biowaste for biological treatment, ii) provide a high connection rate for waste generators, iii) contribute to waste prevention, and iv) it has to be flexible regarding local needs” (TUHH, 2018). To achieve



these goals, D3.7 proposes to implement the following features in each decentralised system

- **Location adapted source-separation guidelines:** The guidelines should provide specific information taking into account the local situation and the actual organisation of the system. Updates taking into account evolution of the system or elements to correct can be foreseen.
- **Waste management information for waste generators:** beside practical information on the sorting guidelines, waste generators should be informed about the goals of source-separation, the destination of biowaste, and the products generated during valorisation, in order to strengthen the trust of the citizens/waste generator in waste management. Feedback on the collected quantities, impurities... presented in kg/cap could contribute to make the waste producer realise their contribution to the system.
- **Labelling of collection containers:** labelling both biowaste and residual containers (e.g. putting the name of the waste producers or a code allowing its identification) will be important to clarify the sorting guidelines and limit sorting mistakes.
- **Control of source-separated biowaste quality at collection:** control of the quality of sorting performed at collection level will contribute to ensure a proper quality of the input and inform waste producers about their mistakes. Various responses can be foreseen, from simple feedback to fines.
- **Quality control for biowaste at treatment site:** periodical composition analysis of the delivered biowaste assures good performance of the biological treatment and provides more detailed technical information which is useful for either waste management purposes or to gain information about waste generators.
- **Periodical reporting to waste management authority:** data on collected quantities and quality serve the purpose of monitoring the performance of the decentralised collection system as well as complying with reporting obligations towards the competent authorities.

## 2.2 CATEGORIES OF TARGET AUDIENCE

Several target audiences were mentioned above. Target audiences should not only be categorised by the types of organisations involved, It is also important to identify the different people belonging to these organisations, as well as their role and position within these organisations. Indeed, this will have an important impact on the information they will require to comply with the needs of the DECISIVE system (in terms of separating the waste or to provide the sorters with the right tools and methods to do so) and on their possible motivations to adopt the right behaviours (taking into account their own constraints, perception and interests).

### 2.2.1 Households

Households are a significant producer of food waste, hence they represent a relevant potential for the collection of biowaste. On the other hand, biowaste generated by households represents a challenging stream to capture: production is scattered, individual control might be challenging depending on the collection system, reaching the different inhabitants can prove to be resource-consuming and difficult depending on the types of housing...

#### 2.2.1.1 Food waste generation

Food waste generated by households can be linked to various factors:

- Inadequate shopping practices (quantities, expiration dates...);

- Inadequate storing of food (management of stock, improper storing...);
- Lack of information on “Sell by date” and “Best Before date”;
- Inadequate cooking practices (e.g. in too big quantities);

When it comes to food waste separation, the key issue is to ease its separation in the kitchen. The targeted fraction is mainly waste linked with meal preparation and expired groceries. One of the most important aspects is to prevent nuisances, i.e. bad smells, leaks and flies.

#### **2.2.1.2 Target audiences**

All members of the households can be targeted when it comes to communication and incentives, yet it seems relevant to focus the efforts on the adults in charge of the groceries and of food preparation.

Bin2Grid’s guidelines on segregated food waste collection (REF) summarises the key messages to be promoted to the inhabitants when it comes to food and food waste:

1. Buy the food you need
2. Eat the food you buy
3. Recycle the food you can’t eat

#### **2.2.1.3 Challenges and opportunities**

Biowaste is a challenging waste fraction for selective collection and source separation, due to its biodegradability that potentially creates nuisances. Compost Plus’s guide for setting biowaste collection states that the main biases against food waste source separation are the following (Compost Plus, 2015):

- Bad odours
- Leaks
- Flies
- Issue with the bio-bin in the kitchen: hygiene, size
- Complexity: sorting guidelines, washing the container
- Uselessness of biowaste separation

The study “Attitude towards the incorporation of the selective collection of biowaste in a municipal solid waste management system” lists as the main reason for the lack of participation the “lack of information, the deficiency of infrastructures, the lack of interest in environmental issues, the lack of space in the household, the lack of time to separate waste, and social pressure” (D. Bernad-Beltrán, 2014).

### **2.2.2 Commercial catering**

Commercial catering encompasses various forms of commercial activities serving food: traditional restaurants, fast food restaurants, take-away restaurants and hotels.

#### **2.2.2.1 Food waste generation**

In commercial catering premises, food waste is generated in various stages:

- During the storage of products (avoidable food waste);
- During the preparation of meals (mainly unavoidable food waste);



- By the guests when not all the food is consumed (inedible part such as bones, and food wastage).

Therefore, different players are involved when it comes to food waste generation and management.

The principal reasons behind food waste in restaurants can be listed as follows (UMIH, 2015):

- Difficulty to assess the number of meals to be served
- Inadequacy between the served quantities and the clients' appetite
- Bad storage of food
- Minimum orders from certain suppliers
- Strict rules regarding food hygiene

#### 2.2.2.2 Target audiences

The actual players will differ depending on the size and the general organisation of the restaurant: in smaller places, one single person might assume different roles while in others, tasks will be more distributed among the various staff members and more administrative, or management positions.

- **Managers** play a significant role in the general organisation of the restaurant, especially when it comes to provide the proper framework allowing food waste separation in the various part of the restaurant (implementing the proper equipment, training and motivating the staff, taking into account the staff's requirements and required involvement...). Managers also impact the storing of food.
- **Back-of-house:** it includes all the positions linked with food preparation as well as dishwashing. Depending on the size of the restaurants, it encompasses various positions: smaller places might only have a single cook while bigger places might work with an entire food preparation team. The chef is a key player for food waste, since he is generally in charge of designing the menus and organising the supplies. Every staff member in charge of food preparation is likely to generate food waste and therefore must be trained for biowaste separation.
- **Front-of-house:** it refers to any location within a restaurant where customers are allowed. It includes all the positions linked with the guest area: waiters, bartenders... Waiters act as an interface between the restaurant and customers and are in charge of bringing back plates from the front-of-house to the back-of-house and throw the food waste remaining on the plate.
- **Guests:** they are also generating food waste when not (entirely) eating their meal.

#### 2.2.2.3 Challenges and opportunities

Restaurants might be reluctant to implement food waste separation. The SYNHORCAT's report on a pilot experiment launched in several restaurants in Paris listed the main reasons behind the refusal to take part to the SYNHORCAT's experiment:

- Lack of resources and time: the lack of staff to handle source separation and time, especially during touristic season, was the main barrier identified by restaurants
- Lack of space in the premises to store food-waste
- Unwillingness to pay for food waste collection: in Paris, restaurants only pay a flat tax

unrelated to their waste production and separation, and are exonerated from the “special fee” applied to commercial activities, making food waste collection an extra cost.

However, food waste reduction and selective collection can be beneficial for restaurants. The “Restaurant Food Waste Action Guide” by ReFED highlights two main opportunities (ReFED, 2018):

- The financial value of food and the cost of food waste management: food waste represents a significant loss of money
- The reputational value that can have a positive impact on the customers and the employees, whose involvement can lead to a better job satisfaction.

Besides, if residual waste is charged according to the generated quantities, bio-waste source separation is a significant way to reduce the waste bill.

### 2.2.3 Collective catering

Collective catering encompasses all services necessary for the preparation and supply of meals to people working or living in collective sites: private and public companies, schools, hospitals, nursing homes, prisons... It can be either organised directly by the organisation or subcontracted to a private company. The preparation of meals can be made in an external kitchen that sends meals to several premises where they are heated and served.

#### 2.2.3.1 Food waste generation

The general food waste generation is similar to what occurs in commercial catering: storage of ingredients, preparation of meals, and food wastage by guests. However, the reason and behaviours behind food waste generation and food wastage is different from one type of establishment to another. In its report gathering data on food waste generation in various sectors, ADEME stated some of these differences:

- In schools, food waste is closely related to the menu, especially in secondary schools;
- In hospitals, food wastage is also linked with the difficulties patients can experience with eating their meal, either because of the lack of staff to help them, or because their treatment or pathology prevent them from eating part of their food.

Setting up food waste collection can be a first step toward the decrease of food wastage. For instance, ADEME reported that the implementation of food waste separation in several secondary schools has led to a significant decrease of the generated quantities linked with an increasing awareness of the issue (BASTIDE, 2013).

Food waste generation also depends on the organisation of the collective catering service.

- **The type of kitchen** has a significant impact on food waste generation. External kitchens (involving a central kitchen preparing the meals and sending them to on-site “satellite kitchens” that only heat the meals before serving them) generally generates more food waste than traditional on-site kitchens. ADEME reports an average of 153 g/meal of food waste in satellite kitchens compared to 93 g/meal in on-site kitchen, with 2/3 of the losses coming from the guests and the rest being linked with the non-served quantities. The report states that about 25% of meals prepared in satellite kitchens are lost compared to 14% of loss in on-site kitchens (ADEME, 2016).
- **The way the meals are served:** the losses are extremely high when meals are served in the guests’ rooms (58% according to ADEME’s study), yet it is mainly because of the type of

guest (elderly people, patients) than the type of serving. Self-service restaurants presents lower losses (about 106 g/meal of avoidable food waste) compared to meals served to the guests (129 g/meal of avoidable food waste).

#### 2.2.3.2 Target audiences

The specific target audiences vary depending on the type of establishment. Several general categories can be identified, but the actual behaviours and motivations will be different from one category of establishment to another:

- **Management:** for any type of establishment, the involvement of the management (school's or hospital's director...) is a key requirement for the implementation of the waste source separation.
- **Food preparation:** the kitchen is in charge of organising the supply of food, design, and the preparation of the meals.
- **Staff:** the staff is composed of the people providing the meals to the guest (either serving the guest when they pass by the kitchen or bringing plates to the patients of hospitals), or the people helping the guest to have their meals (e.g. in day-care centres, kindergarten or hospitals). In schools, teachers can also be involved by addressing food and food waste in their different lessons.
- **Guests:** guests are differently involved in waste generation, depending on how meals are served and how much they can choose the food they are going to eat and the quantities they are getting. In schools, students can also be involved in the promotion of waste prevention and separation.

#### 2.2.3.3 Challenges and opportunities

As for the commercial catering, reducing food waste and separating it from residual waste can be a way to reduce the costs linked with wastage and waste management. For schools and universities, food waste reduction and separation can also be regarded as part of the pedagogic project for raising awareness on environmental issues to the pupils and students. When it comes to opportunities, the main difference with commercial catering is that there is a possibility to involve more the guests for source separation and so lower the extra workload of the staff. Ensuring that the separation does not require extra time from the staff is important.

Some challenges have been already stated above; they may differ depending on the type of establishment. Other challenges can be identified, such as national regulation or guidelines on the quantities to be served. Other constraints are the hygiene requirements, the risk of nuisances, and the lack of space available for collection equipment.

#### 2.2.4 Other relevant stakeholders

Beside waste producers, other target audiences are relevant for the DECISIVE system. Any local player that can positively contribute to the success of the system can be targeted by the communication activities and incentives. These other players can be, for instance:

- **Potential users of by-products,** namely the bio-pesticides, digestate, and energy produced by the mAD and SSF plants. They can be for instance local farmers, local companies... that could benefit from the bio-products and the heat produced.
- **Neighbours in the vicinity of the plant:** both inhabitants and organisations located close to the plants have to be included in the communication strategy. Inhabitants are generally not in

favour of the implementation of a local waste treatment unit, fearing nuisances or a decrease of value for their property. It is therefore important to inform them, in order to avoid an opposition. Local inhabitants can also be involved to report any odour and therefore help with the control of the unit.

- **Any other potential partner that can help conveying the message:** some local organisations can be considered as relevant for helping with the promotion of the system. It depends who the targeted waste producers are, yet several examples can be given: the local authority in charge of waste management (that might provide the waste collection service for the targeted waste producers), any local professional federation or association that can have a significant access to professional waste producers (local restaurant federation...), local environmental NGO...



### 3. Presentation of the pilot sites

DECISIVE will implement two demonstration sites in order to test and document DECISIVE systems, involving micro anaerobic digestion (mAD), Stirling Engine (SE), and solid state fermentation (SSF), at real scale and in an actual context. Both demonstration sites were theoretically characterised in D6.1 “[\*Methodology of characterization of the biowaste management system in the DECISIVE demonstration sites: Current and new systems simulation for the LYON and CATALONIA cases\*](#)” (ENT, 2017). The actual definitions were then specified by both ARC and Refarmers. This part briefly summarises the main outlines of the demonstration sites.

#### 3.1 GENERAL INFORMATION ON PILOT SITE IN LYON

**General description:** the study area in Lyon is centred on the Refarmers site, a peri-urban farm located in Écully. Both the mAD plant and the SSF unit will be implemented on the site of the urban farm.

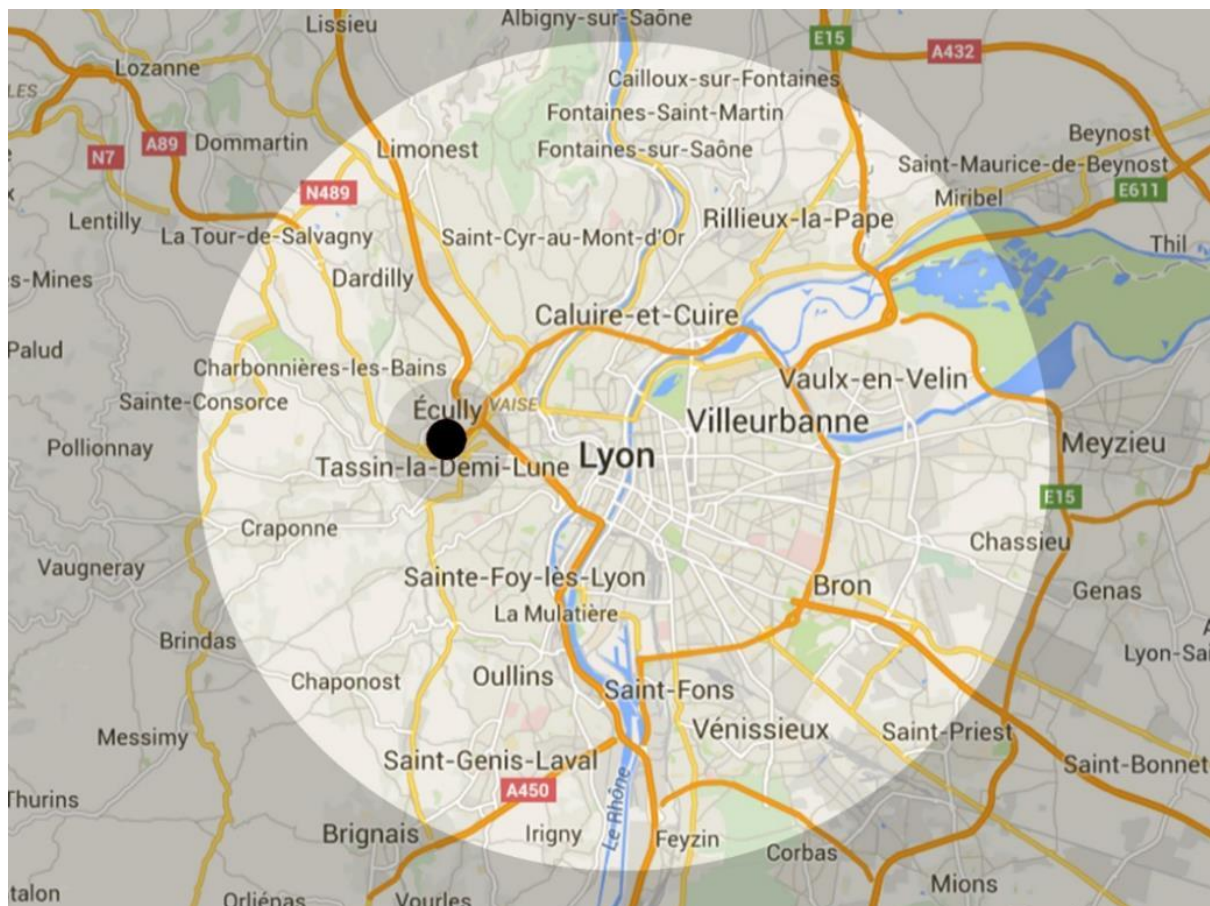


Figure 1: location of the DECISIVE system next to Lyon

**Targeted waste producers:** the main targets will be restaurants and catering services. At first, only vegetal waste from the meal preparation will be collected. Food waste from plates will be included at a later stage.

For restaurants, the key target people will be the managers, chefs, and the staff. When all the waste is included, the staff involved in the front-of-house (waiters...) will be targeted as well.

For catering services (for instance in schools), the targeted people are more or less the same than in restaurants, with a special focus on the head of the schools, the cooks and the kitchen staff. When waste from meals is included, then the dishwashers and the guests will also have to be targeted. The person in charge of emptying the bins in the containers and of making it ready for collection will also have to be involved, with specific requirements on the weight of the containers. The staff in charge of managing green areas might be also relevant targets, especially if green waste is also included. Other staff members might be relevant to reach (administrative, school bursar in charge of food purchase...) to cover legal or financial aspects.

It is important to note that the different types of schools targeted (primary schools, secondary schools...) are managed by different local authorities (municipalities for primary schools, departmental councils for “collèges” – first half of secondary school, and regional authority for “lycées” – second half of secondary schools). These different levels will have to be approached depending on the schools targeted.

#### **Other relevant stakeholders:**

The **users of by-products** will be:

- DECISIVE partner Refarmers will use the bio-pesticides and fertilisers
- The “Abbé Rozier” Urban Farm, an organic farm close to the Refarmers site and managed by the Horticultural Training and Promotion Centre, in-kind contributors of DECISIVE coordinator IRSTEA will recover the solid digestate.
- Local farmers will be proposed to use the liquid digestate.

**The neighbours in the vicinity of the plant** that are not part of the project are mainly local residents as well as Valpré, a hotel that also hosts conference and events. It is relevant to note that Valpré also offers catering services.

Other relevant organisations were identified, that could be interested in the project. Several public authorities are relevant to consider:

- **The city of Ecully:** it is worth noting that the city has developed an Agenda 21 that includes actions focusing on waste and energy.
- **Grand Lyon** is a local authority bringing together 59 communes located in the Greater Lyon, in charge of collecting and treating municipal waste, including household waste and commercial waste similar in nature and composition (with a limit of 840 l/week of waste generation). It has developed a home and collective composting strategy with a call for project available for residents, co-ownership associations, and school restaurants, with the possibility to get a training period of 9 months. A strategy on food waste is also organised, with actions on administrative restaurants and others targeting the general public (with several events and training sessions).
- The Regional authority “**Région Auvergne Rhône-Alpes**” is in charge of drafting and implementing a Regional Waste Plan including a circular economy strategy. It is also managing the “Lycées” (3 last years of secondary schools) and possibly the staff involved in collective catering. The Region is also in charge of a “Positive Energy Strategy” including actions on renewable energy made out of organic waste through anaerobic digestion, as well as waste prevention and recycling.
- The Departmental Council: “**Conseil Général du Rhône**” manages the « collèges » (1st

years of secondary schools). It was also in charge of the previous “departmental waste strategy” including actions on prevention, collection and treatment; however this competence was transferred to the Region a few years ago.

Other organisations have specific interest in biowaste:

- **Eclaira** is a circular economy network in the Auvergne-Rhône-Alpes Region, supported by the Regional Authority. It is open to any public and private stakeholders and aims at fostering synergies and exchanges of experience on circular economy, including biowaste prevention and recovery;
- Lyon **Bioressources** is an organisation focusing on the whole life cycle of food, “from the field to the plate, and from the plate to the field”.

**Current waste management system:** there is currently no selective collection for food waste provided by the Grand Lyon, neither for households nor for commercial activities. Food waste is collected within the residual waste stream, which is then incinerated. Green waste is collected, mainly in civic amenity sites, and sent to composting. The main strategy on food waste is centred on reduction of food wastage and on-site composting.

Selective collection of biowaste is already performed by the Abbé Rozier farm. It includes vegetal food waste from preparation in two restaurants, with about 10 t/y sent to a composting unit. Collection is done once a week. Collection is charged as a flat-rate fee and VAT is not included due to the fact the farm is not subject to VAT.

**Planned collection system:** as mentioned above, the idea is to focus first on vegetal waste from the preparation of meals and then to expand to waste generated by guests. Food waste is mostly not available for restaurants and catering services, meaning that a completely new collection system must be introduced. The strategy is to capitalise on the existing collection to expand it in order to reach the 50 t/y required to run the DECISIVE system. For the moment, the detailed organisation and associated charging system need to be determined.

**Opportunities:** the context presents several favourable parameters for the involvement of local stakeholders, namely:

- An **existing selective collection of biowaste** in two restaurants on which it is possible to capitalise. It can provide actual figures and data, as well as first practical recommendations for the organisation of waste separation and collection in other locations. Moreover, the participating restaurants can be regarded as significant voices to promote and explain the benefits of source separation to other restaurants.
- A **general willingness to sort biowaste** from chefs could be observed.
- **Existing dynamics on biowaste** led by Grand Lyon and the Region, especially on prevention and on-site composting. The DECISIVE system is in line with the regional and local priorities set on waste management. These players can be involved to promote the system and synergies can be identified when it comes to communication. The actions of Eclaira and Lyon Bioressources are also part of this positive dynamics.
- **The absence of a food waste management system** for municipal waste, meaning that there is no competition for the DECISIVE system besides the residual waste collection scheme.
- **The French regulation** makes biowaste recovery mandatory for any “large producer” producing more than 10 t of biowaste per year. In average, ADEME considers that the



regulation applies as follows. However, it is important to note that these figures will depend on several other factors (how much pre-processed food is served, how much food is wasted by the guests...).

- For commercial catering, a restaurant opened every day that serves in average more than 200 meals per day will be concerned;
- For collective catering, a restaurant opened 220 days per year serving more than 340 meals per day will be concerned (ADEME, 2013).

#### **Threats:**

- The main threat when it comes to participation is the **lack of incentives for waste producers**:
  - The restaurants targeted are of medium size and likely to be below the 10 t/y limit;
  - There is no specific fee for non-household waste producers managed by the public service. The service is charged by a tax whose amount is based on the property value and completely uncorrelated with waste generation and sorting. Grand Lyon states that the implementation of a special fee targeting non-household organisation is planned in the coming years, which could contribute to promote biowaste separation in restaurants and collective catering (Grand Lyon, 2015).
- There are apprehensions from sorting agents and staff members regarding the extra work required for the separation of food waste. Some managers worry about the extra costs of such a collection.

**Uncertainties:** the main uncertainty is the willingness of waste producers to introduce a selective collection for food waste, while there are little incentives to do so, even more if a fee is required for biowaste collection. Another uncertainty is how well the plant will be accepted by the neighbours.

**Identification of possible needs:** beside practical information regarding the organisation of biowaste sorting and collection, the main needs identified at this point are:

- Identifying incentives and communication tools to motivate waste producers in implementing biowaste separation. It will be necessary to take advantage of the existing practices to highlight:
  - The benefits to do so for the restaurants or for the territory;
  - The simplicity, convenience, and absence of strong constraints for source separation (in terms of cost, time, and nuisances)
- Promotion of the system to contribute to its acceptability and enhance participation.

It seems also relevant to identify existing and potential incentives set up by other organisation, namely:

- Grand Lyon's plan for introducing a "special fee" ("redevance special") for commercial activities that could make food waste separation economically relevant for both restaurants and collective catering services;
- Région Auvergne-Rhône-Alpes possible subsidies for pilot project focusing on biowaste separation, within the framework of its Regional Waste Plan, as well as potential action plans on renewable energy and environmental actions targeting "lycées". Being involved in possible

regional working groups focusing on biowaste and renewable energy could contribute to establish relevant contacts.

### 3.2 GENERAL INFORMATION ON PILOT SITE IN CATALONIA

**General description:** the pilot site will be located on the campus of the Autonomous University of Barcelona, located about 20 km north from the centre of Barcelona. The UAB campus is regarded as an “experimentation village” where the system can be tested in its entirety:

- Main waste producers are the collective catering services located on the campus;
- The mAD plant will be implemented in the so called Space R, a fenced and monitored area with water and electricity supply, dedicated to waste management, which already contains the Civic Amenity Site (CAS) of the Campus.
- Digestate will be partly sent to the SSF unit located also in the Space R and partly composted on the premises of the Experimental Farming Services of the Faculty of Veterinary Medicine on the campus;
- Biopesticides and the composted digestate will be directly used for crops grown on the experimental fields of the campus as well.

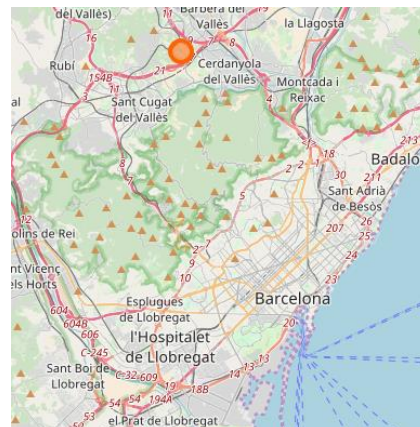


Figure 2: location of the UAB

The overall map of the system is displayed on the following figure:

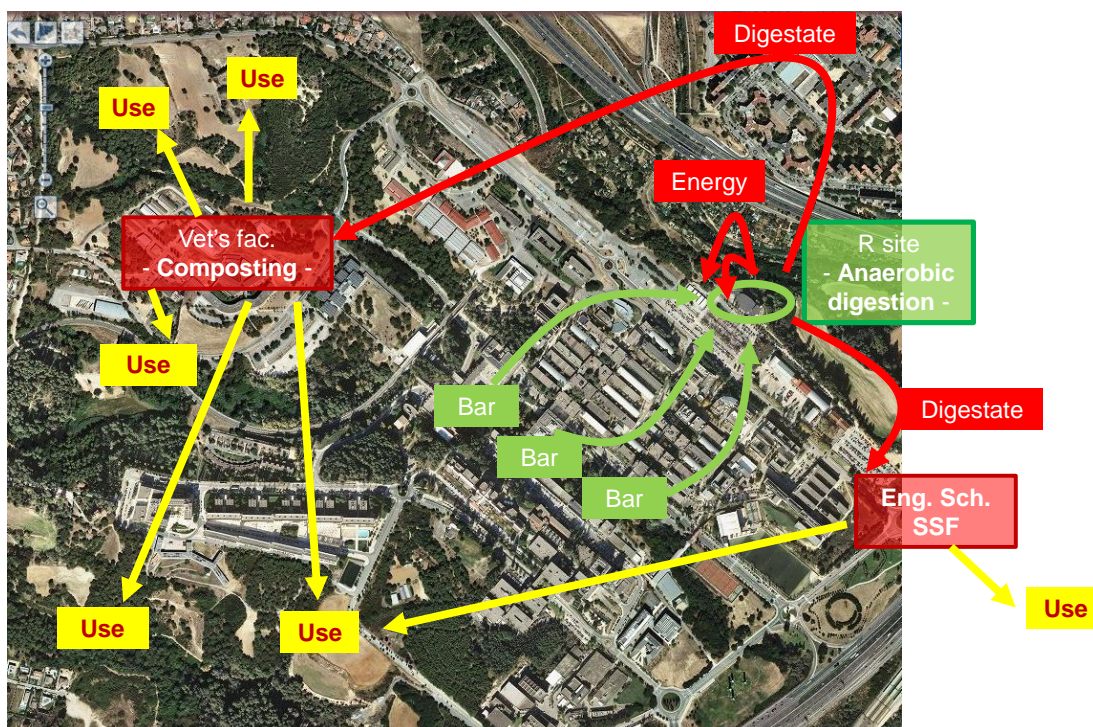


Figure 3: integration of the DECISIVE system in the UAB campus

**Targeted waste producers:** The organic fraction of kitchen waste from the collective catering services is considered the primary source of feedstock for the pilot plant. Thus, the catering companies are the first target group that will be addressed. It consists in 10 cafeterias and restaurants, managed by 3 different companies, and a hotel with 104 rooms and a restaurant that hosts events and catering services. At first, the system will focus on 3 main restaurants:

- Plaça Civica restaurant (700 services/day)
- Science and Bioscience restaurant (1000 services/day)
- Humanities and Psychology restaurant (382 services/day)

On a longer term, it is also foreseen to target the university village that hosts about 2,000 students.

In total, the campus encompasses about 35,000 students, 10,000 postgraduates, 4,000 professors and 4,000 other staff members, which means a potential biowaste generation available for mAD of about 100 – 200 t/y.

**Other relevant stakeholders:** beside the targeted biowaste producers, the support of the Governing Council of the University is vital in order to facilitate the implementation of the system. The collaboration with the Environmental Department, in charge of waste management, and the Department for Catering Service, which manages the relations to the catering companies is essential for the creation of synergies in the organisation of the separate collection. Regarding the communication on waste separation and waste management, the DECISIVE project should capitalize on the experience of these units and coordinate actions in order to avoid confusions or contradictions in the sorting guidelines.

**Current waste management system:** waste collection is currently performed via a bring system using container banks with containers for separate collection of biowaste, packaging, paper, glass and mixed residual waste, which are publicly available at all time. According to information supplied by the Environmental Department of UAB the overall sorting rate amounts to 41% and biowaste represents 19% of the collected quantities of waste. The current capture rate is regarded as low, and the impurity rate is quite high, including much plastic and metal (due to the fact containers are publicly available and little control is possible). The biowaste separated by the waste producers is discharged to the containers in plastic bags. Currently, biowaste is treated in Ecoparc 2, one of the four available AD plants in the Metropolitan Area of Barcelona. The waste collection is performed by the company CESPA on behalf of the Municipality of Cerdanyola del Vallès, which is the competent authority.

**Planned collection system:** the foreseen collection system includes the use of 240 -l, key locked wheelie bins, if possible without plastic bags to preserve the quality of the biowaste stream.

**Opportunities:** this demonstration site presents several positive elements for the implementation of the DECISIVE system:

- **The location** seems favourable for the implementation of the system, since both waste producers and by-product users are located on the campus, which makes the overall organisation concrete and easy to present and demonstrate.
- **First contacts** were already established and so far, positive feedback was received from the kitchen managers, who are in favour of door-to-door collection. The combination of different



factors (nature of waste producers, locked bins, door-to-door collection and possible absence of bags) is believed to lead to a good quality for the collected biowaste.

- **Information campaigns** on waste prevention and separation were already performed on the campus. Moreover, these campaigns actively involved the students.
- **Other communication activities** are already foreseen, including a survey for students and catering staff, and communication on biowaste, decentralised treatment, and circular economy.

**Uncertainties:** how the mAD plant will be perceived is unsure.

**Threats:** no major threats are foreseen so far. Concerning the primary target audience (the restaurants), it is important to ensure that biowaste separation does not entail nuisances, and to ensure the cleanliness of the collection equipment, especially if the intention is to abandon the use of plastic bags. The door-to-door collection is supposed to be more comfortable to use than the bring system, even more so with a frequent collection. Regarding students, the existing dynamics is a good sign for their potential involvement. However, the current overall biowaste collection on the campus seems not to be successful, both in terms of capture rate and quality, meaning that there is a need for more communication and awareness rising. Another difficulty is that the population of student is temporary and frequently renewed, meaning that communication must be an on-going process and requires coordination with other periodical communication campaigns.

**Identification of possible needs:** several actions have already been foreseen, such as:

- **For restaurants:** information material will be provided to the staff, and training sessions will be organised.
- **For students:** a survey investigating the current behaviours regarding biowaste will be established. A communication campaign displayed in restaurants will be organised.

The fact that biowaste is already collected is an important element for the communication activities and incentive system. The information campaign will have to focus on the changes brought by the new DECISIVE system to the collection system and the fact that the biowaste will be processed in a local, decentralised plant. The local use of by-product makes it easier to explain and demonstrate the direct benefits of the plant. Moreover, the innovative and research-oriented aspect of the DECISIVE project can be considered as a positive element for communication in the context of a university.

### 3.3 SIMILARITIES AND DIFFERENCES

Both demonstration projects will take advantage of waste generated by catering services, even though the existing waste collection systems are different since food waste separation seems currently very limited in the Lyon area. For both sites, there is a potential need to present and promote the system to ensure its acceptability. Even though the perception of both waste producers and “neighbours” in the two pilot sites might differ, it seems relevant that both demonstration sites keep in touch during the implementation phase in order to exchange their challenges and solutions, as well as possible successful practices that could be replicated.

The main differences are listed as follows:

- The type of waste targeted: while in Catalonia, all type of food waste is targeted, only vegetable waste from preparation will be included during the first stage of the Lyon’s case.

- The existence of a biowaste separation system in Catalonia might help to foster participation. The new system can be seen as an improvement if it is regarded as more convenient and more meaningful (the sorted biowaste being treated and recovered on-site).
- The current identification of waste producers: in Catalonia, the targeted waste producers are clearly identified and located close to the treatment site. First contacts have been established with some of them. The main objective will be to inform them and convince them to participate. In Lyon, the exact participants are not precisely known, therefore an important effort will have to be made to promote and approach potential participant.
- Specificity of the general target audience: the nature of the site in Catalonia is quite specific, with much of the population belonging to the “academic world” (students, postgraduates, and teachers). The key messages and communication will have to be adapted to this specificity, taking advantage of their specific interests.

## 4. State-of-the-art of communication and incentives on biowaste

### 4.1 GENERAL GUIDELINES ON COMMUNICATION AND MAIN INCENTIVES CATEGORIES

A literature review was conducted in order to identify studies, surveys, and guidelines focusing on biowaste: prevention and selective collection. The main recommendations found in these various guides will be detailed, focusing on the various aspects regarding communication and incentives.

#### 4.1.1 Preventing food waste

Prevention of food waste is the priority of any food waste strategy. It does not only allow the avoidance of food waste to be managed, but it also avoids wasting the resources that were used to produce, transport, store and transform the food (water, fertilisers, energy...). To highlight this, it is important to remind the impact of food on climate change, especially the fact food waste only accounts for 10% of the carbon impact of food when compared to its entire life cycle. Therefore, while it is important to improve these 10%, it is much more significant to avoid wasting the remaining 90% as well by avoiding producing, storing, transporting, and preparing food that directly goes to waste (WRAP, WWF, 2011). As another illustration, the production of food that is not consumed at the end represents about 4% of the total GHG emissions in Germany (Umwelt Bundesamt, 2015).

Food waste seems to be connected to a complex behaviour, linked with both habits and emotions. Changing behaviours is a key element to promote the reduction of food waste through positive campaigns highlighting positive behaviours (Sally V. Russell, 2017). There are several barriers that prevent from reducing food waste (BIO Intelligence Service, 2012):

- The lack of awareness of food wastage and of its importance;
- The feeding habits, which prevent from eating diverse types of food, lack of time taken to eat;
- The refusal to change the habits for preparation and serving of food;
- The difficulty to combine sanitary requirements, nutritional requirements, and food wastage...

Preventing food waste also creates benefits for the households, restaurants, and catering services, one of the most important ones being economic. Less food waste means less waste to be collected, so possibly lesser costs for waste management; it also means that the cost of the associated food is not wasted, therefore savings are achieved.

Promoting changes of behaviours to reduce food wastage can be achieved through various instruments and messages. The following actions can be applied to inhabitants:

- **Highlighting the impact of food wastage** and the potential savings that can be achieved by reducing it. The message can be on the environmental impact/benefits or on the potential economic savings. This aspect was for instance used by WRAP for its “Love Food Hate Waste” campaign in the UK (see Figure 4);

- **Provide further explanations on best-before and use-by date:** while the later is an indication for the safety of the product, best-before date is only an indication of the quality of the product which might be altered after this date. WRAP drafted [comprehensive guidelines](#) for labelling products.



**Figure 4: communication material used for the Love Food, Hate Waste Campaign (Resource Cumbria, 2016)**

- **Provide concrete examples** and tools to help waste producers with the reduction of food waste. This can go from providing guidance on how to properly store food, explaining how to manage the fridge and organise the shopping list, giving recipes to cook leftovers or food that is not commonly regarded as edible (vegetable peels...).

For restaurants and collective catering, other actions can be highlighted:

- **Promote food waste diagnosis** for restaurants and catering services to help them characterise and quantify food wastage, as well as identify possible solutions. Tracking food waste quantities can also be a good way to monitor the evolution of food wastage.
- **Raise awareness and train the key staff members:** cooks, managers, waiters... This is a crucial step since they are directly involved in the generation of food waste. Training can be about storing food, informing guests on possibilities to waste less, or how to design and adapt the menus and the way the food is served...
- **Raise awareness of the guests** on food waste and communicate with them: propose smaller quantities or small changes according to the appetites and taste, collecting feedback on the meals, highlighting the value of food (e.g. local products, home-made meals made out of fresh products...). It can also be relevant to explain why the choice is limited at certain times.
- **Highlight existing good practices** for reducing food waste in the catering sector (doggy bags, proposition of smaller plates or shared meals, adapt the menu with the types of guests). The purpose of this report is not to list and document all the practices that can be implemented by the catering sector. However guidelines are available, such as the ReFED's [Restaurant Food Waste Action Guide](#) and [Food Service Food Waste Action Guide](#)

#### **4.1.2 Implementing a new selective collection of biowaste: attitude of waste producers**

There are several factors behind the lack or refusal of participation of inhabitants:

- Lack of information on the sorting guidelines and on how the waste system works;
- Concrete constraints such as lack of space, inconvenient collection equipment (containers too far away...)
- Distrust in the waste management system;
- No interest in environmental issues. (D. Bernad-Beltrán, 2014)



A survey conducted toward inhabitants in a Spanish municipality showed that the expected participation rate for biowaste separation is close to the actual participation rates for the packaging waste that are already sorted. The survey also shows that there is a possibility to boost the expected participation from 81 to 89% by providing pre-collection equipment. The report states that these figures have to be taken with caution, since respondents to surveys “tend to exaggerate their pro-environmental behaviours”. About 60% are not willing to pay a higher tax for this extra collection, and the 40% willing to pay more would accept a modest increase (+7.5%). No significant correlation could be found with the willingness to participate and socio-economic factors (age, gender, education, position...). However, several factors could be identified as favourable when it comes to the willingness to pay: young people, men, employed people, and educated people are more willing to pay than, respectively, older people, women, retired people, and less educated people. (D. Bernad-Beltrán, 2014)

When setting a pilot implementation of biowaste collection in Parisian restaurants, a first survey has been led to identify participants. In Paris, restaurants do not pay a tax for waste collection, while the pilot implementation required a (symbolic) participation fee from participants. Among the 165 restaurants approached, 20% refused to participate, among which 6% invoked the refusal to pay an extra fee, arguing the foreseen involvement of their staff was already a significant investment. (Moulinot Compost & Biogaz, 2015)

The H2020 Bin2grid project also investigated the willingness of inhabitants and catering services for the separation of biowaste in four European cities: Zagreb, Paris, Malaga and Skopje (Bin2Grid, 2016). A summary of the main results for the four cities is proposed in the following table:

**Table 1: results of the surveys conducted with inhabitants by the Bin2Grid Project (Bin2Grid, 2016)**

	Zagreb (Croatia)	Paris region (France)	Malaga (Spain)	Skopje (Macedonia)
Current participation for the separation of: Paper and packaging Organic waste	76.5% 23.6%	97% 43%	87% 9%	58.3% 21.1%
Willingness to participate in an organic waste collection	89.3%	93.5% 21.8% under certain conditions	87%	87%
More interested categories	Smaller households Older inhabitants	Women Younger people	Bigger households	
Main reasons not to participate	Lack of space Odours Cleaning the container	Lack of space Odours, pests Cleaning	Lack of space Lack of time No benefits seen	Odours Pests Lack of space
Participation rate if it leads to a reduction of the waste tax	96%	94%	91%	92%
Main benefits seen in biowaste separation	Production of compost Energy recovery Avoiding landfilling	Avoid landfilling Energy recovery Production of compost	Creation of jobs Avoid landfilling Production of compost	Production of compost Avoiding landfilling Energy recovery
Not aware of any benefits	4%	5%	20%	12%

It is unsure whether the panels are all representative for the different local populations and it is likely that the answers are a bit overestimated compared to the actual situations (there were online surveys, meaning that participation was voluntary, and no control of the accuracy of the declarations could be implemented). Indeed, it is common that people “exaggerate” their recycling behaviours (R.E. Timlett,

2007). The willingness to participate is high in every territory covered by the survey, yet the foreseen participation rates look very high compared to the current participation rates for packaging. It is interesting to note that the possibility of a financial incentive improves the potential participation rate in every territory, with various effect (between +1% and +6%). Lack of space and odours are the most widespread reasons invoked to decline the participation. Regarding potential drivers, avoiding landfilling and the production of compost and energy are the most common ones. The level of awareness of the benefits is very different from one place to another, with 20% of the participants not seeing them.

The same survey was proposed to restaurants. However, the number of respondents is quite lower than with the inhabitants, which might make the results less representative.

**Table 2: results of the surveys conducted with restaurants by the Bin2Grid Project (Bin2Grid, 2016)**

	Zagreb (Croatia)	Paris region (France)	Malaga (Spain)	Skopje (Macedonia)
Current participation for the separation of: Paper and packaging Organic waste	71% 34%	80% 71%	79% 19%	71% 50%
Willingness to participate in an organic waste collection	92%	91% 37% under certain conditions	85%	97%
More interested categories	Smaller restaurants Older owners	Women	Smaller restaurants	
Main reasons not to participate	Lack of space Odours Pests	Lack of time Lack of space	Lack of time Lack of space	Lack of time Cleaning the bins
Participation rate if it leads to a reduction of the waste tax	95%	100%	91%	97%
Main benefits seen in biowaste separation	Production of compost Avoiding landfilling Energy recovery	Avoid landfilling Production of compost	Avoid landfilling Energy recovery Production of compost	Production of compost Avoiding landfilling
Not aware of any benefits	11%	5%	12%	0%

The surveys also present a strong willingness to participate in a possible biowaste sorting scheme, even more so if it allows a reduction of the waste tax. However, it is possible that the different panels are composed of many restaurants with an interest in waste management, considering it was a voluntary, online survey.

These elements suggest that inhabitants and commercial activities are mostly willing to participate in a food waste separation scheme and understand its benefits. However, it is important to provide solutions against potential nuisances. Moreover, the lack of space is seen as one of the main barrier for waste producers in big cities.

#### 4.1.3 Communicating on biowaste collection

First of all, it is important to remind the necessity to include information and messages about the possible avoidance of food wastage in the communication for biowaste collection. As mentioned above, collecting and processing avoidable food waste cannot be regarded as a sustainable practice when considering the whole life cycle of food and its environmental impact.

Communication on biowaste collection must promote and ensure a proper “sorting environment” for the waste producers, meaning that it must highlight:

- **The practical information** on what is expected from them: what are they supposed to sort, how, and how the biowaste will then be collected;
- **The proper equipment** to be used, both for pre-collection (in the kitchen) and for the collection;
- **Motivations to do so**, either by highlighting the benefits for the waste producer or for the community, or by making sustainable behaviour more advantageous for the waste producers.

Whoever the target audience is, it is important to ensure a continuous communication and training of the staff, to prevent people from giving up on sorting, and to make sure newcomers also have the proper information. For catering services, guests can frequently change (e.g. every year in schools). Therefore, it is important to make the sorting information visible and to renew communication activities.

Awareness raising campaigns allow overcoming the lack of information or motivation that prevents waste producers from properly sorting their waste. To be effective, they need to follow the general principles:

- Ensure the consistency, continuity, and clarity of the communication strategy and its objectives;
- Voice clear messages targeted to well-defined audiences;
- Ensure their efficient delivery through consistent activities. (Joint Research Centre, 2018)

Communication activities are essential for several aspects:

- **Enable the changes of behaviour** for biowaste reduction and source separation;
- Ensure the **quality** of the sorted biowaste;
- Ensure the **durability** of the good practices over time.

For commercial and collective catering, communication can be organised around several main events, such as the preparation of the action, the initial diagnosis (and the assessment of the food waste arising), or the first implementations of actions. Continuous communication must be then ensured to allow the durability of habits, e.g. by presenting the first results. (ADEME, 2013)

Communication activities can take various forms, depending on the resources available and on the objectives of the communication activity. Different communication materials are listed in the following table, along with examples and descriptions:

**Table 3: list of communication activities that can be implemented**

Category	Examples	Uses	Effectiveness
General communication and advertising	Posters, brochures, radio or TV...	Simple message: information, call for action. Allow to spread a common message	General message, display visual elements, target a wide area. Possible links to “more information” (e.g. website)
Information material	Sorting guidelines, calendar	Providing the practical	Clear, well-illustrated,

		information necessary for the proper collection of biowaste	concrete information
Direct communication	Door-to-door campaign, information meeting, roadshow	Introduce a new system or explain a major change, practical information, distribution of equipment	Targeting smaller area, ensuring the message has reached the target audience
Training	Training the staff for source separation, training students as "waste ambassadors"	Change of behaviours, change of internal organisation, new processes (monitoring quantities...)	Concrete actions and behaviours, practical courses, limited number of participants
Study visits	Tour visit of the treatment plant	Reassure local population, show transparency, present the benefits of the system, give meaning to the sorting behaviours	Limited number of participants, must adopt a non-technical message, allow exchanges and dialogues
Press relations	Press release, press conference, contacting local press	Highlighting	Allow to communicate more complete information on a new or changing system
Online communication	Website, social media	Provide and centralise information, engage in dialogues, customer service	More effective on younger audience, links and synergies with other waste actors and public information websites.

There is no ideal communication activity: more general communication allows to target wider audience but their message must be concise and there is no certainty that the message will reach the recipients, whereas direct communication ensures that the target audience gets the message, but is more time and resource-consuming. More direct communication activities are believed to have a higher impact; when it comes to local campaign, any communication activity that make sure the actual target audience has been reached must be given the priority (WRAP, 2013). A training protocol for organising communication campaigns on biowaste collection was published by the SCOW project and is [available here](#). (SCOW project, 2015)

For the start of the biowaste separation and collection in restaurants and collective catering, direct contact and preparation meetings are regarded as essential to highlight the benefits of the new system and provide suitable answers to the possible apprehensions.

When it comes to organic recovery, it is important to take advantage of its very local and concrete aspect. Many local authorities organise visits of their organic recovery plant and provide compost to the inhabitants, either against a fee (as in Munich) or for free during distribution days (Milan). (ACR+, 2017)

#### 4.1.4 Communication material

When it comes to communication material, one important aspect is to ensure the visual consistency of the material used, to make the communication more visible and easily recognisable.

Communication materials are designed to inform and engage the target audience. They must be designed according to their target audiences, be simple and clear, address the identified barriers, and be consistent. It is generally better to focus its communication material on a single, clear message to avoid people being distracted or not remembering the key information. (WRAP, 2013)

Communication materials can take various forms: leaflets, booklets, stickers, posters... Their content must be tailored to their target audience: more practical information for the people that will separate the biowaste or deal with pre-collection and more promotional aspects on the system and its benefits if intended to guests and customers.

There are different distribution methods:

- **Door-to-door / mailbox distribution:** this can be performed by a waste ambassador (which increase the chance the target audience will read it) or sent by mail. This distribution method is recommended for very practical information, such as the sorting guidelines, the collection calendar... Door-to-door distribution can also be done to provide collection equipment (kitchen bin, bags...) along with the communication material;
- **Pick-up:** brochures can be made available in public building, community building, and in any place the target audience is expected to go.
- **Display (posters...):** posters can be displayed in strategic places, especially in restaurants or in kitchens. In the kitchens, they can present the practical information (what can be sorted, the general guidance) while in the front-of-house, the idea is more to promote the biowaste source separation or raise awareness on food wastage. (WRAP, 2013)

#### 4.1.5 Key messages on biowaste source separation

The first important message is the information on the practical organisation of biowaste collection:

- **Sorting guidelines:**
  - What can be put in the biowaste bin: waste from meal preparation, inedible fractions, leftovers, spoiled food...
  - What biowaste is not collected (e.g. bones...) and why;
  - What other waste fractions are detrimental for biowaste collection and treatment (either based on common mistakes, or waste fractions that could be mixed with food waste such as packaging elements...);
- **Pre-collection equipment:** pre-collection equipment can be given, made available, or the inhabitant can be free to use their own. In any case, it is important to provide guidance for waste producers to separate their biowaste in their kitchen, considering the potential nuisances food waste can generate (odours, flies, leaks...); a bad experience can indeed lead the users to stop sorting their biowaste, and re-motivating them can prove very challenging (Compost Plus, 2015). An important aspect is whether or not food waste has to be disposed in bags, and the types of bags to be used (paper, compostable plastics, PET...), since it will impact the pre-treatment process. Other indications are important to provide, such as where to store the kitchen bin and how to deal with very humid fractions. Common recommendations includes: wrapping waste in newspaper or in paper bags to avoid bad smells, using closed kitchen bins, avoid putting the bin under sunlight, washing it frequently (only with water), or emptying it for every collection round... For restaurants, pre-collection bins should be put where biowaste is produced (next to the preparation, cooking, and serving areas). (Bin2Grid, 2015)
- **Collection organisation:** basic information such as collection dates, containers to be used, as well as other practical information (when do the containers have to be presented, where will they be collected...) must be provided in a clear way, especially before the collection is implemented. Some municipalities also recommend not to fill the container more than halfway



to avoid its damaging, or even to 30% of its volume in case of very liquid food waste (ACR+, 2017) , (GECO Food Service, 2017)

It is also relevant to highlight **the fate of the separated biowaste**, e.g. to emphasise the natural process it will undergo to generate energy and fertiliser.

Finally, the communication must explain the benefit of biowaste separation in order to provide a motivation for waste producers to comply. Several elements can be highlighted:

- **The reduction of the residual waste quantities**, and hence the incinerated/landfilled quantities, can be highlighted. Explaining that biowaste represents a significant share of municipal waste is especially relevant.
- **The environmental impact of food wastage and improper management**: highlighting the importance of food wastage and its significant environmental impact might be relevant for raising awareness on the importance of its reduction. ADEME assesses that a French household wastes in average 30 kg/cap/y of food, generating 60 kg eq. CO<sub>2</sub> per capita (the equivalent of 460 km with a car). (ADEME, 2014). For restaurant, an average of 125 g/meal of food waste were assessed by ADEME.
- **The general benefits of organic recovery**: explaining how the biowaste will be recovered, the produced by-product (digestate, compost, bio-products, energy), and their benefit can be an interesting driver. Explaining the value of compost (improving the structure and organic content of soils...) and who are the users will be can be also relevant, especially if the waste producers also consume local farms' products.
- **The financial benefits linked with food waste avoidance**: while environmental facts might not appeal to all, financial savings is a very wide-spread driver. Highlighting the losses associated with food wastage is especially relevant: ADEME assesses that food wastage represents a cost of about 160 €/cap/y, representing almost 8% of the food expenses (ADEME, 2014), while the "Love Food Hate Waste campaigns" presents an even more significant amount: 60 £/household/month. For collective catering, ADEME assesses an average loss of 0.27 €/meal of loss out of a cost of 1.90 €/meal, representing 14% of the cost of raw materials. (ADEME, 2016).

It can also be interesting to present the results of the first 6 months or 1 year to the waste producers, in terms of collected quantities, production of compost and energy, and any other benefits and success from the operation. This can also be the occasion to highlight the most common sorting mistakes or any element that needs to be improved.

#### 4.1.6 Optimising collected quantities while keeping a high quality

##### 4.1.6.1 Pre-collection equipment

As mentioned previously, pre-collection equipment is very important to prevent nuisances and avoid that waste producers give up on biowaste separation. For selective collection in household, a very common system is a 7 to 10-l kitchen bin, possibly with compostable bags.

In Milan, a preliminary survey was conducted toward inhabitants before the implementation of the collection to assess the needs and the possible constraints for storing the equipment. According to their enquiries on inhabitants' satisfaction, it appears that these pre-collection materials are regarded

as a key element of the separation at source. In Ealing, a borough of London, collected quantities have increased by 12% after a distribution of kitchen bins and bags. (ACR+, 2017)

For restaurants, different types of equipment can be proposed. For a pilot project of biowaste collection in restaurants in Paris, the following collection materials were used:

- Thick, transparent compostable bags, allowing controls of impurities (e.g. cutlery that fell when scraping off a plate);
- 120 or 240-l bins with rounded walls, making cleaning easier and more convenient.

#### 4.1.6.2 Collection frequencies

Another way to improve the collected quantities of biowaste is to make residual waste collection less frequent. The idea is to encourage people to use the biowaste collection to get rid of the malodorous fraction of waste rather than to dispose of them in the residual bin. In a Dutch study analysing much waste collection systems in the Netherlands, it is observed that a decrease in the frequency of residual waste entails indeed an increase of the separately collected biowaste quantities, that is attributed to the desire of inhabitants to frequently get rid of this bulky, malodorous fraction. (Elbert Dijkgraaf, 2016)

As an illustration, the borough of Ealing has reduced residual waste frequency to once every two weeks, against once every week for biowaste. This has led to an increase of the collected biowaste of 50% (which can also be attributed to the communication activities surrounding these changes (ACR+, 2017).

An ACR+ study comparing capture rates in five European Cities found a correlation between collection frequencies and performances. In particular, cities where biowaste collection is less frequent than residual waste collection presented rather low performances. (ACR+, 2017)

This is also identified as a good practice in the CompostPlus guidelines, both for controlling collection costs and to boost recycling performances. Reducing collection of residual waste to once every two weeks has also a positive impact on recyclable material collection (Compost Plus, 2015).

#### 4.1.6.3 Improve participation rate

To optimise the collected quantities, it is essential to ensure the highest participation among the waste producers, e.g. that most of them sort their biowaste, and that each one of them sorts their biowaste as much as possible.

To promote participation, it is important to create a good “sorting environment” providing to the waste producers:

- **Information** on what they have to do: what biowaste has to be sorted, what should not be put in the biowaste bin, how to handle biowaste at home to avoid nuisances, and how to ensure its proper collection;
- **Equipment** to enable a proper, comfortable sorting in the kitchen and a proper waste collection, reducing the efforts and potential nuisances as much as possible;
- **Motivation** to get more people involved, through either communication activities or incentives.

The compared analysis from the previously mentioned ACR+ study allowed the identification of good practices, such as the supply of pre-collection equipment or the use of door-to-door collection schemes with controls of the quality and appropriate responses. Other instruments, such as Pay-as-



you-throw systems and mandatory biowaste separation did not necessarily entail a satisfactory capture rate for food waste – their effectiveness depends on how they are implemented. The study highlights some of the reasons behind the successful case of Milan, which could be linked with an intensive communication campaign before and during the implementation, the introduction of a mandatory transparent bag for residual waste, a control system of the impurities and of the content of the residual waste bag, the supply of pre-collection and collection equipment according to the various types of housing, and the quality of the collection service with a monitoring of the satisfaction through surveys. Collecting restaurants enables to collect a significant quantity of biowaste (about 1/3 of the municipal biowaste); the service directed to restaurants must be adapted to their constraints. (ACR+, 2017)

Another relevant instrument is the identification of collection bins (i.e. its attribution of waste bin to one single waste producers, labelled with its name, an individual code, or including a chip that can identify the waste producer), which enables the individual monitoring of participation and allows targeted communication. Another way to better understand sorting habits is to implement composition analysis of residual waste in different areas to have a better understanding on the potential improvements. (ADEME, 2018)

Regarding restaurants, it is important to note that food waste separation involves several changes in the general organisation of the kitchen and of the service, which means that the implementation requires several contacts with the restaurants to ensure its proper setting. The pilot collection of biowaste in Parisian restaurants organised in 2014 by the SYNHORCAT (French HORECA federation) documented how the different restaurants were involved (Moulinot Compost & Biogaz, 2015):

- A first contact with the manager or director was organised, presenting the overall project and the conditions (fees...)
- A second meeting with the chef to plan the practical organisation of food waste separation, allowing to design a tailored collection service taking into account possible constraints;
- A final meeting where the practical organisation (collection days...) and communication materials (mainly signs for the various waste bins) are delivered.

It is important to closely monitor the first weeks of participation to identify potential issues (improper collection equipment...) as soon as possible and bring corrective actions. The general organisation of pre-collection was left to the staff of the restaurants, with the application of two main principles: an easy access to a mixed residual waste bin in every area of the restaurant in order to limit the presence of impurities in the bio-bins, and the conversion of mixed residual waste bins into bio-bins in areas where several mixed bins are already available. Smaller bio-bins were also used in preparation areas to limit the number of transfer from the preparation area to the biowaste container.

For collective catering, the main difference with traditional restaurants is the possible needs to target guests, who might be involved in food waste separation: they are a priority target to ensure a high capture rate with an acceptable quality. The main information to be displayed is the sorting guidelines, possibly with further information on the fate of the sorted biowaste. Posters must be put where sorting occurs (e.g. where guests bring back their plates), but can be also displayed on the way to the restaurant or where the guests are expected to queue. For traditional restaurants, informing the guest on the sorting of biowaste is also relevant to promote the environmental approach of the restaurant; in this case, it might be relevant to avoid displaying food waste, but rather to put the focus on the outcomes of biowaste collection, such as the production of compost. (ADEME, 2013)

#### 4.1.6.4 Ensuring the quality of sorted biowaste

Ensuring the good quality of the sorted biowaste and the low level of impurities is a very important aspect of biowaste collection, so that the produced digestate and compost can be safely used on land. This is especially crucial for the DECISIVE system, for which the possibilities to resort to pre-treatment in order to extract impurities from the biowaste to be digested are very limited. Ensuring a significant participation of waste producers through various incentives (especially making residual waste collection more expensive or less comfortable) and ensuring a proper quality for the sorted waste can prove to be challenging.

A 2013 study analysed biowaste collection data in Catalonia and compared the observed impurity rates with several factors, in order to identify determining factors for their presence. One of the main contaminant observed is plastic, e.g. the PET bags used in many municipalities for collection. Several factors were identified:

- The type of collection: door-to-door schemes present substantially better performances than bring schemes in terms of impurities. For bring systems, single containers present better results than two-fraction containers that have two compartments, one for biowaste and one for residual waste.
- The use of compostable bags rather than PET bags allows to reduce the contamination, due to its compostable nature but also to the fact that its transparency allows quality controls;
- The separation of the other fractions, since most impurities are composed of paper and packaging waste that should have been sorted;
- The analysis suggests that the higher the collection rate, the lower the impurity level, which can be linked with inhabitants' awareness. This also explains that impurities tend to decrease over time as waste producers become increasingly aware of biowaste collection.

In its study comparing biowaste collection in five European cities, ACR+ compared the level of impurities and the corrective actions brought. For one of the cities where biowaste is collected in publicly available bring banks with no control, the level of impurities recorded was very high. In the other cities, the impurity rates were reported between 1 and 7%. The lowest levels (1-2%) were found in cities where biowaste collection is voluntary. In all these cities, biowaste collection is organised door-to-door and quality controls are set during collection, leading to either a communication feedback, the biowaste bin collected and charged as residual waste, or to a fine.

Restaurants and catering services tend to produce biowaste with low level of impurities. Most impurities come from the rest of the meals brought back from the guests, where cutlery or small one-way packaging can get thrown away with food waste.

Collectors can control the content of the container (e.g. the presence of residual waste bags in the bio-bin) and possibly refuse to take the container if the quality is too poor. It is very important to provide a feedback to the waste producers explaining possible errors and how to correct them. The pilot project in Paris documented the most complicated cases regarding quality and made several observations:

- The problems of quality are generally linked with challenges to involve the staff, either because of the presence of different teams over the day, a rapid turnover, the recruitment of

very short-term employees, or very large staff that are difficult to reach. These issues can also be linked with management issues or the lack of support from the management;

- Quality can be affected during rush hours, when many guests have to be served. Errors mainly occur when waiters bring back the plate and empty them in the bins. Several corrective actions were mentioned: controls made by the dishwashers, or stopping the biowaste separation during rush hour and allowing the waiter to dispose of the left over in the mixed residual bin. (Moulinot Compost & Biogaz, 2015)

In general, the quality of sorted waste is possible through consistent controls and awareness rising, regardless of the waste producer. Pre-collection and collection equipment allowing the identification of impurities as well as training the collection staff for checking and possibly reporting low quality containers are both relevant ways of enabling a high quality material.

A 2007 study was led in the UK, focusing on the tools to enhance public participation and therefore improve the quality and capture rate of sorted waste. While it did not specifically focus on biowaste, its findings can be extrapolated to biowaste. Three different projects were led to improve separate waste collection: one based on door-to-door communication, one incentives-based and one delivering personalised feedback to residents. The study highlighted the effectiveness of two of these approaches: the incentives and feedback ones, which allowed significant decrease of contamination of almost 50%. The feedback method consisted in a feedback cards posted in letterboxes and explaining what mistakes were made; its success highlights the fact that sorting mistakes are mainly due to the misinformation on how to sort waste. Personalised feedback seems more effective than generic communication, and communication occurring during collection day (when waste is on residents minds) looks more effective. The study concludes that the most effective method to improve sorting behaviour is to engage residents at the “point of service delivery”, for instance by the collection crew during collection. Therefore, it might be relevant to include it as a part of the collection contract. (R.E. Timlett, 2007)

#### **4.1.7 Pay-As-You-Throw: a powerful instrument for food waste separation**

PAYT is regarded as one of the most effective instruments to boost food waste separate collection (ADEME, 2018). An ACR+ study analysing PAYT systems in several European cities found that food waste was one of the most impacted fractions by the PAYT, resulting in most of the quantities diverted from residual waste, either through food wastage reduction, home composting, or biowaste collection (ACR+, 2016). ADEME compared the results of PAYT in French local authorities and noted the effectiveness of the combination of food waste collection and PAYT: one of the studied local authorities managed to reduce its residual waste quantities by 78% by doing so (ADEME, 2015). Among the changes that can be expected from the implementation of a PAYT, an uptake of commercial biowaste and a decrease of the impurities can also be expected (ENT Environment and Management and Agència de Residus de Catalunya, 2010)

PAYT can be implemented in various ways and the effectiveness will depend on how it is implemented. It is mostly applied to door-to-door systems (ENT Environment and Management and Agència de Residus de Catalunya, 2010)

- The fractions that are taxed: usually, the PAYT is applied to the residual waste, in order to promote the diversion of recyclable fractions from disposal. However, it can also be applied on other fractions to boost prevention. Taxing organic waste might prove counter-productive

for residents, but can be considered for large-scale generators

- User or container identification: the charge can be applied either directly to the users (e.g. that is identified by an individual card used to access the container) or on the waste container (that can be individual or shared among different households).
- How the variable part is calculated:
  - Pay per volume: different systems can be applied: based on the size of the bin, on the frequency of collection, on the number of bags used, or a combination of these systems
  - Pay per weight: bins are weighted when collected.
- The share of the variable part: PAYT systems generally include a fixed fee (that is not related to waste production) and a variable fee that is directly linked to the use of the service.

These various systems present advantages and disadvantages. For instance, pay-per-weight systems generally leads to better prevention and sorting performances (ENT Environment and Management and Agència de Residus de Catalunya, 2010), (Regions for Recycling, 2014) but are more challenging and expensive to implement and maintain, since they require a more complex technology and an accurate monitoring. Prepaid sack systems also give good results. However, it must be noted that PAYT systems must be implemented within a well-developed infrastructure and accompanied by significant efforts in communication. This means that waste producers must be aware and capable of optimising their waste separation, so that they do not decide to resort to illegal practices: illegal dumping, use of street bins, waste thrown in neighbouring cities with no PAYT... (Joint Research Centre, 2018)

PAYT can be applied to commercial activities as soon as each waste producer can be easily identified and charged; in places where commercial activities share or have access to the same collection equipment as households, implementing a PAYT will be more challenging if household waste is not subjected to a PAYT system.

PAYT is regarded as one of the most effective instruments for boosting recycling rates, yet it must be noted that it is not a stand-alone measure. As explained before, its success will depend on the validity of the waste collection system (i.e. whether the waste producers have suitable means for source separation) and on the awareness of the waste producers. Fees have to be carefully set to properly incentivise good behaviours while actually covering waste management costs. Moreover, it is advised to start with a reasonable variable fee and then to progressively increase the fees in order to avoid illegal behaviours. (ACR+, 2016)

#### **4.1.8 Communicating on the unit: promotion and acceptability**

While the previous sections focused on the involvement of waste producers, whose participation is essential to ensure a sufficient supply of clean feedstock, other stakeholders can be significant for the success of the system.

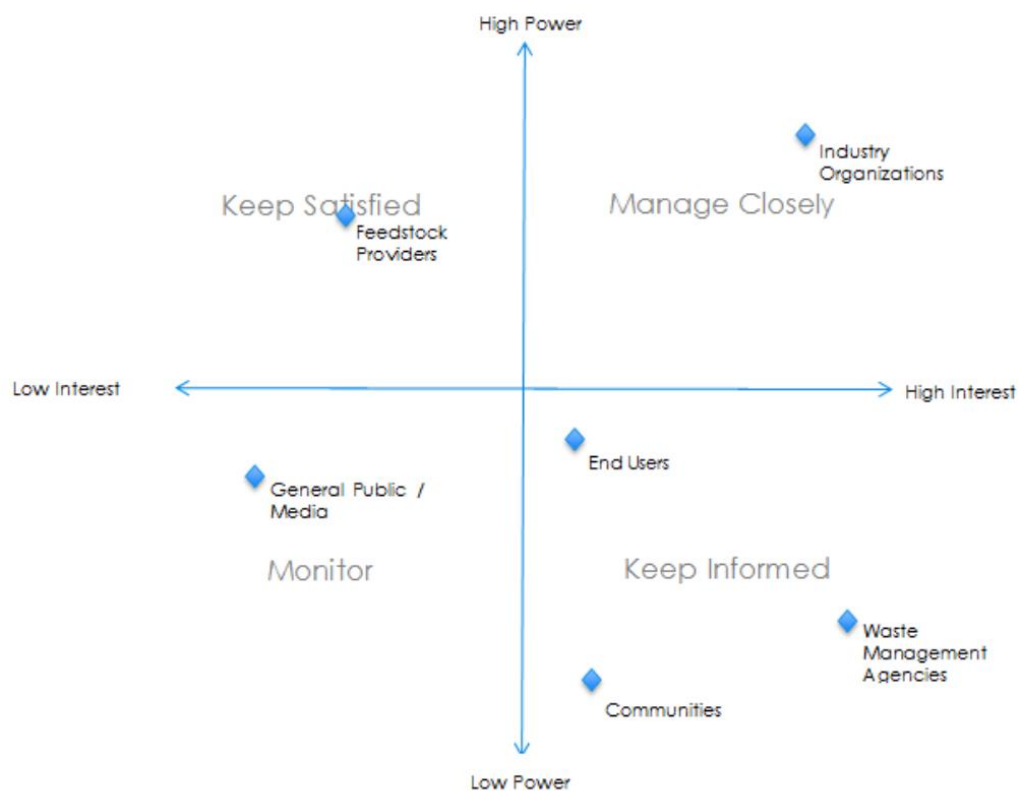
##### **4.1.8.1 Mapping local stakeholders**

Mapping local stakeholders is a relevant starting point before designing a communication strategy for a new DECISIVE system. The idea is to get the involvement of both waste producers and end-product users, the support of local key-player and the acceptance of any person and organisation that could be affected by the system. In a Biogas Market Study prepared for the Canadian Climate Change Emission Management Corporation and focusing on the Canadian province of Alberta, stakeholders

of AD units are listed and classified according to the Freeman's principal of stakeholder analysis. (TEC EDMONTON, 2015). This method uses four categories:

- **Manage closely:** these stakeholders have both great interest in the system and a significant power on its result;
- **Keep informed:** these stakeholders that have an interest in the system but little actual power to influence it;
- **Keep satisfied:** these stakeholders do not have necessarily a particular interest in the system but can influence it significantly if interested;
- **Monitor:** these stakeholders that have little interest and influence in the system.

The stakeholders of AD plant in Alberta are then classified in the following matrix:



**Figure 5: stakeholder overview for AD in the Canadian province of Alberta from the Government perspective (source: (TEC EDMONTON, 2015))**

Applying this method allows to prioritise the communication efforts for the different stakeholders; the positions of the various stakeholders depend on local specificities and the nature of the project.

For DECISIVE systems, beside the waste producers, the other relevant stakeholders were listed in section 2.2.4:

- **Potential users of by-products:** local farmers, local companies... that could benefit from the bio-products and the heat produced.
- **Neighbours in the vicinity of the plant**



- **Any other potential partner that can help conveying the message** including the local authority in charge of municipal waste, waste collectors, local NGOs...

#### 4.1.8.2 Acceptability

A waste treatment unit is generally not well perceived by the surrounding population that fears nuisances and pollution, as well as risks for safety. Biowaste treatment units are especially challenging due to potential bad odours linked to either problems with the composting process or improper storage of the food waste. Spreading of digestate can also generate foul odours. The acceptance of biogas plant by the public is variable in Europe: it can be high in several countries (e.g. in Switzerland), while in others residents tend to organise local committee to oppose the projects, as a result of the “Not in my backyard” (NIMBY) effect or due to opposing views on local environmental strategy (Andrea G. Capodaglio, 2016).

The project acceptance is the results of several parameters, among which the following ones can be highlighted (Andrea G. Capodaglio, 2016):

- **Perceived costs:** they include the economic costs (e.g. reduced property prices) but also non-economic ones, such as inconvenience caused by odours, traffic...
- **Perceived benefits:** as highlighted previously, several benefits can be highlighted, such as job creation, positive environmental impact, production of energy...
- **Trust:** the trust toward the system operator is also an important factor, and can be influenced by the type of information provided or on how the system seems to be operated.

These different elements can be heavily subjective, but also tangible (in case of actual nuisance caused by the unit to the surrounding residents, for instance). One of the main factors impacting the social acceptance is the distance from the plant to the inhabited areas, which impact the perception of costs and the potential nuisances (Anna Rolewicz-Kalinska, 2016). Surveys can help to better understand these different perceptions; as mentioned before, it seems that people are increasingly aware of the benefit of organic recovery and willing to contribute, yet this can change at local level. To positively influence on these parameters, several actions can be undertaken (Andrea G. Capodaglio, 2016):

- **Information:** presenting costs and benefits of the system will contribute to positively influence their perception by the public, show commitment of the system operator to the local community, and thus increase the degree of trust toward the system operator (Anna Rolewicz-Kalinska, 2016). Direct exchanges during meeting or study visits are regarded as relevant ways to disseminate information on the system. Information must be objective, truthful, and adapted to the concerns and level of knowledge of the target audience. (Andrea G. Capodaglio, 2016)
- **Nuisance perception:** ensuring a proper management of odours is especially important for the acceptance of the unit. Recording complaints and responding accordingly are highly recommended.
- **Participation:** trying to involve the public to the system might be beneficial to the system's reception. While it might be complex to make them part of the decision process and involve them in the design phase, allowing them to provide feedback on the system (by asking them

to report any unpleasant odour) or giving them access to the produced compost can be interesting ways to improve the acceptance of the system.

The ACR+ benchmarking study made similar observations in the five European cities where biogas plants were in use: odours were reported as the main issues when it comes to public acceptance. To overcome the nuisances, the main methods were technical solutions (biofiltres...). Implementing a new treatment unit on an existing waste management site was mentioned as a good practice to avoid local opposition, however this might not be an option for decentralised treatment plant (besides using civic amenity sites). The main instrument for local residents is the organisation of visits explaining and showing the process and the organisation of the unit. In Montpellier, where an AD plant was implemented close to the city, a network of watchers composed of neighbouring residents was established to report occurrence and intensity of bad smells, whose observations led to an annual report on odours and several corrective measures (ACR+, 2017)

Little information could be found on the acceptability of mAD plants. Most mAD plants in Europe were implemented in farms where potential nuisances are less likely to affect residents. It is likely that the smaller scale of the mAD units will make acceptability less challenging than for larger, centralised AD plants; decentralised composting units tend to be well accepted by residents. However, the limited investment possibilities might prevent from using bio-filters, thus making the possibilities to reduce odours more challenging.

#### **4.1.8.3 Promotion of the system**

Promoting the system to external stakeholders is relevant for various reasons: it can contribute to the system's success by giving more visibility to it, get support from stakeholders that have influence on waste producers and contribute to their involvement, and help with the acceptability of the project. It can also contribute to the replicability of the system, allowing to create a network of DECISIVE systems that increase the benefits and the resilience of the overall system, and enable synergies for its running.

In the study for the province of Alberta, the lack of support from the general public and local authorities is regarded as a significant potential barrier for the success of the project. To overcome this difficulty, it is advised to meet the various stakeholders in order to present the benefits of the system. Identifying potential supporters of the project among local stakeholders (either being interested in diverting biowaste from disposal, for renewable energy, or for production of bio-based products/compost) is also a relevant option to generate visibility for the system.

In general, it seems relevant to list the various stakeholders, prioritise them according to the potential influence and interest (focusing on the ones combining high influence and interest and leaving aside the ones having little impact), and establishing contacts with the priority targets. To do so, it is relevant to identify their interests and possible synergies with the system in order to highlight the benefits of the systems which are the most relevant to the target's interest.

The promotion of the system can be achieved by the promotion of the produced compost, which is the most concrete output. The [SCOW project](#) (Selective Collection of Organic Waste in tourist areas) published a [handbook for compost marketing](#), highlighting how the compost can be distributed or sold, to whom, and what are its benefits. The handbook explains the relevancy of labelling, details the different targets along with their needs, and insists on the necessity to explain how to use it properly

to the user. (SCOW project, 2015)

## **4.2 FACTSHEETS PRESENTING ACTUAL EXPERIENCES AND RESULTS**

Good practices focusing on food waste prevention and separation in households and catering were reviewed and documented. The objectives are to present more concrete practices as an inspiration for the DECISIVE systems, and to collect quantitative data on the results of these practices and waste reduction and separation.

### **4.2.1 Good practices for households and municipal waste**

## REDUCING RESIDUAL WASTE COLLECTION FREQUENCIES

*Making food waste collection more attractive*

**Target group:** households



<b>Location and time</b>	UK, Ealing (borough of London), 2016
<b>Type of target audience</b>	Households: people managing food waste at home (343,000 inhabitants)

### DESCRIPTION

Ealing, a borough of London, implemented food waste collection for households in 2006. Food waste collection is voluntary and no legal obligation was enforced. In June 2016, residual waste collection frequency was decreased from once a week to once every two weeks, while food waste collection remained once a week. The objective behind this modification was to make food waste collection more attractive, since it becomes the only option for inhabitants to get rid of their putrescible waste once a week. The changes were accompanied with communication activities.

### TYPE OF INCENTIVES



**Collection service**

This case study focuses on the modification brought to the residual waste collection frequency, in order to make biowaste collection more relevant to inhabitants. It is important to note that Ealing has no obligation for food waste collection, or pay-as-you-throw systems.

### RESOURCES ALLOCATED

This change was promoted through a large marketing and communication campaign including letters, leaflets, roadshows, lamppost banners in town centres, attended ward forum councillor meetings, and attended resident meetings.

### RESULTS

Food waste collected quantities increased by +50% after the change of residual waste collection frequencies, while keeping an impurity rate below 3%. The evolution of the collected quantities is shown on the following graph:

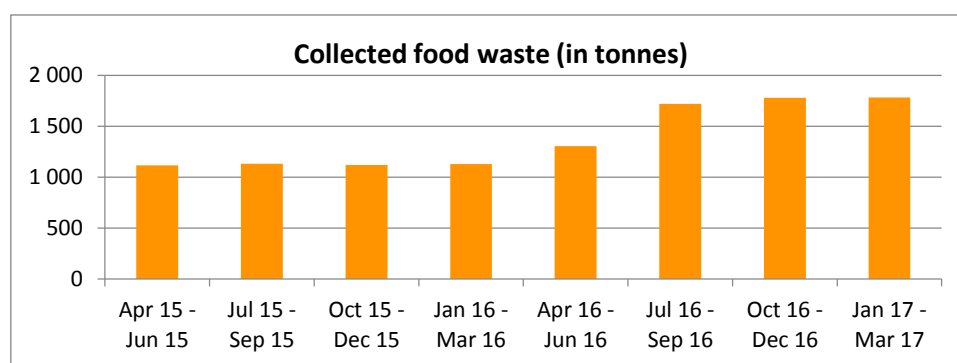


Figure 6: evolution of food waste collection in Ealing (WasteDataFlow - Local Authority waste management, 2017)

Source: (ACR+, 2016)

## COMBINING HIGH CAPTURE RATE AND HIGH QUALITY

*Making food waste collection more attractive*

**Target group:**  
households and  
restaurants



### Location and time

Italy, Milan, 2012

### Type of target audience

Households and restaurants (1.37 million inhabitants)

## DESCRIPTION

The city of Milan introduced food waste collection in 2012, for both households and restaurants. The implementation lasted 2 years, with one new quarter of the city being covered every 6 months. As for now, Milan is regarded as one of the most successful biowaste collection in a big city.

## TYPE OF INCENTIVES



### Communication



### Pre-collection equipment



### Collection service



### Controls



### Mandatory separation

The good performances of the food waste collection can be linked with a combination of instruments:

- **Communication:** during the implementation, letters and a delivery kit including bins and bags were sent by mail. An app and a website were set, and available in 9 languages. In addition, media were targeted including the press, TV, as well as campaigns in schools. In late 2014, a “recall information” campaign was launched with sorting guides in 10 languages (with the involvement of foreign communication staff for direct communication) to increase the quality.
- **Supply of pre-collection equipment:** compostable bags and 10-l, aerated bins were supplied to inhabitants. According to satisfaction surveys, this is regarded as one of the key elements of the collection system by the residents
- **Quality of the collection service:** 80% of the population is satisfied with the bi-weekly collection. Collection containers were provided according to the type of housing.
- **Controls and fines:** transparent bags were introduced for residual waste prior to the food waste collection. The quality of the bio-bin is controlled during each collection, and every building is controlled at least once a month, with the possibility to fine non-compliant residents (42,379 of non-conformities reported in 2013)

## RESOURCES ALLOCATED

Significant resources were allocated to the implementation of the food waste collection, especially an investment of € 4.5 million for the purchase of 45 leak-proof collection lorries, collection equipment and human resources. The bi-weekly collection of residual waste is supposed to be decreased to once a week, depending on the results of a pilot experiment, which would allow to optimise the collection costs.



## RESULTS

Food waste collection quickly increased over the 2 years of implementation, reaching 85% of capture rate in 2015, while maintaining an impurity rate of about 5%. Food waste from restaurants represents about 30% of the total collected quantities.

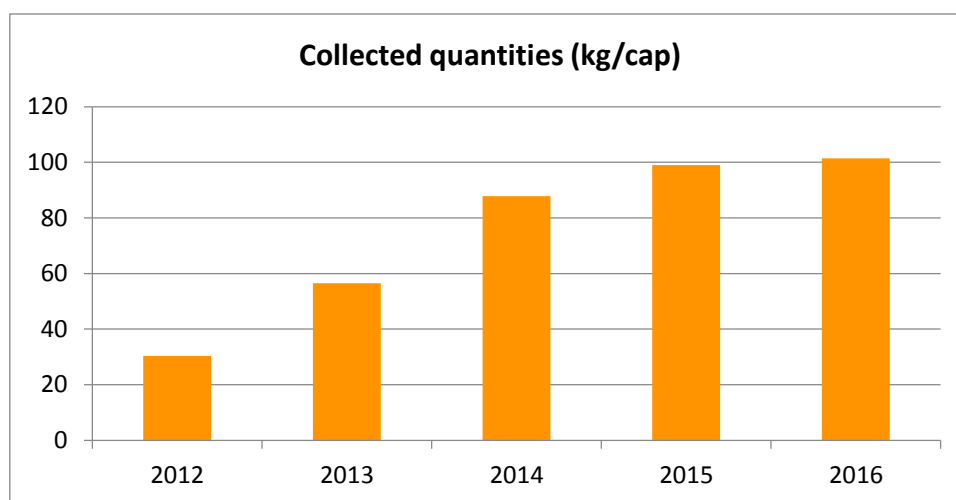


Figure 7: evolution of food waste collection in Milan, in kg/cap (ACR+, 2017)

Source: (ACR+, 2017)

## BOOSTING BIOWASTE COLLECTION WITH VARIOUS INSTRUMENTS

*A combination of tools to reduce residual waste*

**Target group:** household waste



### Location and time

France, SMICTOM des Pays de Vilaine, 2013

### Type of target audience

Households (80,000 inhabitants)

## DESCRIPTION

The SMICTOM des Pays de Vilaine is a group of 44 municipalities managing municipal waste for a population of about 80,000 inhabitants. In 2013, it decided to modify its collection system to reduce the generated quantities and optimise recovery. Centred on the introduction of biowaste collection and the implementation of a composting plant, the new system resorted to various instruments to engage the residents.

## TYPE OF INCENTIVES



**Communication**



**Pre-collection equipment**



**PAYT**



**Collection service**

- **Communication:** an intensive campaign was launched at the beginning of the implementation to ensure that the changes were properly accepted and implemented by the inhabitants. Around 52 waste ambassadors were used to present a new communication kit sent before to all households, over a period of 5 months. A hotline was set up to answer to inhabitants' questions and 950 people were directly met during open hours. A travelling exhibition was also displayed in the different communes. Another important aspect is that communication was partly ensured by intermediaries, such as local environmental and consumers NGOs as well as federations of companies, involved through a local waste committee that was brought together during several meetings.
- **Collection equipment:** all inhabitants were equipped with 120 wheelie bins whose volume is reduced to 35 l collection bins to limit their weight.
- **PAYT:** a new PAYT system was also introduced to promote biowaste separation, enabling the residents to pay according to their use of the service. It is composed of a flat fee based on either the number of inhabitants in a single house or on the volume of the share residual waste container in vertical housing, and a variable part equal to the number of collection (over a fixed annual number of 12 collections) and a fee based on the volume of the container.
- **Collection service:** residual waste collection frequency was reduced to once every two weeks, vs. once a week for biowaste.

## RESOURCES ALLOCATED

The investments costs for the new collection systems and the PAYT (including new containers, identification chips, and software) amount to about €2.5 million, with a financial support from ADEME of about €1.6 million.

## RESULTS

The combination of these different instruments allowed impressive evolutions when it comes to waste performances over 4 years:

- A reduction of about 60% of residual waste generation, now below 90 kg/cap/year
- The collection of 30 kg/cap/year of biowaste, with an impurity rate below 2%
- The increase of sorted quantities for other fractions: +6% for packaging, +5% for waste sorted in civic amenity sites

Source: (Compost Plus, 2015)

## LOVE FOOD HATE WASTE IN WEST LONDON

*Measuring the impact of a communication campaign*

**Target group:** households



### Location and time

UK, London, 2013

### Type of target audience

Householders (600,000 households)

## DESCRIPTION

Between October 2012 and March 2013, a communication campaign targeting household food waste was organised by the West London Waste Authority, Recycle for London, and local Borough. The originality of this campaign is the important monitoring efforts that were done to monitor the changes of behaviours and the impacts. The objectives were to decrease the food waste production and the associated costs for collection and disposal. This communication campaign was part of a national programme, “Love Food Hate Waste” organised by WRAP, that provides communication materials, key messages and

## DETAILS ON THE COMMUNICATION ACTIVITY

### Type of communication activity

The campaign was part of a London-wide communication campaign, and mixed various types of communication, from general advertising through direct engagement and training led by a network of volunteers. The ‘4 E’s’ behavioural change mode was used: enabling people to make a change; encouraging action, engaging in the community, and exemplifying what is being done by others.

### Proximity with the target audience

The campaign mixed general, non-addressed communication with direct engagement. It also included internal communication activities targeting the staff of the borough.

Direct communication activities included 50 roadshow and 28 Let’s Get Cooking Clubs providing practical advice for cooking and preserve food.

### Key messages

The key message was that avoiding food waste allows saving money: ‘you could save up to £50 per month by throwing away less food.’

The London campaign also focused on different topics over its course, including the impact on water, or how to conserve food. It also took advantage of various events (Christmas, New Year Eve, and Valentines’ day).

### Communication channels

Radio, digital and print advertising, posters in the metro and in community buildings, as well as press adverts.

### Who is voicing the message

The national and local authorities were the main actors voicing the general messages. “Food Waste Champions” were also recruited and trained to organise training programmes in local communities.

## RESOURCES ALLOCATED

The total investments amounted to about £170,000 (0.28p per household), which includes the local radio adverts, 28 Cooking training sessions, online advertising and website, and the organisation of 50 community events. It also involved about 1,400 volunteer hours.

## RESULTS

Composition analyses allowed the assessment of food waste reduction:

- 0.4 kg per household per week, i.e. -15% reduction
- Avoidable food waste decrease of -14%
- 14% of the households declared having changed their behaviours, resulting in a decrease of 43% of avoidable food waste.

The economic savings were also assessed to about £14 million per year for residents, and £1.3 million for avoided disposal costs

Source: (WRAP, 2013)



#### 4.2.2 Good practices for restaurants

##### PILOT IMPLEMENTATION IN PARISIAN RESTAURANTS

*Subtitle with general objectives*

Target group: restaurants



##### Location and time

France, Paris, 2014

##### Type of target audience

Commercial catering and staff: managers, kitchen staff, waiters... (77 restaurants)

### DESCRIPTION

To prepare the implementation of a new regulation making biowaste collection mandatory for non-household organisations producing more than 10 t/y, a pilot operation was organised by the SYNHORCAT, a professional federation of HORECA organisations, with the support of the national, regional and local authorities. It was initiated by the owner of an eco-responsible restaurant, who also co-founded a company providing food waste management services for the catering sector. The pilot project that included 77 participants started in early 2014 and lasted 10 months.

The project was launched after an initial test with 10 voluntary restaurants that implemented the preparation steps, allowing the improvement of the toolkits. Two months after the 10 pilot restaurants, the 67 others implemented the collection.

The collected biowaste was sent to an AD plant located in the Paris Region.

### TYPE OF INCENTIVES



Communication



Pre-collection equipment



Controls



Collection service

- Communication:** a first call for participation was sent to 165 restaurants, among which 48% accepted to join the experiment, 20% refused, and the rest could not join for practical reasons. Beside environmental concern, one of the drivers was the upcoming regulation making biowaste separation mandatory for large restaurants. Then the managers were presented the project with a first meeting, and a sorting guide as well as an engagement charter was presented.

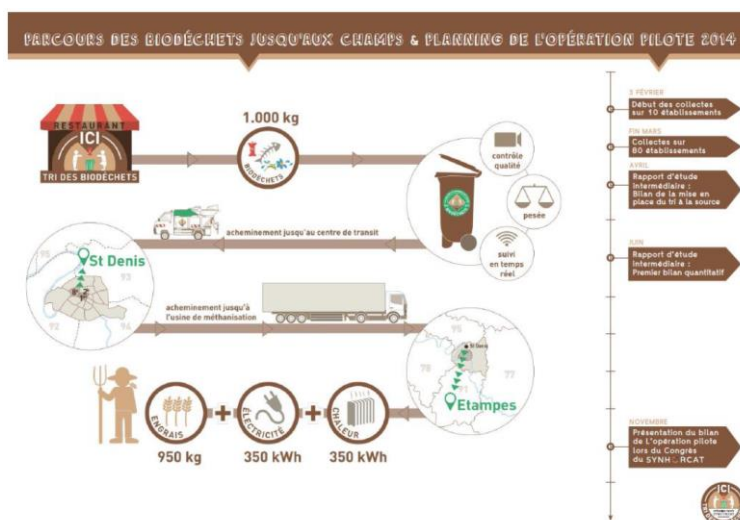


Figure 8: illustration in the sorting guide provided to restaurants (Moulinot Compost)

#### & Biogaz, 2015)

A second meeting is organised with the kitchen chef to collect information on the internal organisation and the possible constraints, allowing the proposition of a pre-collection scheme. Finally a 3<sup>rd</sup> meeting is organised to deliver the material and the practical information.

Posters presenting the sorting guidelines are put where the bins are located, along with stickers on the bio-bins. An extranet was also set to provide all the communication resources, as well as figures on the collected quantities and the evolution.

Each restaurant was in charge of training the staff, but only half of the employees reported being specifically trained with a dedicated internal meeting.

- **Precollection equipment:** bins and transparent bags were provided to the restaurants before the first collection rounds. Recommendations were given for their locations (as replacement of some of the residual bins in every strategic location: bar, dishwashing, preparation ...) and the availability of residual bins to avoid impurities.
- **Control of the quality** achieved thanks to transparent bags and visual control of the content. A close follow-up is organised during the first weeks of collection to spot any issue, and new meetings are organised to bring corrective actions. Visual controls were systematically performed during the collection, and composition analyses were performed on a regular basis. Analyses of the presence of food waste in residual waste bins were also performed. Collection containers are 120 or 240-l bins with a rounded interior to help their cleaning.
- **Collection service:** the collection frequencies were set depending on the constraints of the restaurant (available space to store bins, production rate...), ranging from 3 times a week to a daily collection.

## RESOURCES ALLOCATED

A participation fee was required from the restaurants, ranging from 50 to 400 € according to their size. The total cost of the operation amounts to 308,000 € and was partially financed by public funds from ADEME, the city of Paris, the Synhorcat, and the Paris Region.

## RESULTS

The project successfully involved 77 restaurants representing 1,500 staff members and allowed the recovery of 580 t of food waste (7 t per restaurants) The results exceeded the initial expectations and helped restaurants with the identification of possible reduction, especially thanks to the transparent bags. About 75% of the restaurants captured more than 80% of the biowaste with very low impurity level, while 13% presented low capture rate and/or issues with contamination. While waste from meal preparation is commonly sorted, waste from plates is more challenging to sort, especially during rush hours.

Out of the 77 participating restaurants, 42 went on with food waste separation despite the lack of financial incentives to do so: it costs about 250 €/t for restaurant to have its biowaste collected and treated, with no savings made on residual waste. Several possibilities are investigated: the exoneration of the waste tax for participating restaurants, or the possibility to join the waste collectors' capital and get some interests from the benefits (source: <http://www.assises-dechets.org/fr/actualites/assises-2015/110-collecte-des-biodechets-les-restaurateurs-parisiens-mettent-la-main-a-la-pate>)

Source: (Moulinot Compost & Biogaz, 2015)

## BIOKRAFT HARTBERG AD PLANT

Collecting commercial biowaste in bulk

**Target group:** restaurants, catering services



### Location and time

Austria, Hartberg, 2005

### Type of target audience

Commercial waste producers, including catering services

## DESCRIPTION

The Hartberg AD plant is located in the Province of Styria, located in the south-eastern part of Austria. The plant treats mainly commercial waste, including waste from the food and beverage industry and from farms. The main feedstock is waste from catering services, representing about 80% of the treated waste. The collection is provided by the waste management Saubermacher and is performed using only wheelie bins and no bags.

## TYPE OF INCENTIVES



**Pre-collection equipment**



**Collection service**

The originality of the collection system is the use of sealed, 120-l wheelie bins. The bins are equipped with a sealing and a shutter on the top of the lid, limiting the bad odours. Bins are not individually allocated to the waste producers: they are the property of the waste management company.



**Figure 9: bins equipped with shutters, and trucks used for their transport (Bin2Grid, 2016)**

Bins are collected from twice a week to twice a month depending on the season and the size of the waste producer. The bins are collected as such by a small truck that can carry 40 bins. When full, each bin weight between 80 and 100 kg. After being emptied on the treatment sites, they are washed with hot waste (about 60°C) with an automatic washing machine, ensuring their proper disinfection. The water is partly re-used for the waste processing. When bins are collected, clean ones are left to the waste producers. Spare bins are also allocated in case of larger waste amount.



**Figure 10: bin washing system (Bin2Grid, 2016)**

## RESOURCES ALLOCATED

The investments consist in the purchase of bins (about 50,000 bins are collected and delivered to the biogas plant), the collection truck and the washing equipment. Bins cost about €30 each and last about 10 years. Collection costs are around €150-250 per tonne of biowaste, depending on the producers, and treatment around 25-60 €/t.

Three workers operate the plant (from technical operation, maintenance, to administrative works).

## RESULTS

The waste company collects around 5,450 t/y of food waste from catering services, out of the 6,500 t/y treated by the unit. The quality of the sorted food waste is quite good.

Source: (Bin2Grid, 2016)

## MENU DOSE CERTA

*Supporting restaurants to reduce food waste*

**Target group:** restaurants



### Location and time

Portugal, Porto, 2008 – on going

### Type of target audience

Restaurant: managers, staff, guests

## DESCRIPTION

The Menu Dose Certa project (right serving menu), implemented by Porto's waste management organisation LIPOR, aims to reduce food waste in restaurants and to change attitudes and behaviours by raising awareness on the problem of food waste. The goal is to support restaurants in creating menus that generate notably less food waste.

The project is a partnership between LIPOR, the association of Portuguese nutritionists, the local authorities of Espinho and local restaurants. The initiative kicked off at pilot level in the Cristal restaurant in Espinho, the generating significant media attention at regional and national level. The project continued to expand in 2010 and 2011 with more restaurants involved and a competition among participating restaurants to produce the best recipe for a Right Serving Menu, in terms of serving size and nutritional value. Also in 2011 the project was restructured into Dose Certa, where the main goal is not only Menu Dose Certa implementation, but also the promotion of good practices regarding waste prevention, during buying, storing food and preparing meals phases. The project is still on-going and catering services can apply on Lipor's website.

## DETAILS ON THE COMMUNICATION ACTIVITY

### Type of communication activity

The project is divided into a 1-year phase for implementation, and 1-year phase for monitoring. The implementation phase includes the following activities:

- Preparation phase – Inscriptions; Informative procedures;
- Initial diagnosis phase – Evaluation of the basis situation at environmental, nutritional and food stocks management;
- Training and good practices implementation phase;
- Final diagnosis phase – Evaluation of the “post awareness” situation at environmental, nutritional and food stocks management;
- “Dose Certa” Certificate attribution.

Participants have to satisfy several requirements, such as monitoring the generation of food waste with weighing, recording this information using the project's website, applying recommendations in term of stock management as well as nutritional and environmental recommendations. To ensure their participation, a “Dose Certa” commitment referencing these different requirements is to be signed by participants.

### Proximity with the target audience

The project is disseminated through general communication activities to restaurants, mainly using the website. When applying the restaurants are then specifically trained by the project's officers. Then, the new menus are promoted to guests by the restaurants.



<b>Key messages</b>	The key message is based on the results of the previous experiments. It is assessed that the average potential of reducing food waste is around 30-35%, also leading to a reduction of associated economic losses. It means that for every euro spent, 30 cents goes to waste.
<b>Communication channels</b>	The main platform is the project website, which includes a private platform for participants. The project took advantage of the pilot participants to disseminate the project, and local media helped raising awareness. The participating restaurants are presented on a map <a href="#">on Lipor's website</a> .
<b>Who is voicing the message</b>	An important element of the project is the partnership between Lipor and the Portuguese Association of Nutritionists that contributed to the creation of good practices on storage, preparation and nutrition, and validated the changed menus. This is especially important to provide recognition and credibility for the restaurants.
<b>RESOURCES ALLOCATED</b>	
For the 3 first pilot restaurants, the budget was about 12,000 €, including human resources, equipment, (containers, scales, communication materials), and general costs. The project team was composed of two waste technicians and two people in charge of monitoring the quantities.	
<b>RESULTS</b>	
<p>Quantitative results are available for the two first participants:</p> <ul style="list-style-type: none"> <li>▪ The first achieved a reduction of 133 g/guest/meal, representing 50 kg/year for a daily meal;</li> <li>▪ The second experienced a reduction of 320 g/guest/meal of food waste, leading to a reduction of 117 kg/y for a daily meal.</li> </ul> <p>In average, a reduction of 30% was experienced by participants.</p> <p>About 30 restaurants joined the initiatives.</p>	

(ACR+, 2013)

Other good practices can be listed in a more concise way (Love Food, Hate Waste, 2013)

- **Provide guests with options to reduce food waste:** this can be done by proposing either smaller portions (for a smaller price) or different choices for side dishes.
- **Highlight these possibilities** in a concise, clear, and positive way, without referring to food waste, either on the top of the menu, on the blackboard or on a table card.
- **Make the message positive:** avoid referring to food waste, but rather put the emphasis on choice, smaller price, or more adapted food to their needs;
- **Involved front-of-house staff** for the engagement of guests to provide them the information and explain the possibilities of ordering plates that are more fitting the guests' requirements;

### 4.2.3 Good practices for collective catering

#### 4.2.3.1 Healthcare units

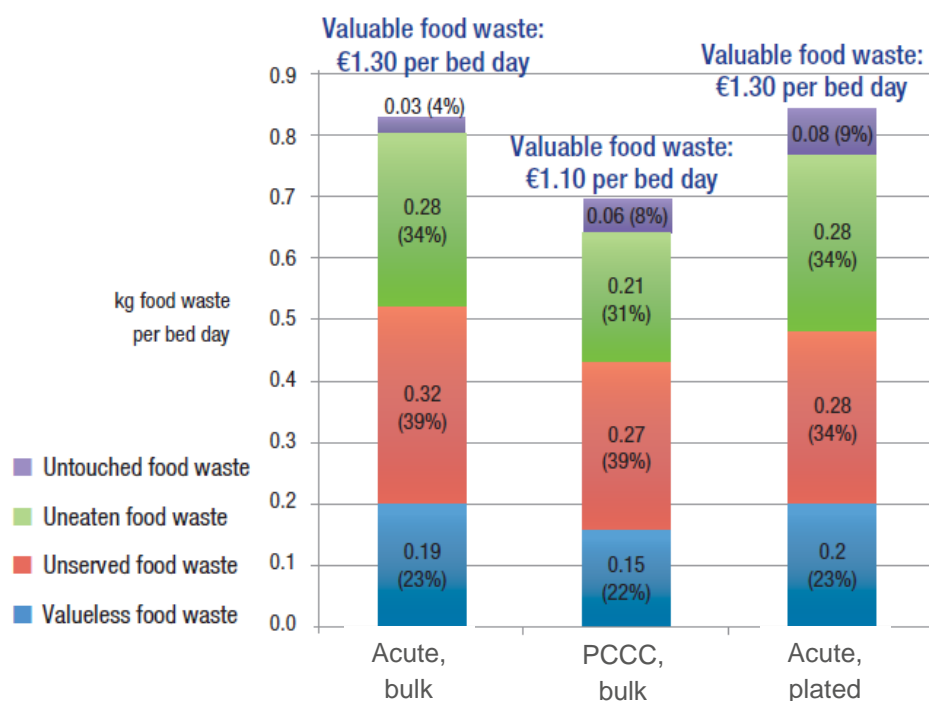
FOOD WASTE COLLECTION IN CENTRAL MANCHESTER HOPITALS		Target group: collective catering, hospital	 
Waste separation managed by the catering service			
Location and time	UK; Manchester, 2014		
Type of target audience	collective catering ( managers, other staff members)		
DESCRIPTION			
Sodexo operates the facilities management contract on behalf of the main PFI contractor Catalyst. The collection of food waste was introduced across the Central Manchester site in 2011 and is currently sub-contracted to Olleco by Sodexo via their waste broker GreenZone. Food waste collected from the sites is treated by anaerobic digestion at Lower Reule Bioenergy’s site near Stafford.			
DETAILS ON THE COMMUNICATION ACTIVITY			
Type of communication activity	<p>The Sodexo waste manager is responsible for overseeing communications related to the food waste scheme. The main target audience are the staff members that are responsible for running the scheme; namely the domestic staff and waste management staff. All staff involved in the scheme are provided with both initial and an ongoing programme of training; signage and bin stickers are used to remind staff of the accepted materials</p> 		
<p>Figure 11: posters used to explain the sorting guidelines</p>			
Proximity with the target audience	Communication is very much addressed as it targets specific staff members along the food value chain – chefs and other staff members including those external to the kitchen who deal with food waste once it gets disposed of. While there are leaflets, posters and instructions as reminders, they also receive ongoing training.		
Key messages	Beside the sorting guidelines, information regarding the tonnage collected was provided by the contractor highlighting the progress accomplished in terms of		

	sorting rate and energy generated through AD.
<b>Communication channels</b>	Leaflets, posters, trainings
<b>Who is voicing the message</b>	Collection operator
<b>RESOURCES ALLOCATED</b>	
Not much information is available regarding the resources allocated. Purchases consisted in collection material and collection containers (240-l bins).	
<b>RESULTS</b>	
<p>The Trust is generally happy with the performance of the scheme and is not planning to make any changes. There are still concerns regarding the suitability of the 240 litre wheeled bins which are felt to be too heavy when full to tip onto their two wheels making them difficult to move. This issue however, has been partially addressed using the trolley and tug system. The Trust is also talking to the contractor about gaining more regular and detailed information regarding scheme performance. Data indicates that, alongside the dry recycling scheme, the food waste scheme has helped to increase the 'domestic' waste recycling rate from 25% to 95%. 120 t of food waste is diverted annually or 1.9 kg per bed.</p> <p>There were some initial issues with contamination following the launch of the scheme while staff familiarised themselves with the new system but this has improved and there is now very little contamination and no bin has been rejected by the contractor due to contamination.</p>	

Other general recommendations are presented by the GreenHealthcare Programme, an initiative launched by the Irish EPA in order to improve resource efficiency and decrease costs in the Healthcare sector, and following a 2009 pilot project (GreenHealthcare, 2014). The programme focused on food waste among other waste fractions and consisted in an initial survey followed by an action plan. All the various findings and lessons learnt were presented in several [guidance documents](#) on various subjects: how to perform an initial surveys and assessment of generated quantities

The survey allowed highlighting several elements:

- Food waste costs around 2 €/kg to hospitals (taking into account the costs of food and the cost for its storage and preparation). This is one of the key messages of the programme to raise awareness on this issue.
- Food waste consists in unserved food waste, untouched food waste (that was served but not touched, either because the patient is not present or too unwell to eat), and uneaten food waste (leftover from a partly eaten plate);
- Food waste is served in two different ways: bulk systems, where food is sent in bulk containers and plated in the wards and plated centrally systems, where food is prepared and served in the kitchen, and plates are directly delivered to patients.



**Figure 12: average food waste production in PCCC (Primary Community and Continuing Care, where long-term patients are treated) using bulk systems, acute hospital (treating short-term emergencies) in bulk system, and acute hospital with plated centrally systems**

The surveys highlighted the following findings (Figure 12):

- Both serving systems generate the same amounts of waste, yet there is a transfer between unserved food and untouched food between the bulk and the plated system.
- PCCC facilities generate less food waste in average, mainly because of some specificities of the acute hospitals: they tend to be smaller so food storage and orders are simpler, patients stay longer which allows the staff to develop a better knowledge of their eating habits, and the treatments provided has less impact on the presence of the patient and his appetite.
- The survey and assessments allowed the proposition of benchmarking elements:
  - Acute hospitals generate in average 0.83 kg/bed/day of food waste. The lowest ratio measured is 0.45 kg/bed/day;
  - PCCC hospitals generate in average 0.70 kg/bed/day of food waste. The lowest ratio measured is 0.24 kg/bed/day;



The GreenHealthcare plan also delivered recommendations for reducing food waste in hospitals:

- Food waste actions must be undertaken in collaboration with the nutritionist to ensure it does not affect the alimentation of the patients. When it comes to portion size, several good practices can be highlighted:
  - Some patients have less appetite (e.g. elderly patients) and tend to lose their appetite when presented with large portion. It is advised to provide them a smaller portion with possibility for refill.
  - Proposing different size options and communicating them effectively to the kitchen

- staff can help;
- Providing serving material that can help the kitchen or serving staff to better measure the portion size can be relevant (e.g. scoops for vegetables);
  - Food waste can be decreased with an improved communication:
    - Better communication with the kitchen when ordering the meals for the different wards;
    - Collecting feedback from the staff serving the food on eating habits and possible issues (e.g. types of food that is not eaten).
  - For bulk serving system, pre-portioning the food will help directing the right amounts in the wards and serve the right portions;
  - For canteens for the staff and the public, the general recommendations presented before apply.



#### 4.2.3.2 Catering in schools

BJURHOVDA SCHOOLS COMPETITION		Target group: collective catering in schools			
A competition to reduce food waste					
Location and time		Sweden, Västerås, 2011			
Type of target audience		Collective catering in Schools: pupils, teacher, canteen staff			
DESCRIPTION					
<p>The restaurant of the school started by assessing the daily amount of food wasted by the pupils, which turned out to represent 11 kg/day (about 2 t/y). To reduce these quantities, it was decided to launch a challenge for the 400 pupils, aged from 6 to 11 so that they reduce their food waste. Since children are the ones that put the food on their plate and that they cannot be ordered to finish their meal, it was decided to make them change their habits by themselves. The experiment lasted 4 months.</p>					
DETAILS ON THE COMMUNICATION ACTIVITY					
Type of communication activity		<p>The main communication activity was the contest: a transparent tube made by students in woodworking class was put next to the compost, and every day that less than 11 kg of food waste was produced, an equal amount of balls were put in the tube. At the top of the tube a sign saying “Kitchen Surprise” was displayed, but no explanation was provided. When the tube was full, a special event was organised and 500 cinnamon rolls were given in class by the headmaster and the kitchen staff.</p>			
Proximity with the target audience		<p>The approach was very direct and promoted direct engagement. The idea is to use a rewarding and fun system, as well as the mystery surrounding the purpose of the tube to get the pupils attention.</p>			
Key messages		<p>The key message was to reward the change of behaviour, by rewarding the children proportionally to their effort. Nobody told them how to reach their goal: the pupils found and shared solutions among themselves.</p>			
Communication channels		<p>The tube was the centre of the communication activity. The results were also presented on a whiteboard in the restaurant and reported via the school's internal radio every Friday to summarize the week.</p> <p>The campaign was then promoted on the website and via a 2 min film. The campaign received significant press coverage.</p>			
Who is voicing the message		<p>The message was conveyed by both the kitchen staff and the teachers. After the end of the campaign, it is worth noting that the children brought the message to their parents.</p>			

## RESOURCES ALLOCATED

No detailed information was provided on the allocated resources.

## RESULTS

Between the beginning and the end of the campaign, food waste was reduced by 50% (from 11 to 5.6 kg/day). It is worth noting that the changes were durable, as the food waste level are stable. Parents also reported that children tended to waste less food at home.

(Avfall Sverige, 2012)

## COLLECTING LARGE PRODUCERS

*Collecting various catering services*

**Target group:** collective catering



### Location and time

France, Brest, 2014-ongoing

### Type of target audience

Catering services: schools, universities, nursing home

## DESCRIPTION

In October 2014, to prepare the obligation of biowaste separation, experimentation was launched by Brest Métropole, the local authority in charge of waste management in the area of the city of Brest. It initially targeted 13 various catering services, from university restaurants to nursing homes. After having implemented on-site composting for smaller establishment, this solution was implemented for the larger producers (more than 400 meals/day) that are subject to a specific fee for residual waste.

## TYPE OF INCENTIVES



### Mandatory separation



### Communication



### Pre-collection equipment



### Reduced fee



### Controls

- **Mandatory separation** is one of the starting points, along with the specific fee charged to large producers benefiting from the collection service.
- **Communication:** the preparation phase is crucial. It consisted in a 3-month study consisting in establishing contacts and organising personalised diagnosis. The main recommendations were on the sorting guidelines and the necessity to avoid the presence of cleaning products or of food that were in contact with such product.
- **Collection equipment:** 140 l bins formerly used for mixed waste collection were provided, with a 80 l reducing bin limiting the weight of the full bins. Transparent plastic bags were also provided.
- **Reduced fee:** the special fee paid by the participant is reduced according to the sorted quantities, taking into consideration the savings on treatment costs; the costs are about 20% less important for biowaste than for residual waste.
- **Controls:** the use of transparent bags allows checking the presence of residual waste in the food waste when the bins are collected.

## RESOURCES ALLOCATED

The investment consisted in plastic bags (7,500 € for the first year). The sorting is left to the staff of the different participants. Collection is performed by two agents using a traditional collection truck, which were “saved” thanks to an optimisation of the municipal service.

Biowaste treatment is about 65 €/t

## RESULTS

In 2016, 16 units are collected, with a total quantity of 222 tonnes of biowaste that is sent to anaerobic digestion. The collected quantities are quite stable since the beginning of the experimentation. The experimentation is still on-going to adjust the service. The level of impurity is considered as low. Important seasonal variations occur, with almost no quantities collected in summer time (July-August), mainly due to the summer break. However, it must be noted that the fact biowaste are collected in bag makes the use of a deconditioning unit mandatory. It had to be improved to provide satisfying results.

Source: (Brest Métropole Océane, 2017)

Other good practices can be listed in a more concise way:

- **Exchanges with the guests:** discussions between the kitchen staff and the guests can help to identify reasons and solution against food waste. They can be materialised by regular meetings organised between the kitchen staff and a panel of guests (e.g. students or representatives of pupils’ parents) where menus are proposed, discussed and adapted. Such meetings were organised in the agricultural college of Bordeaux – Blanquefort, where different options were tested and rated. The results were then communicated to the other students to raise awareness on the efforts made. This allowed the kitchen staff to have a better understanding of the expectations of the guests (BIO Intelligence Service, 2012)
- **Changes of plates or of serving methods:** simple changes can contribute to decrease the share of food wastage: allowing guests to help themselves rather than proposing individual portions that might not be adapted to their appetite, serving smaller portions but allowing the guests to ask for a refill, or using flat plates instead of bowls, which helps to have a better appreciation of the served quantities and gives the impression that the portion are more important. For younger children, ensuring they spend sufficient time for their lunch can also help. This has been experimented in primary schools in Blanquefort, where it was measured that children spent between 6 and 8 minutes at lunch. After making it mandatory to spend at least 20 minutes, a decrease of 15% of food wastage was recorded (BIO Intelligence Service, 2012).



*Une assiette creuse traditionnelle.*



*La même quantité versée dans une assiette plate : il y a un excès manifeste de nourriture. Il faut donc servir moins de nourriture pour obtenir le même effet.*

© Eric Faget

**Figure 13: the same quantities of food served in a flat plate and in a soup plate (BIO Intelligence Service, 2012)**

- **Measuring and highlighting the wasted quantities:** this can be achieved through weighing

campaigns, or by displaying e.g. the wasted bread for one week in a transparent column. Organising visits of the kitchen after lunch time with students can also help highlighting the wasted quantities generated during each meal. (ADEME, 2013)

### 4.3 FOCUS ON DECENTRALISED COMPOSTING EXPERIENCES

Guidelines are available for the implementation of decentralised composting. As for biowaste collection, communication is a key element for the success of decentralised composting, and several elements must be taken into account to make it effective: the target audience, the key messages, who voices the message, and the communication channels that can be used. (ECCOVAL, 2012).

Decentralised composting schemes generally rely on a more intensive involvement of the participants, since in most cases the composting units are directly managed by the waste producers (the inhabitants, the staff of the catering service...). “Binding communication” can then be used, whose aim is to move from a positive attitude to a positive behaviour, and thus trigger the change of behaviour. In addition to traditional communication, whose goal is to bring a message to a given target audience, binding communication also involves:

- **Making the target audiences act**, by training them, making the act convenient and normalised, and giving meaning to the act;
- **Put the act in a more general perspective** to create a sense of community and of involvement to a greater cause, e.g. environmental benefits, but also job creation...
- **Monitor and highlight the positive impact** on participation and of the changes of behaviour.

Binding communication is more resource-consuming and cannot target a very large audience. It also requires preliminary communication activities to raise awareness on the issue at stakes and positively influence the attitudes toward composting. (ECCOVAL, 2012)

Decentralised composting systems generally rely on “master composters”, key residents or staff members that ensure that the composting process is properly managed. Ensuring a proper training for these master composters is essential for the strategy.

To promote decentralised composting, the communication and incentives can be very similar to traditional biowaste sorting. When considering existing guidelines (ECCOVAL, 2012) or cities that developed a decentralised strategy (Brussels, Besançon...), several common activities are promoted, such as the distribution of kitchen bio-bins, sorting guidelines and stickers... However, all of them emphasise practical demonstration and direct contact: participants are encouraged to assist to training courses or to be involved in the general management of the composting unit. For instance, participants in Brussels are asked to participate at least once a year to an activity on the composting unit (mixing the compost...) (WORMS A.S.B.L., 2017). This element is highlighted in the communication messages: participants are invited to participate in a community project at the scale of their district. The convivial aspect of community composting is often highlighted. Another key message of decentralised composting is its convenience: participants can empty their bio-bins whenever they want, while with traditional door-to-door biowaste collection, it is only possible to get rid of its biowaste on collection days. Compost is also distributed to the participants, as a concrete output of their sorting behaviours.

#### 4.3.1 Decentralised composting for household

Several documented practices of decentralised biowaste treatment for households were identified in order to analyse the communication and incentive systems set. The objective of this part is to



determine whether specific systems are applied to decentralised biowaste systems compared to centralised ones, and see how the decentralised character of these systems can be used to boost the participation and acceptance to the system.

**Table 4: overview of decentralised composting systems and its communication/incentive systems (Bruxelles Environnement, 2007) (ADEME, 2018)**

Case	Communication and incentives	Key factors of success
Collective composting in vertical housing (Limoges, France)	<ul style="list-style-type: none"> <li>Communication campaign targeting lessors and tenants through mails and information meetings</li> <li>Demonstration platform with training sessions on various composting techniques and compost use</li> <li>Partnership with co-ownership managers to identify voluntary tenants and make audits.</li> <li>Charter of commitment and supply of bio-bins</li> </ul>	<ul style="list-style-type: none"> <li>Continuous monitoring and training organised by the local authority</li> </ul>
Collective composting in a small village, involving tourists and restaurants (Ayen, France)	<ul style="list-style-type: none"> <li>Information leaflets distributed in tourists accommodations and panels next to composting units</li> <li>Several inspections per week by a technician</li> <li>Production of compost as a substitute for chemical fertilisers</li> </ul>	<ul style="list-style-type: none"> <li>Training and continuous information, especially for temporary staff and tourist</li> <li>Continuous monitoring of the composting units</li> </ul>
Collective composting in social housing (Ostende, Belgium)	<ul style="list-style-type: none"> <li>Information letter sent to inhabitants</li> <li>Information meeting</li> <li>Official opening of the site</li> <li>Leaflets presenting the project's objectives and sorting guidelines (accepted and forbidden waste, opening time and contacts)</li> <li>Continuous information in municipal journal</li> <li>Training of cleaning staff as master composters</li> </ul>	<ul style="list-style-type: none"> <li>Good involvement of the population, which leads to more social cohesion</li> <li>Flexibility of the system</li> </ul>
Collective composting in small vertical housing (Evergem, Belgium)	<ul style="list-style-type: none"> <li>Information meeting to inhabitants</li> <li>Master composters trained</li> <li>Information panel indicating sorting guidelines</li> <li>Sorting leaflets mailed to inhabitants</li> <li>Contact point designated among the residents</li> <li>Regular articles in municipal journal</li> <li>Mail sent to residents in case of problem</li> </ul>	<ul style="list-style-type: none"> <li>One resident as contact point allows a continuous control</li> <li>Master composter in charge of monitoring in exchange of the use of compost</li> <li>Flexibility: accessible all day</li> </ul>
Collective composting in social housing, low income area (Alost, Belgium)	<ul style="list-style-type: none"> <li>Invitation letter, district meeting, feedback, posters in buildings entrance, leaflets</li> <li>Panels with sorting guidelines and practical information on composting site</li> <li>Residents trained by master composters at some point for them to manage the sites</li> <li>Contracts signed with caretakers for managing the sites</li> <li>Meeting of caretakers with master composters every 2 months, then once or twice a year</li> <li>Promotion by caretakers during local parties</li> </ul>	<ul style="list-style-type: none"> <li>Use of the compost by shared gardens</li> <li>Synergies with socio-cultural centres</li> <li>Environmental and social impacts (social cohesions, reduction of illegal dumping...)</li> </ul>
Collective composting (Basel, Switzerland)	<ul style="list-style-type: none"> <li>Call for participation to interested residents, then signed convention</li> <li>Hotline open 10 hours per week to contact master composter (200 calls per month)</li> <li>Communication: website, brochures, posters...</li> <li>Words of mouth: most effective dissemination</li> <li>Communication campaigns with a tram transformed in education space</li> <li>Compost sold to inhabitants</li> <li>Main message: against apprehensions (smells, rats...)</li> </ul>	<ul style="list-style-type: none"> <li>Regarded as a relevant and ecological collection/treatment schemes, and free</li> <li>Training and material available from master composter</li> <li>Involvement of the residents</li> </ul>
Collective composting (Langenthal, Switzerland)	<ul style="list-style-type: none"> <li>Several events over the year</li> <li>"Compost box" for compost ambassador with posters, leaflets, contacts...</li> <li>Information boards on composting sites</li> </ul>	<ul style="list-style-type: none"> <li>Long dynamics (20 years): well established habits</li> <li>Open access</li> <li>Compost masters providing assistance</li> <li>Intensive communication on markets in March/April</li> </ul>
Collective composting (Zürich, Switzerland)	<ul style="list-style-type: none"> <li>Call for participation: residents can apply by contacting the compost master.</li> <li>Implementation process: find a group of volunteers, identify a location, identify participants, collect positive and negative arguments, approval by co-ownership</li> </ul>	<ul style="list-style-type: none"> <li>Most effective: word of mouth</li> <li>Regarded as a relevant and ecological collection/treatment schemes</li> <li>Social aspects as valued as</li> </ul>

	<ul style="list-style-type: none"> <li>organisation, opening and follow-up</li> <li>Promotion material: brochure, website</li> <li>Information board on composting sites</li> </ul>	environmental ones by residents
Collective composting in vertical housing (Rennes, France)	<ul style="list-style-type: none"> <li>Information on composting sites in the building entrances</li> <li>Promotion kit: presentation for info meetings, press file for opening of composting sites, demonstration sites, surveys to collect feedback, monitoring system</li> <li>Implementation process: contact with co-ownership organisation, involvement of gardeners from the start, definition of location, meeting, signature of convention and information letter to inhabitants, follow-up</li> </ul>	<ul style="list-style-type: none"> <li>Open access to composting sites</li> <li>Response time of supporting services: quick correction of problems</li> <li>Bi-yearly monitoring</li> <li>Cooperation between local authority and associations</li> </ul>
Collective composting in vertical housing, using closed vessels (Göteborg, Sweden)	<ul style="list-style-type: none"> <li>Concise sorting guidelines</li> <li>Use of compostable bags in paper</li> <li>Composting units in a common "sorting area" where 13 waste fractions can be sorted</li> </ul>	<ul style="list-style-type: none"> <li>Stimulation of social contacts</li> </ul>

When it comes to similarities in communication activities, messages, and factors of success, several elements can be highlighted:

- Training, master composters, and feedback to participants are generally used and regarded as good practices. The relative small scale of the systems makes direct communication a relevant instrument;
- Participants seem to value both the convenience of the systems (the possibility to bring biowaste whenever they want) and the social interactions created by the community projects;
- For many systems, the success relies on the active participation of residents, especially of the participants that are designed as contact points.

The main differences with centralised systems are connected with the smaller scale and more reduced numbers of participants, which create a more consistent community around the project, and provide a more concrete dimension to the sorting behaviours: participants interact more with the waste management system and directly see the outputs, from which they can benefit.

#### 4.3.2 Decentralised composting in schools

ADEME's OPTIGEDE platform gathers a significant number of factsheets focusing on experimentations on various topics, including on site composting and food waste campaigns. While it is not relevant to detail all these various experiences here, it is interesting to highlight common findings on the various potential target audiences.

For collective catering in schools, over 80 factsheets on on-site composting could be reviewed, both for primary and secondary schools. The level of information provided varies a lot depending on the actions, but several similarities are interesting to list, as well as instruments that could be identified as food practices. Many of these practices were developed within the framework of local or regional prevention strategies, meaning that a public authority initiated and coordinated the implementation, but in some cases the project was initiated by the school itself. The most common reasons for starting such a project are either environmental (reduce the share of residual waste, reduce food wastage, and make the school autonomous on food waste management), economic (reduce the waste fee paid by the schools, sometimes newly introduced), or legal (reach the quantitative target for waste prevention, mandatory biowaste collection for big producers...). The educational objectives were also very much highlighted.

When it comes to good practices, the following points can be listed:

- Most factsheets identified the **involvement of all players** (teachers, staff, and students) as

the key factor of success. Defining contact people in charge of ensuring the system works well is a key aspect. In many cases, both waste from meal preparation and leftovers were separated, and students were asked to sort the biowaste themselves.

- When it comes to communication, a **direct approach** is usually implemented, with meetings and trainings organised for the kitchen staff and teachers.
- Regarding the **changes of behaviours**, various actions are proposed to the different players: methods to adapt the cooked quantities for the cooks, serving the right portions for the kitchen staff, and on the value of food for pupils. Serving different sizes (small, medium, large) can also help reducing food wastage. Using the savings achieved by the reduction of waste to propose uncommon plates (locally-made ice-creams, exotic fruits...) is also an interesting way to reward the students.
- Pupils and students are generally actively involved through **very concrete actions**. Making them **sort wasted bread** or weigh the wasted quantities can highlight the significance of food wastage in a very concrete way. Activities around composting are also relevant, such as the study of insects in the composting unit, or the use of compost in educational gardens to highlight its benefits of sorting biowaste. They can also be motivated through small contests with prizes. In several practices, small groups of students were also involved in awareness raising activities and composting.
- On-site composting can be used as an **educational tool**, e.g. for biology class.
- **The beginning of the action** is a crucial step and requires a special attention: the effectiveness and the quality of the separation must be monitored and errors quickly corrected. Many implementations were conducted after an initial diagnosis allowing an in-depth analysis of the organisation of both the kitchen and the lunch room, and a closer assessment of the avoidable and non-avoidable quantities.
- Several cases consisted in **the establishment of a network of participants**, with the implementation of extranet and online platform for them to share information and good practices. Relying on participating schools to convince and involve new ones is also an interesting instrument.



**Figure 14: "waste metre" for bread, used to highlight bread wastage in a school (credits: Lamballe Communauté)**

Most actions were implemented in schools where the meals were prepared on-site. It is possible to implement actions on schools that directly receive prepared meals as well, yet in this case it is more effective to involve the contractor in charge of meal preparation as well.

Finally, most case studies highlighted the fact that flexibility is required when working with catering services, since every establishment has its own organisation and the staff members are all different.

#### **4.3.3 Decentralised composting in administration and restaurants**

Fewer examples on collective catering in offices or in restaurants could be identified. The following good practices could be identified:

- The importance of the preparation phase and of the first weeks of implementation, to ensure a proper training, adapted equipment and organisation, and quick correction of first sorting

mistakes;

- The relevancy to highlight participating units and rely on their expertise and experience in order to voice the messages on convenience and benefits. Setting a pilot site acting as a demonstration site is a relevant option.
- The importance of promoting the behaviour of participating waste producers to the general public.

#### 4.3.4 Conclusions on communication for decentralised systems

The different case studies reviewed here tend to show that the decentralised systems can be considered as an advantage when it comes to promote source separation of biowaste, regardless of the type of waste producer. The main opportunities identified in the case studies are quite close to the ones highlighted in the general guidelines, presented at the beginning of this section. They are:

- The very **concrete illustration of the positive outcome** of source separation: waste producers can easily see the destination and use of their sorted biowaste. Links with local garden (shared gardens, educational gardens in schools) makes it even more telling for participants.
- The **smaller scope of the systems** allows establishing more direct contacts with the various stakeholders, enabling to organise meetings and site visits, or to create networks allowing the exchange of good practices. This can also contribute to create a sense of community and make the contribution more concrete.

Therefore, it seems essential to capitalise on the decentralised aspect of the DECISIVE system to engage more actively the various stakeholders.

### 4.4 CROSS ANALYSIS OF THE DIFFERENT FACTSHEETS

The cross analysis of the various case studies tends to show the same findings as the general guidelines, namely:

- Good performances can be achieved thanks to a combination of instruments; legal obligations and PAYT systems are particularly effective;
- The importance of direct communication, especially when it comes to the catering sector;
- The importance of the preparation and first weeks of implementations, to ensure that pre-collection and collection is well organised, and to bring quick responses to any problem (nuisance, impurities...).

The review of existing practices allowed the collection of data regarding the performances achieved thanks to various incentives and communication methods. A cross analysis allowed to identify benchmarking elements regarding the potential impact of various instruments on performances. However, it must be noted that there is a significant share of uncertainties, since the documented actions generally focus on different instruments at once; moreover, the starting situations are not always the same. The bigger the performances are, the more challenging it is to improve them. Moreover, the context can make high performances more challenging to reach, such as very high density and vertical housing, where ensuring a high participation and a proper quality is more challenging than in single housings.

Based on the data collected and the highlighted good practices, a list of benchmarking values is proposed here. These values focus on the three main target audiences: households, commercial

catering, and collective catering, and focus on the following elements:

- **Capture rate**, which is the share of separately collected biowaste compared to the total generated quantities;
- **Impurity rate**, e.g. the share of unwanted waste fractions within the biowaste stream;
- **The potential impact of various types of instruments** (communication and incentives) on both capture rates and impurity rates.

The sources and references of the proposed values will be explained as much as possible, as well as any factor that might affect their relevancy (such as the scope of the data that might be limited to a given area).

The main objective of this benchmarking exercise is to provide input for the upcoming D6.4: “Report on the simulation of the implementation of the methodology in different types of locations”, within the framework of activity 6.1.5, for which a simulation of the application of the DECISIVE methodology will be carried out on 10 selected territories; the collected benchmarking elements will contribute to the establishment of these scenarios by providing assessment for the potential effect of various communication and incentive methods.



#### 4.4.1 Households

The data presented here focus on household food waste collected either door-to-door or in bring banks.

Name of the indicator	Value	Recommendation regarding its use	References
<b>CAPTURE RATE</b>			
Capture rate, door-to-door scheme, food waste included	Average value: 40% (range: 13-85%)	<p>The data presented here comes from the analysis of 51 territories, mainly medium to big cities. It is important to note that:</p> <ul style="list-style-type: none"> <li>Various other factors can impact the capture rate (the scope of collection, the share of the population covered...)</li> <li>Biowaste collection with bring banks is much less represented within the 51 documented territories. The presented data are only based on 2 cases.</li> </ul>	Comparison of 51 territories (source of the data: (Regions for Recycling, 2014), (ACR+, 2017), (ACR+, 2017), (Bipro, 2015))
Capture rate, door-to-door scheme, garden waste only	Average value: 18% (range: 1-50%)		
Capture rate, bring bank scheme, food waste included	Average value: 34% (range: 21-47%)		
Potential impact of the collection of similar waste on collected quantities	About 30% of municipal biowaste is commercial biowaste	Data from medium to big cities, might differ depending on commercial activity and scope of municipal waste collection	(ACR+, 2017) (Compost Plus, 2015)
Impact of <b>PAYT or sorting obligations</b> with fines: <i>Capture rate with PAYT or strong sorting obligations (food waste included)</i> <i>Capture rate without PAYT or strong sorting obligations (food waste included)</i>	<i>Average value: 47% (range: 16-85%)</i> <i>Average value: 28% (range: 1-51%)</i>	The data presented here comes from the analysis of 51 territories, mainly medium to big cities. PAYT can be implemented in different manners, with variable impact.	Comparison of 51 territories (source of the data: (Regions for Recycling, 2014), (ACR+, 2017), (ACR+, 2017), (Bipro, 2015))
Impact of a <b>reduced residual waste collection</b> <i>Average capture rate, biowaste collection</i>	+50% of sorted quantities  <i>Average: 30%</i>	<p>Little quantitative data could be found for this indicator. This is based on the Ealing Borough 's experience</p> <p>Based on the available data for 30</p>	<p>(ACR+, 2017)</p> <p>Comparison of 51 territories</p>

frequency lower than for residual waste Average capture rate, same collection frequency	Average: 40%	cities. It must be noted that collection frequencies might vary within the same city. The number of cities for which biowaste collection frequency is higher than for residual waste is quite small, making the value uncertain	(source of the data: (Regions for Recycling, 2014), (ACR+, 2017), (ACR+, 2017), (Bipro, 2015))
Average capture rate, biowaste collection frequency higher than for residual waste	Average: 60%		
Impact of direct communication campaign on biowaste collection, including regular controls	+30% of participating inhabitants	This will depend on the initial participation. This was observed starting from an average participation rate	(Compost Plus, 2015)
<b>PREVENTION OF FOOD WASTE</b>			
Share of avoidable food waste within total food waste generated	European average: 60%	Data were collected at national level for 9 Member States, with much variation (from 25% to 60%, with an average around 50%). Using local composition analysis might give more accurate results.	(Bio Intelligence Service, 2010)
Potential impact of a food waste prevention campaign	Overall: -15 to -20% of food waste reduction For participating households: -50% is achievable	Few food waste campaigns present quantitative results. Results might vary depending on the intensity of the communication campaign	(WRAP, 2012) (WRAP, 2013) (ADEME, 2018)
<b>MACRO-IMPURITIES</b>			
Average macro-impurity rate, door-to-door scheme	5%	Data were collected from 23 countries, regions and cities	(ACR+, 2017) (ACR+, 2017) (Bipro, 2015)
Average macro-impurity rate, bring bank scheme	14%		
Impact of a regular control of impurities during collection	The cities for which a control system was reported indicated impurity rates below 5% Lower rates can be achieved with continuous control (below 2%)	Little data was found regarding controls systems. Controls are believed to be conducted by many cities, with variable effects and responses.	DECISIVE waste database + (Waste Management World, 2014) (Compost Plus, 2015)
Impact of the use of compostable bags	From 9% impurities to below 2%	These figures were recorded in different cases in both in Catalonia and in Italy	DECISIVE database (Waste Management World, 2014)

#### 4.4.2 Commercial catering and restaurants

Name of the indicator	Value	Recommendation regarding its use	References
COMPOSITION			
Total food waste generation	150 – 350 g/meal Average around 200 g/meal	Produced quantities can vary much depending on the restaurants. “Fine dining” restaurants for which there is much more food preparation tend to generate more (300-400 g/meal) than take away restaurants	(ADEME, 2013) (Moulinot Compost & Biogaz, 2015) (WRAP, 2013) Norden
% of food waste generated by food preparation	Average: 45 – 55 %	The shares of the various types of food waste also depend on the type of restaurant, with more preparation waste in “fine dining” restaurants and more losses in places where pre-processed food is proposed	SYNHORCAT WRAP Where food waste arises within the UK hospitality and food service sector (Norden, 2012)
% of food losses in the kitchen	Average: 10 – 20 %		
% of food waste generated by guests	Average: 35 – 40 %		
CAPTURE RATE OF FOOD WASTE			
Average capture rate, total food waste	75% of total food waste (range: 50% - 90%)	The capture rate will depend on whether all the categories of waste (especially if food waste from guests is sorted or not. If not, the average is close to 50%).	(ADEME, 2013) (Moulinot Compost & Biogaz, 2015) (WRAP, 2015) (Verdicité, 2014)
Potential capture rate following staff training	85%	This will depend on many different parameters, including the motivation of the restaurant, the starting point...	(WRAP, 2015)
PARTICIPATION RATE FOR SOURCE SEPARATION			
Average participation rate of restaurants (number of restaurants performing source separation divided by the total number of restaurants), no incentives	10% (range 0-20%)	The participation rate in absence of strong incentives is difficult to foresee. It might depend on the existence of programmes or communication activities promoting it. If restaurants are collected by the public service with no PAYT system and no	(ADEME, 2013) (Verdicité, 2014) (WRAP, 2011)

		biowaste separation, it is likely that participation will be very low. The existence of a municipal biowaste collection will favour the existing participation.	
Average participation rate of restaurants, PAYT or legal obligation	75% (range 60-90%)	The results of strong incentives will depend on the enforcement of the PAYT and legal obligation, as well as the available solutions for separate collection of biowaste. The identified data are assessments based on actual case studies, whose representativeness could not be identified.	(ADEME, 2013) (Verdicité, 2014) (Bin2Grid, 2016)
<b>PREVENTION OF FOOD WASTE</b>			
Share of avoidable food waste generated in the kitchen (waste from preparation and losses)	25% of total food waste generated in the kitchen (range: 15 – 40%)	Losses in kitchens depend on the share of pre-processed food used and the general management of food.	(Moulinot Compost & Biogaz, 2015) (WRAP, 2015)
Share of avoidable food waste from guests	95%	Little data could be found on the share of food waste that cannot be avoided (mainly bones and fishbone). It might be very different in specific places, such as seafood restaurants.	(Moulinot Compost & Biogaz, 2015)
Potential for the decrease of total food waste	20% (average)	This average is based on various case studies with different types of actions (proposing new menus, take away bags for the leftover, training).	(ADEME, 2013) (ACR+, 2013) (ADEME, 2018)
<b>MACRO-IMPURITIES</b>			
Average impurity rate, food preparation	< 3% impurities	Little quantitative data could be found on impurity rates from restaurants. The main issue comes from single-use packaging used by guests.	(Moulinot Compost & Biogaz, 2015) (ACR+, 2014)
Impact of a regular control of impurities	No elements could be found on this issue.		

#### 4.4.3 Collective catering (Hospitals, schools, companies)

Name of the indicator	Value	Recommendation regarding its use	References
COMPOSITION			
Production of total food waste	Average: 185 g/meal Range from 125 to 300 g/meal  Average for hospitals: 650 g/bed/day Average for school: 100 g/registered_student/day (range: 40-190) Average for offices: 130 g/meal	Total food waste production depends on several factors: the type of establishment (For instance, ADEME reports more food waste in university canteens due to more changes in the number of guests due to internships, exam periods, and students changing plans). How the food is served has an impact: self-service generates less waste while service in rooms (in hospitals) generates more. In general, important variations can be observed from one establishment to another.	(ADEME, 2016) (ADEME, 2013) (Norden, 2012) (WRAP, 2013) (WRAP, 2011)
% of food waste generated by food preparation	Average: 25% of total food waste (range: 10-40%)	Food losses tend to be lower for self-service and when food is prepared on-site. “Losses in the kitchen” refers to food that could not be served (surplus, not chosen by guests) and that has to be disposed of.	
% of food losses in the kitchen	Average: 30% of total food waste (range: 25-35%)		
% of food waste generated by guests	Average: 50% of total food waste (range: 40-60%)		
CAPTURE RATE OF FOOD WASTE			
Average capture rate, total food waste	75% (range 60-90%)	The reviewed data displayed overall good capture rates, quite similar to restaurants. The most challenging part will be to capture guests’ food if they are asked to sort their waste.	(ADEME, 2013) (Verdicité, 2014) (WRAP, 2011)
Potential capture rate following staff training and awareness raising actions targeting guests	85%	This will depend on many different parameters, including the motivation of the collective catering service, the starting point...	(WRAP, 2015) (WRAP, 2011)



PARTICIPATION RATE FOR SOURCE SEPARATION			
Average participation rate of restaurants, no incentives	20% (range 0-40%)	Depending on the local/regional waste strategies, several schools might be involved in source separation or on-site composting if it was promoted to them and possibly with financial aids for investments. The existence of a municipal biowaste collection will also favour the existing participation.	(ADEME, 2013) (Verdicité, 2014) (ADEME, 2018)
Average participation rate of restaurants, PAYT or legal obligation	75%	The identified data are assessments based on actual case studies, whose representativeness could not be identified.	(ADEME, 2013) (Verdicité, 2014)
PREVENTION OF FOOD WASTE			
Share of avoidable food waste generated in the kitchen	Average: 50% of food waste generated in the kitchen (range: 40-80%)	The losses in the kitchen are mainly composed of meals that were prepared and not served. They tend to be lower if the food is prepared on-site	(ADEME, 2016) (ADEME, 2013) (Norden, 2012) (WRAP, 2013)
Share of avoidable food waste from guests	95%	The data found for the restaurants is used here. It is assumed that most food waste generated by guests are avoidable	(Moulinot Compost & Biogaz, 2015)
Potential for the decrease of food waste	Average: 30% (Range: -15 to -80%)	Several documented food waste prevention actions (awareness raising, reduction of served portions, better management of food...) targeting either kitchen waste or guests' waste presented different results, most of them ranging from -20 to -30%.	(ReFED, 2018) (Norden, 2012) (ADEME, 2013) (GreenHealthcare, 2014) (BIO Intelligence Service, 2012) (MEAD, 2017)
MACRO IMPURITIES			
Average impurity rate, total food waste	Average: 5% impurities (Range: 1-10%)	Very little quantitative data could be identified for collective catering. Reports tend to indicate low levels of	(WRAP, 2011) (ADEME, 2018) (ACR+, 2014)

		impurities in businesses and primary schools where children are more supervised, but more difficulties in secondary schools where more responsibilities are given to students. A specific case displayed a 30% impurity rate due to low involvement of the kitchen staff.	
Impact of a regular control of impurities	No quantitative data could be found on the decrease of impurities following corrective actions (mainly monitoring sorting made by guests).		

It is important to keep in mind that there is a share of uncertainty for the presented data. The possibility to apply them to any situation is unsure, since they are average values of data that could be identified. When performing simulation, it is recommended to look for local or regional available data before resorting to average values.

## 5. Recommendations for the pilot sites: taking into account targets and context / based on cross analysis

### 5.1 RECOMMENDATIONS FOR THE COMMUNICATION TOOLS AND INCENTIVES

The previous sections allowed the identification of good practices regarding the communication tools and incentives used to promote food waste prevention and separation. The recommendation will focus on the primary targets of both demonstration sites, e.g.:

- For the Lyon case: the commercial restaurants and collective catering services, focusing on vegetal waste from meal preparation;
- For the UAB campus: the collective catering services on the campus, including all types of food waste.

#### 5.1.1 General recommendations

Some of the recommendations can be applied to both case studies:

1. **Direct communication and training** is generally mentioned as essential in guidelines or report on good practices. Meeting the manager to present the project and the chefs for the practical organisation are generally mentioned as the first steps of the implementation for source separation. Staff training is generally left to the restaurants, yet it seems important to encourage the restaurants to foresee this with an internal meeting before the start of the collection.
2. **The importance of the preparation phase:** when it comes to restaurants and collective catering, every situation is specific when it comes to internal organisation and constraints (e.g. size, time...). A proper preparation might take some time and resources, but it can save some time afterwards by preventing improper sorting, misunderstanding and nuisances. The preparation phase can include an assessment of the produced quantities (e.g. analysing the avoidable fraction). Its aim is mainly to organise the pre-collection in the kitchen, the location of the sorting bins, how these bins are emptied in the biowaste containers... It is also the occasion to assign people as contact points for the selective collection.
3. **Relying on existing experiences and “peers” to convince or highlight the benefits:** restaurants can be reluctant to implement biowaste separation for various reasons: concerns about the time and resources needed, constraints of space, fear of odours... They might also be sceptical about the benefits they can get from the implementation. Previous experiences tend to show that the messages can be easier to receive if they are voiced by other restaurants sharing the same constraints. Organising meetings where a restaurant already participating explains the practical organisation and highlights the results, as well as costs and benefits, can be more telling.
4. **The importance of the first weeks of implementation:** despite the preparation phase, most documented practices reported the need to adapt the source separation and collection organisation, and correct possible mistakes. A closer monitoring system has to be set, especially for the impurities (during source separation, collection, and at the reception at the

treatment plant). It is also important to be very responsive if any problem arise (e.g. if the pre-collection or collection equipment is undersized). These first weeks of source separation are important to carefully monitor since any significant inconvenience (bad odours, leaks, flies...) can convince the waste producer to quit source separation.

5. **The importance of continuous monitoring of quality:** quality is a key requirement for the DECISIVE system, for which pre-treatment options are limited. A continuous monitoring of the sorted biowaste has to be implemented, possibly at different stage:
  - At the source separation level: depending on the chosen organisation, some staff members can be asked to regularly check the content of the biowaste bin. In some cases, it was reported that the dishwashing staff check the content of the food waste put in the bin by the waiters when bringing back the plates.
  - The use of transparent bags can help ensuring a continuous monitoring of the sorting stage.
  - Monitoring the content of the container before collecting it is a mandatory step. If the quality is improper, it is advised to either refuse the bin or collect it as residual waste.
  - Monitoring the content of the container before treatment and reporting mistakes to the waste producer.
6. **Follow-up:** ensuring a proper follow up is important, not only on the impurities. Providing feedback on the results and achievement, inviting the waste producer to a visit of the plant to show the produced outputs... can help keeping the interest and providing some meaning to the sorting behaviours.
7. **Promote the waste producers' behaviour and contribution to its clients:** providing visibility to the restaurant participating to the system is a good way to show recognition. However, it is advised to avoid referring to waste and waste management (at least visually) to the guests, as it can be regarded as deterring in a restaurant. Focusing on the energy production, the bio-products, and the food produced thanks to the participation to the DECISIVE system, or displaying the participation on the receipt, can be a better option.
8. **Take advantage of the “decentralised” character:** the very local aspect of the system gives the opportunity for every player of the value chain to meet and know about each other. Organising an event where the different players (waste producers, collection operators, treatment operators, and users of the organic by-products) can meet and share their role and position within the system can contribute to create a sense of community, understand the impact of unsustainable behaviours, and give meaning to their participation.

### 5.1.2 Acceptability and promotion of the system

As presented in this report, biowaste treatment can be negatively perceived by the neighbours, who can be afraid of possible nuisances, or a decrease of their property value. Decentralised systems such as collective composting units are generally well accepted, yet they are generally smaller than the foreseen DECISIVE mAD units, and the direct participation of residents in their operation help with their acceptance.

To reduce the risks linked with public acceptance, transparency is regarded as one key element. Regarding the DECISIVE system, the following recommendations can be given:

- **Meet the closest neighbours** of the treatment plant to present them the project: how it will be run, what are the outputs, what purpose it serves. It is important to present these elements
- **Invite the neighbours** to a presentation of the plant can help making it more concrete. It also contributes to promote the transparency of the system to the general public;
- When it comes to nuisance, odours are the most potentially damaging. Ensuring a **proper management of odours** is very important, as well as **providing a possibility to the neighbours to report any inconvenience**.

When it comes to the promotion of the system to local stakeholders, it is important to map and prioritize the various local players according to their possible interest as well as their potential influence on the system. Public authorities, local NGOs, and catering federations can be regarded as relevant stakeholders to be targeted.

### 5.1.3 Case-specific recommendations

The situation and targets of the demonstrations sites are specific; therefore some more detailed recommendations can be formulated.

#### 5.1.3.1 Lyon

The choice of focusing on waste from preparation makes the implementation simpler. The analysis of case studies tends to show that waste from preparation is easier to sort out compared to waste from the plates, for which they might be less time to do a proper sorting, or that can be mixed with impurities. It also means that the communication/incentives efforts can be focused on the kitchen staff.

When it comes to communication and incentives for the Lyon case, one of the main challenges is to “recruit” waste producers and make them separate their biowaste. One of the challenges is that there is apparently little to no incentives to sort their biowaste. Considering the case studies reviewed for this report, the two main drivers to start source separation of biowaste in restaurants or collective catering is a legal obligation (with possible fines in case of non-compliance) and an economic reason (mainly a charging system making residual waste collection less viable than biowaste collection). While the environmental benefits might be relevant to some of the waste producers, it could prove to be insufficient if the extra costs are significant. The example of the Paris pilot project, where about half of the participants decided to stop source separation when they were charged for biowaste collection, is quite revealing.

When it comes to the recruitment of new participants, the following recommendations can be formulated:

- Focusing on the waste producers that are subject to the legal obligation of recovering their biowaste, i.e. producing more than 10 t/y of biowaste;
- Identifying possible incentives by meeting relevant public authorities, mainly Grand Lyon and Région Auvergne-Rhône-Alpes:
  - Grand Lyon mentioned the possibility to introduce a special fee for non-household producers in order to improve the management of similar waste, which could provide a significant incentive.
  - Région Auvergne-Rhône-Alpes is managing the Regional Waste Strategy, for which biowaste is supposed to be one of the priority waste fractions, according to the

regulation. Identifying possible subsidies to help waste producers introducing selective collection of biowaste;

- Relying on the two restaurants to design the key messages, mainly:
  - How to highlight the benefits of joining the project;
  - How to lift possible fears when it comes to the internal organisation and costs (also in terms of time and staff), e.g. by listing the potential issues and the associated arguments;
  - How to effectively train the staff and provide practical information for the sorting guidelines.

#### 5.1.3.2 Catalonia

The Catalanian pilot site presents several favourable elements for the implementation of the system, and the first contacts made with the first participants are quite positive. It will be important to ensure the proper implementation of these first experiences to fine-tune the general organisation and collect data that can be used for replication. A successful and demonstrative first implementation will be very useful to convince the other restaurants in joining the system and will facilitate the preparation steps of the next participants. The first communication efforts will therefore have to focus on ensuring this smooth implementation by providing the right practical information to the sorting staff.

An important aspect of this implementation is **whether or not the guest will be asked to sort their waste**. Waste generated by the guest can represent a significant share of the total food waste (up to 2/3 according to the collected data). If it is decided that guests have to sort their food waste when bringing back their plates, a significant communication effort will have to be done to disseminate the sorting guidelines and ensure the proper sorting, especially during the first weeks of implementation.

When it comes to collective catering, one of the key elements of success is the involvement of all players, according to the review of good practices. Another important element is the designation of at least two contact points among the staff to manage the proper implementation of the source separation. It is important to ensure that the role is given to someone else, should one of the contact points leave.

Finally, the specificity of the system implemented on the UAB campus is the relatively small geographical area, which can be regarded as an opportunity when it comes to communication and the engagement of the various players. This can contribute to:

- **Establish a network of participants:** it is possible that the different restaurants on the campus are already connected and collaborating on other issues. Taking advantage of the possible existing dynamics to help them exchange on their practices, challenges, and solution could be relevant. Otherwise, giving the possibility for contact points to be in touch (either by sharing their contact details, by creating a dissemination list, or by setting an online platform) is a valid option.
- **Use the shift from the centralised system to a decentralised system as a way to make separate collection more concrete and meaningful:** insisting on the local treatment, but also and especially on the use of the output (energy and organic products) on-site. Organising meetings bringing together the various players of the value chain (from waste producers to users of by-products) can contribute to this.



## 5.2 CONTENT OF THE COMMUNICATION AND KEY MESSAGES

### 5.2.1 Reduction of food wastage

Even if ensuring a proper supply of biowaste to the mAD plant can be considered as one of the primary target of the communication tools and incentives, it is important to regard food waste prevention as the priority of the overall strategy. Striving for the reduction of food wastage is necessary for the consistency of the DECISIVE approach (considering the environmental impact of food wastage and the sustainability of the system); it is also in the interest of waste producers to limit food wastage as much as possible, especially when it comes to financial losses.

While it is not foreseen to provide assistance to the waste producers regarding the reduction of food waste, a section on the possible importance and relevancy to reduce it could be proposed in the sorting guidelines. Such section would highlight:

- Some average value on the importance of the avoidable food waste production in restaurants and/or collective catering, along with the associated impacts, and financial losses;
- A short list of possible actions to reduce food waste (adaptation of portions, choices for the side dishes, changes in the serving methods...) along with links toward existing guidelines.

For collective catering, an interesting way to raise awareness of the guest on food wastage is to highlight its significance, either by reporting the waste quantities or by displaying e.g. daily wasted breads.

### 5.2.2 Practical information and sorting guidelines

Regarding the very practical information, it is important to focus on the concrete information that the people in charge of sorting the waste needs to know, i.e.:

- What type of waste can be sorted?
- What bin has to be used for biowaste, and what bin for residual waste?
- What are the unwanted fractions and how to avoid impurities?

It is recommended to provide this information directly to the people in charge of waste sorting. It can be left to the restaurant's manager or chef, taking advantage of an internal meeting. It is also important to train new staff members to avoid any mistakes.

In addition, the sorting guidelines must be reminded where the sorting occurs, so next to the bins. A poster displaying mainly images of the most common waste to be sorted (peelings...) and a picture of the associated bin to be used is recommended. Stickers to be put on the sorting bins (e.g. displaying "biowaste separation" with a picture of biowaste) can also be used.

If the guests have to sort their food waste, the same approach can be used as for the posters to be displayed next to the sorting bins, with possibly an extra poster for mixed waste. However, it might be relevant to promote the action as a whole beforehand, e.g. by handing over flyers presenting the overall system and introducing biowaste sorting (how they will have to do it, when it will start). Posters presenting the same types of information could be displayed at the entrance of the restaurants or in waiting lines, if any. Ensuring that the guest is aware of the new sorting systems and the reasons why it is implemented before reaching the sorting stage is important

Finally, as mentioned above, a closer monitoring of the sorting habits and presence of impurities has to be implemented in the first days of the sorting, with corrective action. If guests have to sort their

food waste, a possibility is to position someone next to guests' sorting bins to explain the new sorting guidelines and ensure this is done properly.

### **5.2.3 Motivation for waste producers: key messages**

As mentioned previously, legal and financial incentives can be regarded as key drivers to promote source separation. However, the options to take advantage of these drivers seem rather limited for both demonstration sites.

According to the analysis of decentralised system, the decentralised character of the DECISIVE system can be regarded as an advantage when it comes to communication: it can make source separation more meaningful and concrete for waste producers and makes the overall system more comprehensive. As mentioned previously, referring to the local character of the treatment and recovery of both energy and organic products is believed to contribute to the motivation of waste producers. In general, explaining the big picture and not focusing on the sole role of the waste producers is recommended.

As mentioned previously, different messages can be used to promote the system. They have to be selected according to the targeted audience and its interest. These main messages are:

- The reduction of the residual waste quantities;
- The environmental impact of food wastage and improper management ;
- The general benefits of organic recovery, including organic recovery and local jobs;
- The financial benefits linked with food waste avoidance;
- The innovative character of the DECISIVE system...

It is therefore recommended to couple these messages with concrete examples of benefits for the concerned case study.

Choosing other people to voice the message on benefits can be beneficial for its credibility. For instance, having one manager of a participating restaurant explains how he implemented the systems, how he overcame difficulties, and what benefits he gained from this implementation will be more telling and more credible to another restaurant. Likewise, training several students to explain and promote the message to their classmates will contribute to adapt the message so that it can be better received and understood.

Finally, taking advantage of the local character of the system and organising a study visit of the plant can contribute to make the participation of waste producers more meaningful and help them understand the sorting guidelines (e.g. why impurities are detrimental to the process and the quality of organic outputs).

### **5.2.4 Promotional and acceptability**

The first communication action when it comes to the acceptability of the plant is to meet the direct neighbour to present the project to them. This can be done through direct contact or by organising a public meeting. Involving the municipality for the dissemination and organisation of the event can help getting the general public's attention. During a meeting the various players involved in the project (waste producers, operators of the collection and treatment, users of by-products) can be invited to explain their roles and motivations and detail the expected benefits they will get from the system. A Q&A session has to be foreseen as well. The video presentation of the project can be a good

introduction to quickly present the main benefits and concepts behind the system.

Announcing the launch of the system is also recommended, by issuing a press release and possibly organising a press conference. Like with the information meeting, inviting all relevant stakeholders and interested organisation (the public authorities, local NGOs...) could be interesting. Conveying the collaborative approach where all the different players contribute and get benefits from the new system is important to demonstrate how the project contributes to locally shift toward a more circular economy. While food waste might be regarded as the starting point of the project, it is important to highlight other aspects: the production of bio-products, the importance of local food production and energy production.

When the site is properly running, it is recommended to propose visit of the plant, to present the general organisation and the use of the by-products. The visit can be preceded by a short presentation of the project and the overall systems. Different target audiences can be targeted: local residents, schools, biowaste producers (participating or not)...

When a first assessment of the system is available, it is important to promote the system's results and positive impact, highlighting different elements:

- Number of participating waste producers
- Quantities of waste collected / diverted from disposal
- Quality of sorted material...
- Energy produced (with equivalent to make the figure understandable, e.g. the corresponding of households that could have been supplied by the produced energy)
- Quantities of bio-products produced, possibly with the qualitative impact and the quality...

The results can be promoted through various ways: a dedicated page on the website, an email send to the main stakeholders, or a poster to be displayed in key location (participants' premises, public buildings...).

### 5.3 FIRST PROPOSITION OF COMMUNICATION MATERIALS

This part will list a proposition of communication materials to be produced for the pilot. Based on these propositions, the communication materials will be adapted to the local situations and final organisations of the demonstration sites and designed by the partners in charge of the sites, with the support of ACR+.

#### 5.3.1 Practical information

The following communication materials are proposed when it comes to practical information:

- **Sorting guidelines:** this consists in a booklet that will be handed over to waste producers joining the project. The following content can be proposed:
  - General presentation of the project and the local DECISIVE system, along with the objectives and associated stakeholders;
  - A scheme presenting how the system will close the loop, from waste producer to the treatment system to food production, back to waste producers;
  - Practical information on the sorting organisation: what fractions are sorted, what impurities have to be avoided, and the sorting equipment;

- Contact details.
- **Sorting leaflets for guests:** they should display on one or two pages very concise information on the sorting guidelines to be introduced (what fractions to be sorted, how) and the reason why this new sorting system, by displaying the local DECISIVE system and its benefits.
- **Sorting posters:** their content must be as concise and as visual as possible, with two key elements: what must be sorted, and in what bins the biowaste has to be put. They have to be adapted to the sorting guidelines and displayed where the sorting actually occurs.
- **Stickers** on pre collection bins / collection containers: again, they must be very visual and informative, e.g. “Sort the biowaste here” or only “biowaste”, along with a picture or pictogram (e.g. an eaten apple...) displayed.

### 5.3.2 Promotional material

The following communication materials are proposed to promote the action:

- **A dedicated webpage** to present the system and updates on results/news;
- A PowerPoint presentation to present in a few slide the system, with the same content than the sorting guidelines, with a few more slides on results when the first data can be collected;
- **A general poster** to promote the action, highlighting the “closing the loop” approach, the collaborative method, and the expected/actual results;
- **A poster** promoting the involvement of the waste producer to the guests. Displaying food waste might not be appropriate here, it is recommended to highlight the positive impact of the waste producer’s behaviour, e.g. “by sorting its biowaste, we have contributed to produce XXX quantities of thermal energy/ xxx quantities of fertiliser ... The same type of poster can be used for guest of collective catering, e.g. by leaving a blank space where the restaurant can display the sorted quantities over a given period and the associated benefits;

### 5.3.3 General recommendations

The design of the communication materials will be up to the partners in charge of the demonstration sites. The following recommendations and requirements are reminded:

- Use DECISIVE visual identity to make the overall communication consistent;
- The acknowledgement of EU funding has to be displayed, taking into account the requirements listed in DECISIVE communication strategy;
- Every partner involved in the demonstration sites have to be acknowledged, for instance by displaying their logos;
- Communication materials have to rely as much as possible on pictures, infographics (pictograms), and visual elements to make the message more appealing and cleared to the various target audiences.

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## Disclaimer

The content of this report does not reflect the official opinion of the European Union.

