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Analysis of the current development of household UCO collection systems in the EU

23rd May 2016

ewaba

European Waste-to-Advanced Biofuels Association

Preface by the European Climate Foundation

In December 2015, world leaders agreed a new deal for tackling the risks of climate change. Countries will now need to develop strategies for meeting their commitments under the Paris Agreement, largely via efforts to limit deforestation and to reduce the carbon intensity of their economies. In Europe, these climate protection strategies will be developed via the EU's 2030 climate and energy framework, with a view to ensuring an integrated single market for emissions reduction technologies.

Existing EU energy policy for 2020 foresees an important role for bioenergy as a means of reducing carbon emissions from heating, power, and transport, and yet there are concerns that this has led to a number of negative consequences related to the intensification of resource use. If bioenergy is to continue to play a role in EU energy strategies for 2030, it seems wise to learn from the past to ensure that this is done in a manner that is consistent with the EU's environmental goals, including the objective of limiting temperature rise to no more than 2 degrees C.

With this in mind, the European Climate Foundation has convened the BioFrontiers platform, bringing together stakeholders from industry and civil society to explore the conditions and boundaries under which supply chains for advanced biofuels for transport might be developed in a sustainable manner. This builds on work developed in the ECF's Wasted platform in 2013-2014, which focused on waste- and residue-based feedstocks for advanced biofuels. This time around, there is an additional focus on considering land-using feedstocks and novel fuel technologies.

As the name BioFrontiers suggests, this discussion enters new territory and is faced with numerous gaps in knowledge. To facilitate a transparent and constructive debate between industry and civil society, the ECF has commissioned a number of studies to help fill such knowledge gaps. This is one such study. It does not represent the views of the members of the BioFrontiers platform, merely an input to their discussions. If this research also helps inform the wider debate on the sustainability of bioenergy, that is a bonus. I would like to thank Greenea for using the resources provided by the ECF to improve our understanding of these important issues.

Pete Harrison

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Project objectives and methodology

THE OBJECTIVES OF THIS ANALYSIS ARE:

1. To estimate the collectable quantities of used cooking oil produced at households in all EU Member States now and in 2030.

2. To estimate the quantities of UCO collected from households in each Member State in 2015 and to make predictions for 2030 given two scenarios:

    - No proactive support from Member States
    - Active support of Member States to promote the development of household UCO collection

3. To analyse the existing household UCO collection systems in the EU and determine their key success factors

METHODOLOGY:

The quantitative analysis of collectable UCO resources available from households was carried out based on the sales of bottled vegetable oils in each of the Member States. The actually collected volumes were obtained directly from the collectors / organisations responsible for monitoring the collection or people involved in the business.

The description of the current household UCO collection systems in the EU was based on interviews with people involved in the collection, analysis of the available materials and reports as well as our own observations.

Abbreviations

ATM: Abfallwirtschaft Tirol Mitte GmbH / Waste Management Association Mid-Tyrol Ltd

EU: European Union

FOG: Fat, Oil and Grease

HORECA: Hotels, Restaurants and Catering

MS: Member State

UCO: Used Cooking Oil

WHO: World Health Organisation

Introduction

The so called Fat, Oil and Grease (FOG), if not disposed of properly, is a growing problem in cities as it causes blockages in sewage systems. FOG enters drainage systems when it is washed down the sink at individual households or in restaurants, food producing premises, etc. Scientists from University College Dublin have estimated that approximately 50-75% of all sewage blockages are caused by FOG. What is more, UK water companies spend yearly around 100 million euros to clean the blocked sewage system all around the country. These costs could be successfully decreased if used cooking oil, which constitutes large part of the FOG, was properly disposed of.

Introducing and developing household UCO collection systems can help save the additional costs spent yearly on the drainage systems cleaning while the collected oil can serve as feedstock for biodiesel production. Due to the fact that such systems are not yet established in Europe, there is a big opportunity still to capture.

UK water companies spend yearly around 100 million euros to clean the blocked sewage system

In this report we have focused on the analysis of the existing household UCO collection systems in the EU and on the estimations of the growth potential of the UCO collection in Europe until 2030. The analysis starts with an overview of the already established household UCO collection systems in chosen EU countries in order to determine the key success factors of household UCO collection. Then follows a more detailed discussion of the possible issues at each stage of the collection process together with proposed solutions. Next part focuses on the proactive support of the Member States for household collection and contains an analysis of the marketing campaigns launched in chosen countries. Then follows an estimation of collectable used cooking oil quantities available at households across Europe. Finally, an attempt is made at predicting how much oil could be collected from EU households by 2030 given active support from the governments and no support at all`. These assumptions, however, are highly hypothetical as the speed of development of household collection systems as well as people's willingness to participate are hardly measurable.

The aim of the study is to show the current situation of the sector of UCO collection in Europe and to show that the growth potential left to capture is still high. Yet, any development in the household sector will be hardly possible without support from the Member States or the European Union as comprehensive promotional campaigns are crucial to convince individuals to recycle their oil.

Executive Summary

With growing ecological consciousness of people across the EU and development of the biodiesel industry, used cooking oil collection is becoming increasingly popular. While recycling of UCO from the professional sector, e.g. restaurants, hotels, is already well developed in most of the Member States, collection from individual households is only in its early developmental stage. Currently, three countries only: Austria, Belgium and the Netherlands have a household UCO collection system organized on a country level. In Sweden, we can observe a well-functioning system, however, it is co-ordinated by local authorities instead and there is no co-operation between them.

By far the most popular way of organizing household UCO collection is through collection points located across the country. People have to bring their UCO in bottles or specially designed containers to such collection points which are localized in the streets, parking spaces, supermarkets, schools, etc. In fact, it is the location of the UCO collection points rather than their number that influences the quantities of oil collected in the town or region.

The successful launching of a household UCO collection system is pre-determined by a well-designed informational and promotional campaign. People have to be well informed about both the necessity and the possibility to recycle their UCO. They have to understand why they should do it and what the benefits will be, otherwise they are not likely to start the collection at home. It is also very important to involve children in the collection to start creating habits of UCO recycling among the youngest generations.

Judging by the experience of already functioning household collection systems in Europe, the promotional campaign has to be modified depending on the region where it is going to be introduced. People in different countries or regions may rely on different types of information sources. They may also be motivated by various drivers, e.g. in Sweden people are well aware of the importance of recycling and very little convincing is needed while in certain Member States involving people in UCO collection may require organisation of various events, contests with prizes, TV spots, etc. in order to achieve similar results.

According to our survey carried out among collectors across Member States, successful launching of a collection system depends on good organization. People can get easily discouraged if the recycling is not simple enough and the collection points are located in the wrong places. They also believe that education at schools about the benefits of UCO recycling is important for the long-run success of UCO collection. Finally, additional posters and pamphlets are also helpful at explaining to people how and where to dispose properly of their used cooking oil.

So far, the only unsuccessful initiative was the one introduced in Denmark. It is difficult to determine the exact reasons for the lack of success of the pilot project there, however, there is a possibility that the informational

campaign was not well suited to the needs of the targeted people. The inhabitants of the region where the pilot project was run claimed that they do not really deep-fry much so they do not have UCO to dispose of. As dietary habits in Denmark are generally rather healthy, it is still hard to believe that no UCO is generated at individual households.

We estimate that currently less than 50,000 tonnes of UCO gets collected per year from households across Europe. At the same time, potential resources should be at the level of 800,000 – 900,000 tonnes per year. This results in around 800,000 tonnes of UCO still to capture. However, as household collection has to be organized from scratch in the majority of the countries, capturing all the resources will take time and require a long-term development scenario. We estimate that until 2030, maximally around 200,000 tonnes per year could be collected in the case of active and continuous support of Member States. Yet, it has to be remembered that this is a very optimistic scenario that would involve uninterrupted and very dynamic development of household UCO collection system from today till 2030.

REVIEW OF THE EXISTING HOUSEHOLD UCO COLLECTION SYSTEMS

Introduction to household UCO collection systems

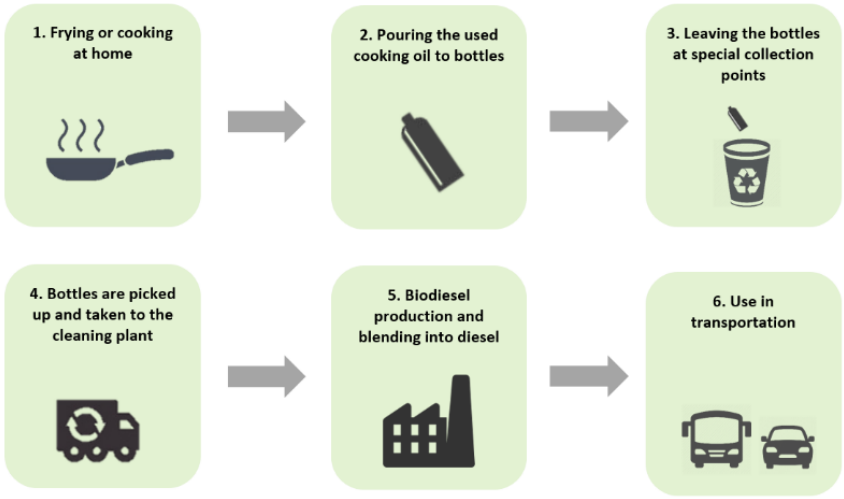
It is estimated that one litre of UCO can contaminate up to one million litres of water while, according to World Health Organisation (WHO), only 50 to 100 litres of water per capita per day are needed to ensure that human's most basic needs are met.

In addition to social costs, the **separation of oil from water is 700 times more expensive than regular water purification** which costs 0.46 euros per litre of UCO or 505 euros per tonne. [1]

HOW DOES UCO HOUSEHOLD COLLECTION LOOK LIKE?

The UCO household collection supply chain starts at individual households with people frying food to prepare meals for their families. Then, instead of pouring the remaining oil down the drains, they have to collect it in a specially designed container or in a plastic bottle, e.g. one previously used for mineral water or vegetable oil. Once the container or bottle are full, they have to be left at a specially designated collection point. In some cases, the waste management company picks the bottles/containers directly from households together with other waste materials. The collectors take the UCO to a cleaning plant where it undergoes filtration before it can be further transported to a waste-based biodiesel producer. Later on, UCOME (biodiesel made from used cooking oil) is blended into diesel and used in transportation.

Exhibit 1: Household UCO collection supply chain



[1] Interview with a Representative of *Asociación Española de Abastecimiento y Saneamiento*

As already pointed out above, the third stage of the household UCO collection system depends on the set-up chosen by the company or organization responsible for the collection in a given region. There are three possibilities:

- **Decentralized ("door-to-door" collection):** UCO is collected directly from individual households, often by waste management companies already operating in the region and picking up other types of waste

- **Centralized:** collection points are located across towns and cities in schools, shopping malls, parking lots, streets, etc. There are two different arrangements possible:

    1. UCO poured directly from the small container or bottle to the provided containers at collection points or waste recycling centers

    2. UCO collected in bottles or small reusable containers that are left at the collection point and, in the case of specially designed containers, exchanged for a clean one

- **Combined:** both abovementioned methods are used: collection points across towns and "door-to-door" collection

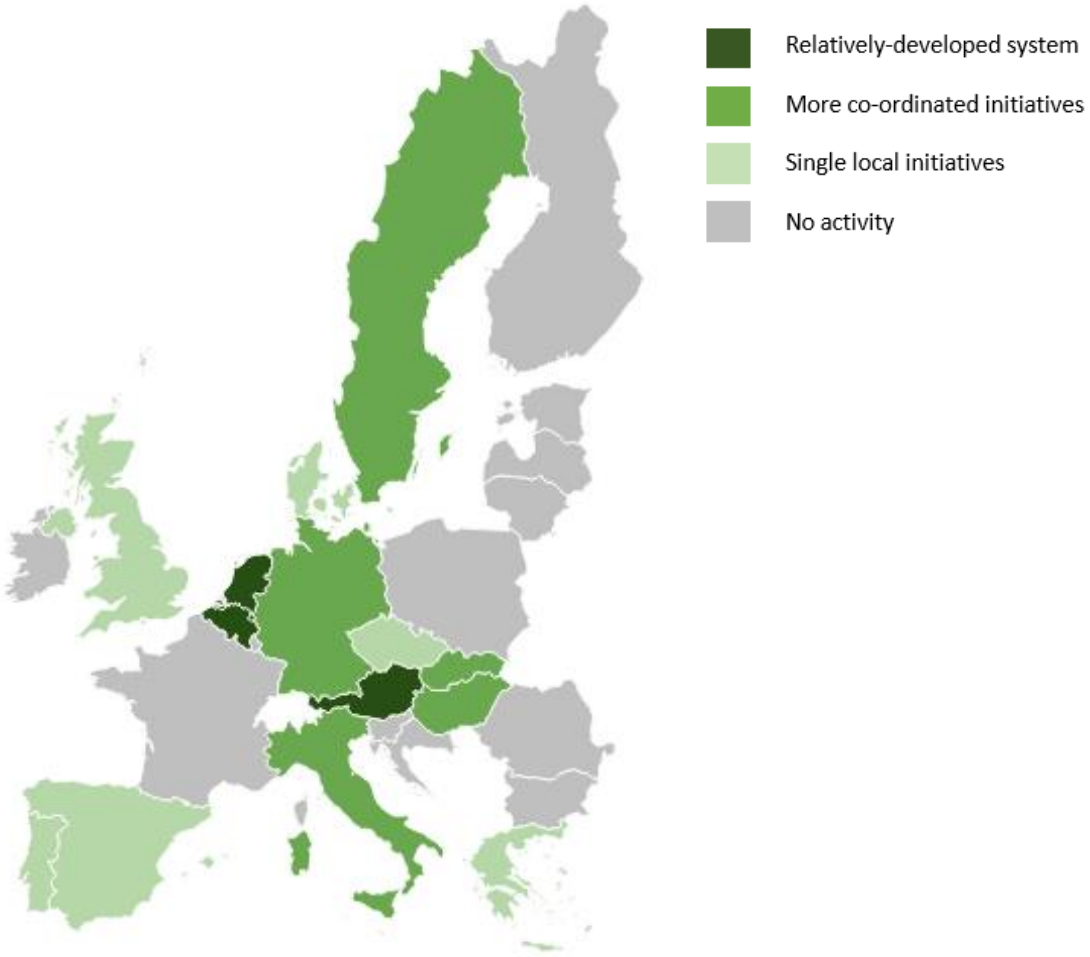
Centralized collection is, by far, the most popular one due to its financial viability as it has lower operational costs than the decentralised one. It is also easier to organise and co-ordinate.

Household UCO collection across the EU

Compared to UCO collection from hotels, restaurants and catering companies (so called HORECA) which is well developed, especially in Western Europe, household collection is only in its developmental stage. **Relatively-developed systems on a national level exist only in Austria, Belgium and the Netherlands.** Their example is closely followed by Italy, Germany and Hungary where some co-ordinated initiatives have been launched on regional or national levels to collect UCO from individuals. Yet, in these countries, we cannot talk yet about a fully-fledged household collection system as the one in Belgium, for example. Such Member States as the UK, Slovakia, Czech Republic, Denmark, Greece or Spain have been organising several local initiatives, yet, no large scale programs.

Household collection is only in its developmental stage

Exhibit 2: Map of household collection systems across the EU



FOCUS ON THE CHOSEN COUTRIES: BELGIUM

The Valorfrit system dates back to 2004 when it was created as a response to the need for a national system of recycling edible oils. It was due to the introduction of a regulation stating **that producers, importers and distibutors of cooking oil have to report the quantities of oil placed on the market and the quantities of UCO recycled**. Valorfrit, thus, is an umbrella association, coordinating the collection and reporting on the whole territory of Belgium. It was founded by Fevia, Comeos and 9 other companies: Aigremont, AOP, Baeten & Co, Cargill, Colruyt, Deli XL, Makro, Vamix and Vandemoortele. Currently 99 companies, associations, governmental bodies, etc. are part of the system. It is obligatory for the edible oil sellers and distributors to adhere to the UCO recycling program. The obligation is regulated by the Belgian federal government.

Valorfrit covers the whole territory of Belgium. Even though, there are some operating differences between the three regions: Flanders, Walonia and Brussels-Capital regions, the general operating scheme can be divided into four stages:

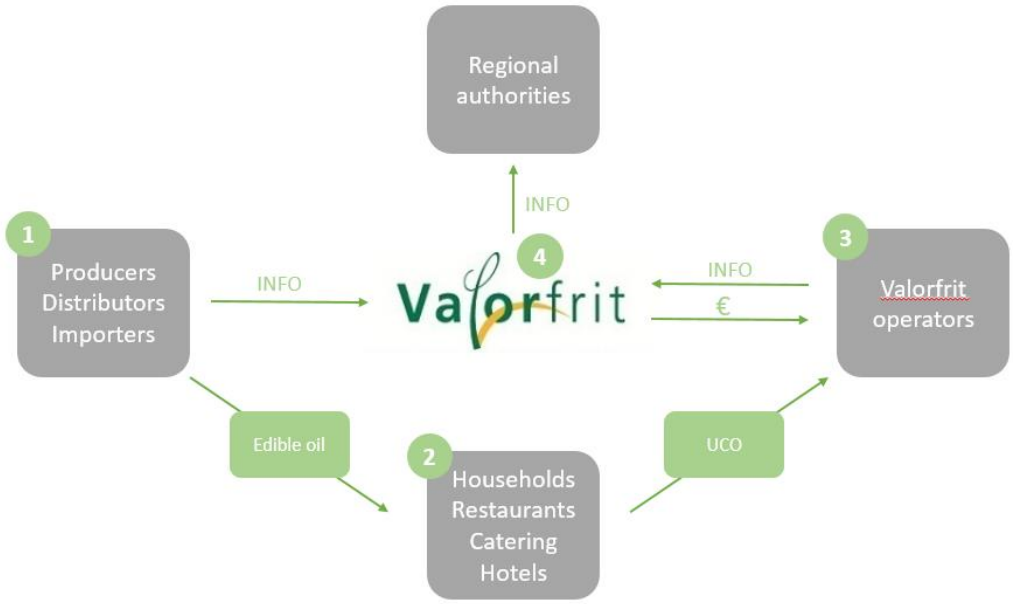
Stage 1: Producers, importers and distributors of edible oils inform Valorfrit about the quantities of oil placed on the Belgian market. They have to make the distinction between oil for domestic and professional use.

Stage 2: Valorfrit licensed operators collect used cooking oil from professional users and from containers placed across towns and cities, filled by oil coming from individuals.

Stage 3: Valorfrit licensed operators have to inform Valorfrit about the quantities of UCO collected from professionals and from collection points. They also have to provide information about the final destination of the recycled oil, e.g. biodiesel production. This is the stage where the operators get payment for their work.

Stage 4: Valorfrit compiles and analyses the received data and hands it over to the authorities responsible for monitoring the UCO recycling activities.

Exhibit 3: Valorfrit system



The household UCO collection system in Belgium is predominantly centralized with collection points (often equipped with several containers) localized around cities and towns, in shopping malls and public places. There are a few smaller communities where "door-to-door" collection is used, however, it is not very common.

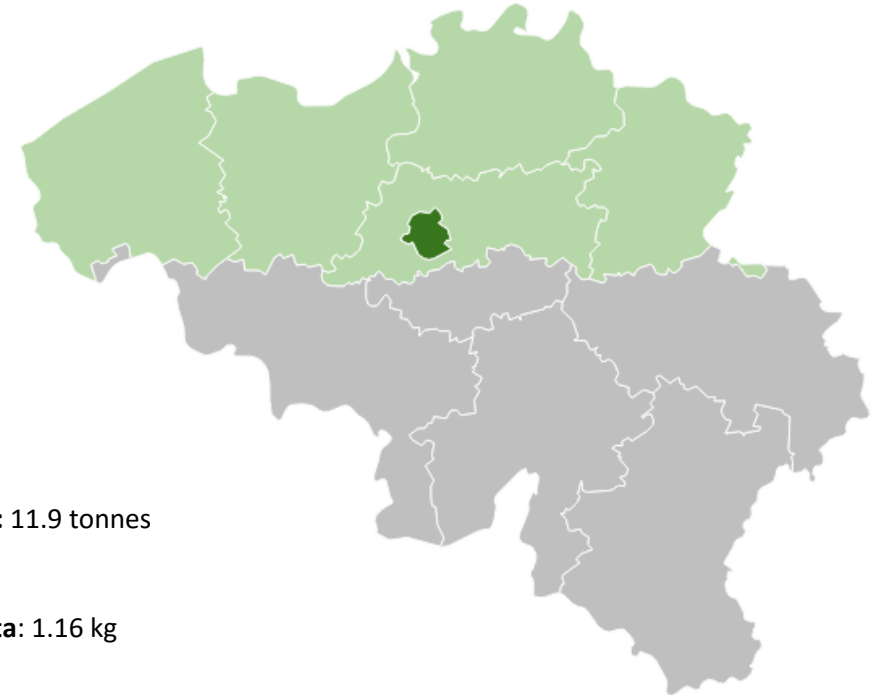
In Belgium, around 64% of UCO from households gets collected

98% of the collected UCO is transformed into biodiesel while 2% goes into the oleochemical sector.

Keeping the system alive requires significant amounts of money for the promotional campaign. Even though the exact data is considered confidential, the person interviewed mentioned investment of around 1 million euros per year for the marketing campaign. These costs, even though quite significant, are difficult to avoid as without constantly reminding people about the

necessity of recycling UCO, the quantities collected could drop sharply. Yet, as now the system is free for members, **obtaining enough money is a challenge that puts the existence of Valorfrit at risk**

Exhibit 4: Household collection in Belgium



BELGIUM:

Population covered: 11.3 million

Number of collection points: 700

Quantities collected: 8,300 tonnes

UCO collected per collection point: 11.9 tonnes

UCO collected per capita: 0.73 kg

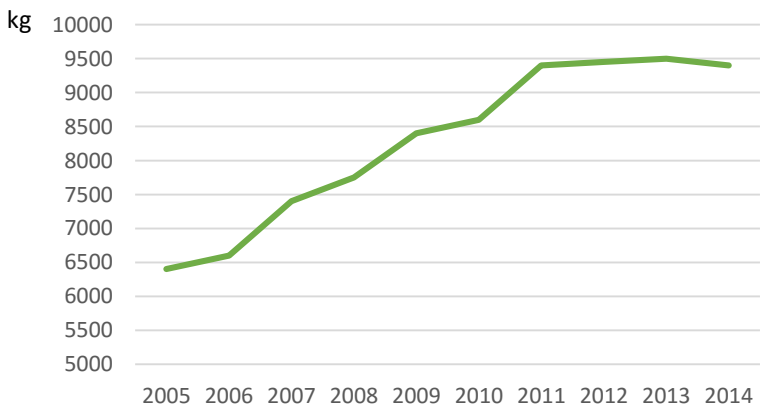
Estimated UCO resources per capita: 1.16 kg

% of UCO collected: 64%

(values per year)

For the last two years**, the sales of edible oil to individual consumers in Belgium had been falling down** (-4.9% from 2013 to 2014) which resulted in a decline in quantities collected. This trend can be explained by wider adoption of healthy life style which is linked to the elimination of excessive quantities of fried food from diet.

Exhibit 5: Household collection of oils and fats in Belgium from 2005 to 2014



COUNTRY-SPECIFIC FACTORS INFLUENCING THE HOUSEHOLD UCO SECTOR IN BELGIUM

Belgium is in the group of European countries whose citizens consume relatively big quantities of fried food due to their dietary habits. Traditional food in Belgium includes French fries while their preparation requires significant amounts of oil. As a result, the per capita production of UCO in the country is higher as compared to France, for example. **We estimate that, on average, each inhabitant of Belgium produces at home 1.16 kg of UCO yearly.** At the same time, current household collection covers 64% of the estimated resources as 0.73 kg of UCO per capita was collected from Belgian households in 2014. As the household collection system in the country is already well developed and the sector has achieved its maturity, the growth potential is very limited.

Recycling habits in the Benelux countries are already very well entrenched

The Belgian household collection experience is not directly applicable to other EU Member States except for the Netherlands. It is because in these two countries we can observe similar culinary habits and thus high fried food consumption as well as a well-organized system of UCO collection. Recycling habits in the Benelux countries are also already very well entrenched and with the help of a well-designed promotional campaign, it is not a big issue to convince people to properly dispose of UCO.

There is, of course, a number of other countries whose inhabitants traditionally also fry a lot, e.g. Spain or the UK, yet the habits there differ from what we see in Belgium. The UCO household collection is less developed and people are less willing to recycle their oil. Culinary habits are also changing there and include more ready-made meals. This, however, will be discussed in greater details in the following parts of the study.

FOCUS ON THE CHOSEN COUTRIES: THE NETHERLANDS

The household UCO collection system in the Netherlands started in 2011 with pilot projects in Amsterdam and Den Bosch. Currently, with 2,000 collection points, it covers the whole territory of the country. **Unlike in the case of Belgium, the Dutch system is not a response to an obligation placed by the authorities but rather a voluntary initiative**. It is organized by an association which co-ordinates several partners from the whole supply chain: collectors, biodiesel producers, local authorities, sewage cleaning companies. The collected UCO is used to make biodiesel.

Exhibit 6: Companies and other organizations cooperating in the household UCO collection in the Netherlands

The organizational side of the collection is taken care of by Rotie, a Dutch UCO collector under the logos of Frituurvet, recycle het and Vet Goed. They use a centralized collection system, however, they have made interesting additions to the model. First of all, the inhabitants are encouraged to use regular plastic bottles to dispose of their UCO and to facilitate the pouring process, they receive special plastic funnels, so called Ekofunnels, to put on the top of the bottle. Secondly, in order to involve children in the process and teach them the importance of recycling, the program closely cooperates with sports clubs and scouts all over the Netherlands. Kids actively participate in the UCO collection and, in return, receive some financing for their clubs and scouting organisations.

Exhibit 7: Additions to the supply chain in the Netherlands

EKOFUNNEL

- In the Netherlands, the way to encourage inhabitants to collect UCO was distributing the tool to facilitate pouring the oil into the bottles called EkoFunnel.
- It is a Swedish design that is put onto the bottle to prevent spillages. It is reusable and easy to clean.

RAISING FUNDS FOR SPORTS CLUBS

- In order to involve children in household UCO collection, sports clubs around the country are encouraged to place the containers inside their premises so that all the members can dispose of their oil there.
- The sports clubs, in return, receive some financing as a form of "payment" for the collected oil.

The collection points are placed predominantly in shopping malls, schools, sports clubs and in the streets. According to the person interviewed, the most effective places are both shopping malls and schools. The latter also has the advantage of forming habits among the youngest members of the society who will hopefully later continue the UCO recycling in their adulthood as well as pass the good practice to their own children.

Exhibit 8: Household collection in the Netherlands

THE NETHERLANDS:

Population covered: 16.9 million

Number of collection points: 2,000

Quantities collected: 3,600 tonnes

UCO collected per collection point: 1.8 tonnes

UCO collected per capita: 0.21 kg

Estimated UCO resources per capita: 0.7 kg

% of UCO collected: 30%

(values per year)

COUNTRY-SPECIFIC FACTORS INFLUENCING THE HOUSEHOLD UCO SECTOR IN THE NETHERLANDS

As certain regions in the Netherlands also use the majority of their oil for frying instead of salads, for example, the percentage of oil that can be recycled as UCO is quite high compared to other countries such as France, for example. However, in the Netherlands, people generally do not consume big amounts of vegetable oil at households, which, in turn, results in much lower UCO resource estimation than in Belgium.

The number of containers on the territory of the Netherlands is more than double of the containers localized in Belgium which is due to the higher number of inhabitants. Unfortunately, **the amount of UCO collected per collection point is lower in the Netherlands: 1.8 tonne while in Belgium it can reach 11.9 tonnes.** The collection system seems also to be much less effective as less than 50% of potentially produced UCO is currently collected in the Netherlands. This may result from the fact that unlike in Belgium, in the Netherlands the recycling of UCO is voluntary.

Although the efficiency of the collection in the Netherlands is not yet as high as that in the neighboring Belgium, there is high growth potential in the next few years as the response of the society remains very positive. The ongoing promotional campaign constantly reminds people, through multitude of channels, that it is extremely important to properly dispose of their UCO and the habits

Unlike in Belgium, in the Netherlands the recycling of UCO is voluntary

among the Dutch society are being successfully created.

FOCUS ON THE CHOSEN COUTRIES: AUSTRIA

Austria was the first country in Europe to develop a household UCO collection system. The initiative is called Öli and dates back to 1999. **It was established in Tirol and spread, over the years, to other regions of Austria as well as to parts of Germany and Italy.** Now, more than 1 million households in 6 regions of Austria participate in the collection. It is a centralised system in which people bring their UCO to the collection points in three-litre reusable containers which have been specially-designed for that purpose.

The system was developed by the Waste Management Cooperative Tyrol (ATM) and the Waste Water Treatment Association of Hall.

The long-term project to establish a nation-wide collection of UCO from both households and restaurants is called "Energy and Fuel from Fat." The collection points are located in municipal recycling centres.

Before the establishment of Öli, UCO collection from households reached 0.2 to 0.3 kg per person per year and large amounts of oil were poured down the drains. This, in turn, caused increased maintenance and cleaning costs of the sewage system reaching up to 0.30 euro per kg of wastewater. **Currently, up to 1 kg of UCO per capita is collected from Austrian households.**

Exhibit 9: The supply chain of the Öli system

The **supply chain of the Öli system** can be summarised in 6 stages:

1. The Öli bucket is filled with used cooking oil at individual households. It is easy to handle and can hold up to three litres of oil. It is dishwasher safe and can be filled with oil that is up to 80 degrees.

2. Once the Öli bucket is full, people can leave it in the specially designated collection points across Austria. In exchange, they receive a clean container.

3. In the Öli plant in Fritzens the UCO is cleaned with the latest technology in order to be ready for further processing. After the containers are emptied, they are cleaned and prepared for further use.

4. 10% of the oil is converted into biogas which is used in cogeneration units for power generation. The remaining 90% is converted into biodiesel.

5. The biodiesel produced from household UCO is used for powering both individual and public transportation.

6. The closing stage is making sure that everything runs smoothly, here, various groups are involved: ARGE Energie, collectors, as well as local authorities.

In Austria, inhabitants are encouraged to use the original Öli container to dispose of their oil instead of plastic bottles, like in the case of Belgium or the Netherlands, for example. This is easier to handle from the point of view of the collector, yet, might result in some issues for individual users. Once the Öli bucket is full but there is still more oil to dispose of before exchanging the container, people might simply pour the remaining UCO down the drains instead of keeping the excess oil in a bottle or jar until they get a clean bucket.

Exhibit 10: Household collection in Austria

AUSTRIA:

Population covered: 2.4 million

Quantities collected: 2,400 tonnes

UCO collected per capita: 1 kg

Estimated UCO resources per capita: 0.8 kg

% of UCO collected: 34%

(values per year)

The quantitative analysis made for Austria should be seen as an exception and cannot be directly applicable to other countries. According to our estimations, based on the quantities of vegetable oil sold in each Member State, **the collectable UCO potential in Austria could reach 0.8 kg per person**.[2] At the same time, in regions where the Oli system is operating, up to 1 kg of oil per person is being collected. This would mean that more is collected than is actually produced. Yet, traditional Austrian dishes, e.g. schnitzel are predominantly fried using lard and not veg oil. Therefore, we suppose that more than 50% of the oil disposed of in Öli containers is in fact animal fat which is not accounted for in our calculations.

The main growth potential of the Austrian system is its development to the whole territory of the country. According to the data provided by the Oli system organisers, the potential of collectable UCO in Austria is 3-5 kg per capita. However, this number seems very optimistic given the sales of bottled veg-oil at the level of 2.3 kg per person.

GRAZ: ÖKODRIVE PROJECT

Before the Öli system was launched in Austria, the city of Graz already started its own household collection initiative which is still running today. The project dates back to 1990 when free UCO collection points were organised around Graz. In 1999 the collection was extended to restaurants and catering services. The UCO collected is converted to biodiesel used to fuel buses in the city of Graz. The biodiesel producer involved is SEEG in Mureck. Yearly around 75 tonnes of UCO are collected from houses in Graz.

In 2003, the EU project Civitas Trendsetter enforced the implementation of the Ökodrive initiative and added 54 new UCO fuelled buses to the fleet. Since 2005, 134 buses have been running with UCO based and locally produced biodiesel.

People involved in the project claim that its success is due to close cooperation of the collectors, local authorities, people responsible for promotion, the Biodiesel plant, the public transport company and the University of Graz which guides the whole project.

FOCUS ON THE CHOSEN COUNTRIES: ITALY

Italy has a very well-organized UCO collection system from the professional sector but the household collection is still in the early stages of development. There are a few initiatives promoting UCO collection from individual households, however, there is no nation-wide system like in Belgium, for example. **The two biggest initiatives are: Olly, which is an Italian branch of the Austrian Öli system, and Per Olivia, a private initiative started by a UCO collecting company Adriatica Oli.**

THE OLLY SYSTEM

It came to Italy from Austria in 2010 and is gradually developing to new provinces and regions. However, as it came from Austria, so far it is present in the North of Italy only. The system is operated by Eco Energia, an Italian UCO collector who got the license to use the Austrian idea in Italy. The collected oil is used to produce biodiesel.

[2] 30% of the veg-oil sold becomes UCO

The supply chain of Olly in Italy mirrors the Austrian system. Reusable containers are distributed among inhabitants in order to facilitate the UCO collection. Once the container is full, they can bring it to the collection point localized in their area. In Italy, the major partner of Olly is Coop, the chain of supermarkets that help with advertising of the campaign as well as allow the collection points to be established on their premises.

Olly pays special attention to the way UCO is disposed of at the collection points, which are small closed buildings, often made of wood and powered by solar energy. Each individual who subscribed to the Olly collection system has a special card with the user number that allows them to enter the collection point, leave their full container and pick up a clean one. The collection point is closed and equipped with a camera to avoid vandalism and thefts. This system allows the collector to easily trace the origin of all the UCO that is collected through the Olly system.

The container distributed to Italian families has the capacity of 3 liters and is easy to open. When closed, it protects the smell from going out so it can be kept in the kitchen within easy reach. It is resistant to temperatures up to 80 degrees Celsius so it will not get destroyed when filled in with hot oil.

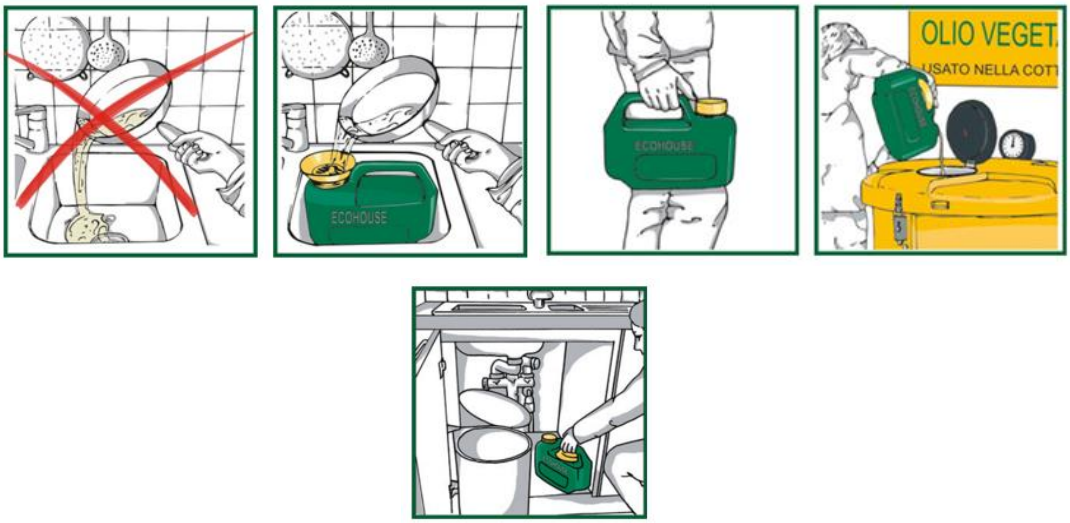
Exhibit 11: Closed collection point for Olly containers

Exhibit 12: The container used by Olly and Öli systems

PER OLIVIA

Per Olivia is the first household collection system introduced in Italy. It was launched in 2004 and has, since then, developed into a comprehensive collection and promotional system. Apart from collecting UCO from inhabitants, the Per Olivia team runs an extensive informative campaign whose aim is to bring people's attention to the benefits and importance of proper disposal of cooking oil. They work closely with schools, focusing on developing recycling habits in the youngest generation. More details on the promotional tools of Per Olivia can be found in part 4 of this report.

Exhibit 13: Per Olivia instruction for users on how to recycle UCO



In the case of Per Olivia, inhabitants are encouraged to collect their oil either in a special container or in a plastic bottle they may have at home. Then they need to pour the oil from their small container or bottle to the common container at the collection point. This system seems to work in the case of Per Olivia, however, it is less convenient for the individual user than just exchanging the container for a new one like in the case of Olly or just leaving the UCO in a plastic bottle at the collection point.

Within the Per Olivia system, there are three different types of collection points: containers installed in the streets, containers localized within the bigger waste-recycling points and mobile recycling points that come to the given area according to a pre-determined schedule.

Exhibit 14: Per Olivia 2014 collection volumes

Part of the country	Number of inhabitants covered	Collected volume (kg)	kg per capita
North	78,000	21,000	0.27
Center	51,000	35,000	0.69
Center	996,000	753,169	0.76
Center	73,000	40,000	0.55
		849,169	

Exhibit 15: Household collection in Italy

FOCUS ON THE CHOSEN COUNTRIES: PORTUGAL

In Portugal, the household UCO collection is regulated by law on a country level. Since 2009, according to Portuguese law, local administrative units are responsible for domestic UCO collection. By 2015, municipalities with more than 300,000 inhabitants, for example, had to set up at least 80 collection points. The number of collection points required is directly linked to the number of inhabitants. Currently the collection is carried out by small and medium sized enterprises and local projects. Lack of compliance with the law results in significant financial fines making the Portuguese system a very strict one but only in theory. In practice, there is no system put in place to really control if the UCO is being properly disposed of while the promotional campaigns in Portugal are not very well diffused.

OILPRODIESEL PROJECT

It was a four-year initiative that ran between 2005 and 2009 in Oeiras. The UCO collected there was used for biodiesel production that fueled the municipality fleet of Oeiras for waste transportation.

There were 20 containers placed around the municipality for the duration of the project. People were instructed to bring their UCO in plastic bottles and throw them into the containers. The inside part of the container was equipped with wheels which made it easier for the waste-company to empty it once full. In order to optimize the work of the collector, a remote control system was introduced. It consisted of a devise placed in the container that informed the control center once the container was full. This helps to save the costs on unnecessary trips to the collection points that are often in significant distances from one another. The system was developed with the use of Google Earth application.

oilprodiesel
A LIFE–Environment DEMONSTRATION PROJECT

In total, in all the containers, 11,155 kilograms of UCO were collected during the project. However, after the end of the pilot, the biodiesel plant was closed, dismantled and sent back to Sweden, as it was only a temporary production line. The containers were left in the streets of Oeiras but without the monitoring system and it is now the waste collection company of the municipality that takes care of emptying them.

FOCUS ON THE REMAINING COUNTRIES: SLOVAKIA

Slovnaft in cooperation with Rest Oil, an environmental company, launched a program called “Each drop counts” in order to develop household UCO collection across Slovakia. The project was introduced in 2011 in Bratislava as a pilot initiative. Since then it has spread to 88 Slovnaft petrol stations on the whole territory of the country. Inhabitants bring their oil in plastic bottles and leave them in yellow containers located at the filling stations. In order to encourage people to properly dispose of their UCO, they are rewarded with special points for bringing it to the petrol station and can later exchange them for rewards or get some discounts through the Slovnaft loyalty club.

The collection is of around 360 tonnes per year in total. Definitely more promotion is needed to make people aware of the possibility and necessity to recycle their used cooking oil. It could also be a good idea to place the collection points not only at gas stations as people who do not drive a car rarely go there and in most cases are not willing to make the extra trip.

FOCUS ON THE REMAINING COUNTRIES: CZECH REPUBLIC

In Czech Republic the awareness of the necessity to recycle UCO from households is steadily growing with some projects being launched in the major cities. Currently in Prague the City Hall is running a pilot project with 21 collection points set up across the city. By the end of 2016, a fully-fledged system should be ready and yellow containers for bottles with UCO should appear in all points where recycled bins are present.

The most developed system is run by Eko-PF, a company specializing in biodegradable waste disposal. Since 2011 they have been collecting UCO from households in 140 municipalities including the city of Tabor and České Budějovice.

Brno, the second biggest city in Czech Republic is serviced by SAKO. The collection here started in February 2015.

Altogether, around 5,400 tonnes of UCO is collected yearly from households in Czech Republic.

FOCUS ON THE REMAINING COUNTRIES: HUNGARY

The system in Hungary is closely connected to the one launched in Slovakia as Slovnaft is part of MOL Group, the entity responsible for the UCO household collection in Hungary. The UCO collection program was first launched there in 2011 with collection points located at the MOL petrol stations. Currently there are around 100 collection points spread across the country. The yearly collection reaches 75 tonnes per year. The UCO is used for biodiesel production in the plant in Komarom.

In order to better understand the habits of Hungarians in terms of recycling, MOL ran a survey in 2013 asking about people's willingness to collect their used cooking oil. The results show that there is still a lot of work to be done in terms of promotion and raising awareness of the importance of UCO recycling. The survey was carried out through the internet and around 1000 people participated, most of whom were women between 18 and 59 years old. More than 50% of the respondents claimed that pouring oil down the drain is simply the easiest option so they keep doing it. 75% of the people asked said that they would only recycle their UCO if the collection point was located very close to their home. The remaining 25% claimed that they would do it only in the case of door-to-door collection.

Major difficulties to face and suggested solutions

While analyzing the UCO household collection systems across the EU Member States, we have compiled a list of major difficulties that the collectors had to face. During the interviews with people involved in UCO collection from individual homes, we have also asked them how they managed to efficiently solve the most difficult problems. Below you can find a sum up of their experiences.

Exhibit 16: Household UCO collection supply chain (key stages)

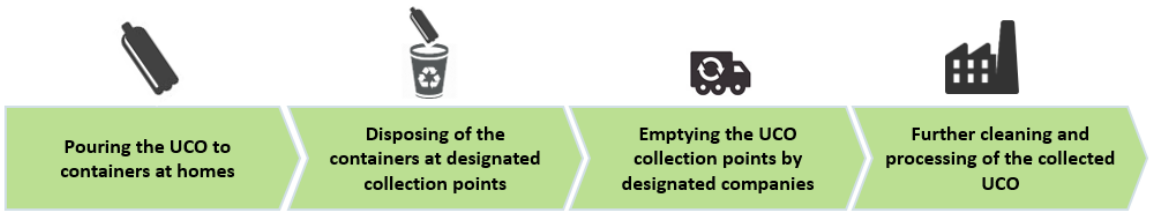


Exhibit 17: Major difficulties and suggested solutions at stage 1

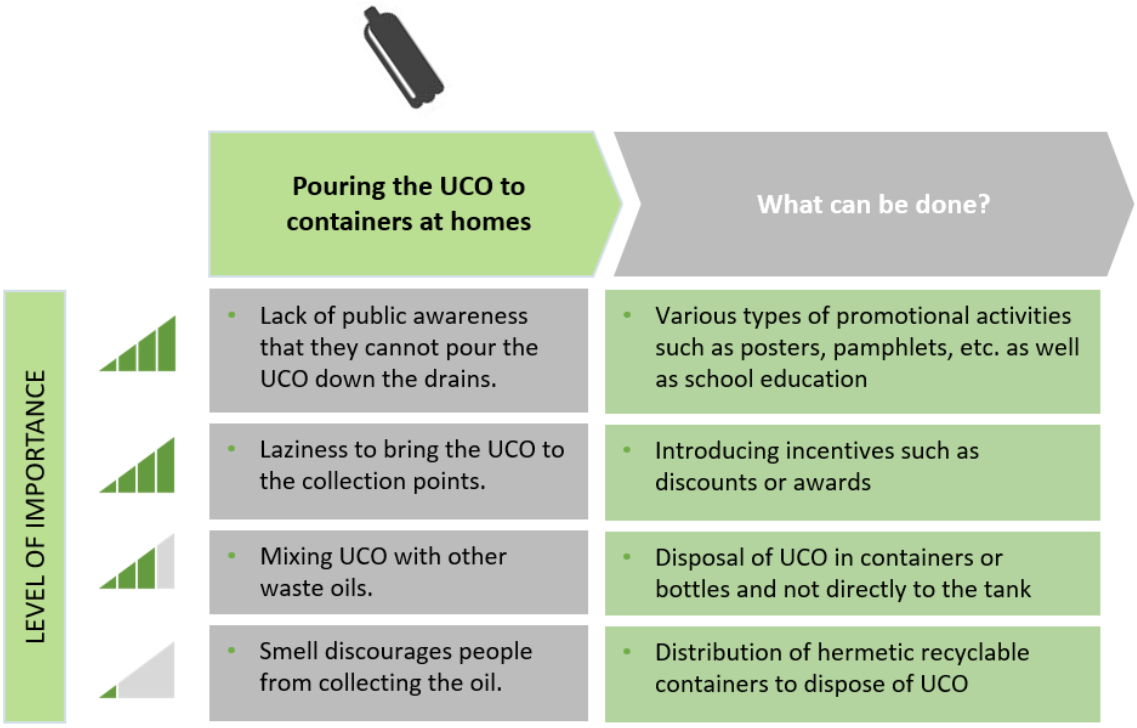


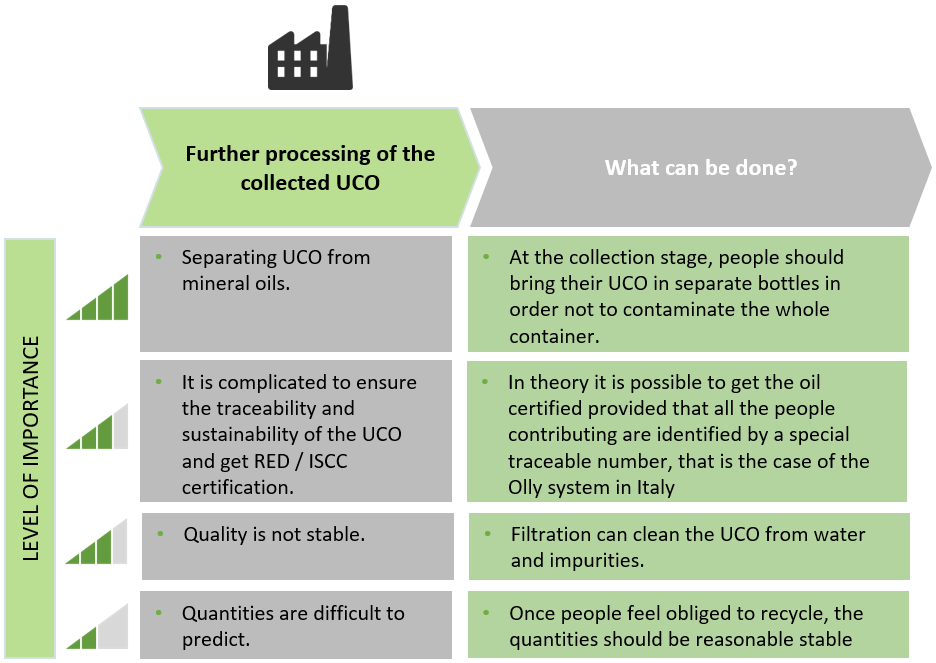
Exhibit 18: Major difficulties and suggested solutions at stage 2

LEVEL OF IMPORTANCE	Disposing of the containers at designated collection points	What can be done?
	Location of the containers is not convenient or the distance is too big.	Constant monitoring of the most used disposing points and survey among residents where to open new ones
	The disposing places are not well-marked or easy to spot.	Establishing a uniform sign for UCO collection points around certain area
	Containers are full, preventing people from being able to dispose of their UCO.	Co-operation with other waste collectors, supermarkets, etc. for informing the UCO collectors once the containers are full
	Inadequate packaging causes spillages of the oil.	Usage of special containers distributed to the citizens.
	Throwing rubbish to the UCO containers.	Usage of special containers distributed to the citizens.
	Dumping the UCO in the wrong bin.	Better marking of the containers.

Exhibit 19: Major difficulties and suggested solutions at stage 3

LEVEL OF IMPORTANCE	Emptying the UCO collection points by designated companies	What can be done?
	Unloading the containers and opening the bottles is time consuming.	It is difficult to speed up this process, however, it is extremely important as it prevents all the UCO from contamination by small addition of mineral oil.
	Low temperatures in winter time make the UCO solid which, in turn, makes it more difficult to empty the containers.	Well-isolated containers made from resistant materials to prevent damages of the UCO. Placing the containers inside especially during winter time.
	If the collection points are not well protected, the product can be stolen.	The collection points can be localised in the areas closed for the night, private ones or where there is monitoring installed.
	Smaller uncertified companies collect the UCO illegally.	People should be well informed where they can leave their UCO in order to have it properly disposed.
	Damaging of the containers.	Placing the containers in frequented places

Exhibit 20: Major difficulties and suggested solutions at stage 4



Some of the issues are easy to solve, yet, difficult to predict. However, they should be taken into consideration while planning the household collection system as they might help to avoid significant financial and operational problems during the implementation stage

Summary of the findings

It is clearly visible that only Belgium, the Netherlands and Austria managed to develop comprehensive large-scale UCO collection systems for individual households. In Italy, two private systems: Olly and Per Olivia are developing independently from each other, however, they still cover only parts of the country's territory.

Judging by the success of the Dutch and Belgian systems, country support is important in order to successfully launch a national household collection system.

OVERVIEW OF THE KEY SUCCESS FACTORS

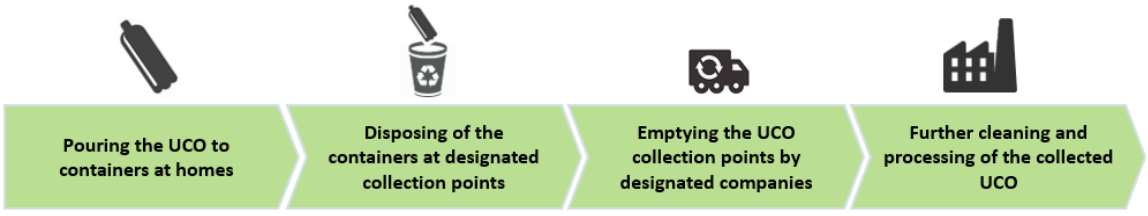
Best practices to copy and worst practices to avoid

Even though the experience of household UCO collection in Europe is still narrow, the know-how, however limited, should be put into use while expanding the existing systems and creating new ones. It has to be remembered, though, that some of the practices might be country, region or culture dependent and might thus bring different results when implemented somewhere else. That is why, a thorough understanding of people's habits connected not only with recycling waste but also with cooking practices, usage of local media or highly frequented places is necessary.

BEST PRACTICES AT EACH STAGE OF THE COLLECTION PROCESS

Analysis of the results of the pilot projects as well as experiences shared with us by people involved in household UCO collection in Austria, Portugal, the Netherlands, Belgium and Italy let us make a summary of the key best practices to follow. They are divided into four stages of the household UCO supply chain.

Exhibit 21: Household UCO collection supply chain (key stages)



Stage 1:

- School education about the necessity of UCO recycling and newspaper articles promoting the oil collection in the region prove to be the most effective promotional activities.
- Introducing incentives such as discounts for edible oil or lotteries for people who actively recycle their UCO encourages individuals to collect the oil and not pour it down the drains.
- Disposing of UCO in small specially-designed containers or bottles and not pouring the oil directly into the big container. It is more comfortable for individual people as they do not get dirty while disposing of their oil.
- Distribution of hermetic recyclable containers and funnels to facilitate the collection of UCO at home.

- The small containers used by residents have to be easy to clean and well sealable in order to lock the smell inside.

Stage 2:

- Constant monitoring of the most used disposal points and surveys among residents asking where to open new collection points in order to choose places that are most convenient for the local people.
- Establishing a uniform sign for UCO collection points around certain area to help people easily find the collection place.
- Co-operation with other waste collectors, supermarkets, etc. on informing the UCO collectors once the containers are full.
- Establishing a digital monitoring system that would inform the collectors once the container is full and needs emptying.
- Collection points in supermarkets and shopping malls proved to be most effective as people can dispose of the oil while going shopping and do not have to make a separate trip to hand in their UCO.

WELL-ORGANISED DISPOSAL

To optimize the costs, the disposal cannot be scheduled too often. Yet, full containers can discourage people from bringing their UCO. A system informing about how full the containers are, should be put in place by co-operating with waste companies, shopping malls, schools, etc.

- Co-operating with scouts and sports clubs to promote UCO collection and supporting local clubs at the same time with money earned on the UCO collection.

Stage 3:

- Well-isolated containers made from resistant materials prevent spillages of oil and protect it from changing weather conditions.
- Placing the containers in areas closed for the night, private and highly frequented ones or where there is monitoring installed to prevent thefts and vandalism.

Stage 4:

- Involvement of players from the whole supply chain and their close co-operation help to optimize the operation along the whole supply chain.

The majority of best practices refer to the first stages of the household UCO supply chain as they differ largely from the collection system established at restaurants and catering services and their operational side is not yet well known to the collectors. Stages 3 and 4, however, are similar to what is already known to collectors who work with restaurants, hotels or catering services and therefore require less theoretical analysis.

PRACTICES TO AVOID WHILE SETTING UP HOUSEHOLD UCO COLLECTION

As household UCO collection is still in its early development stages, collectors have to determine themselves which practices work and which result in failure. However, it is critical not to discourage individuals from recycling their UCO in the process as it is a pre-requisite for the system's existence.

Stage 1:

- Not explaining to the inhabitants why it is so important to recycle their UCO and not pour it down the drain. If they do not understand it, they will never develop a habit of collecting and properly disposing of their oil.

- Lack of advertising or advertising through wrong channels. As UCO recycling is a very new phenomenon, people have to be constantly reminded they should do it, how and where.
- Not taking regular feedback from inhabitants on what is not working well and how it can be improved.

Stage 2:

- Not putting enough attention to the esthetic side, e.g. oily containers or pavement at the collection points, strong smell, might discourage people from properly disposing of their UCO.
- Establishing collection points in places that are not highly frequented by people and thus they have to make an extra trip to dispose of their UCO. In that case, few will actually decide to do it.

Stages 3 and 4 have significantly less impact on the habits formation of individuals and thus cannot directly discourage inhabitants from household UCO collection. At the same time, they are already quite well organised as they resemble the process used by collectors while gathering UCO from restaurants and hotels.

POSSIBLE REGIONAL LIMITATION TO BEST PRACTICES

THEFTS

Stealing UCO both from restaurant backyards as well as from household collection points is a common problem nowadays as UCO has become a commodity. The collection points should be localised in places where they are well lit, monitored or in places such as shopping malls, schools, etc.

As already stated above, the application of best practices is not universal and some of them are highly dependent on cultural and regional factors. Thus a thorough background analysis including surveys among inhabitants has to be carried out in order to better understand the habits of the individuals in a given region. This, in turn, will allow the collectors to predict which practices could work and which have to be adjusted.

CLIMATE INFLUENCE

As the quality of UCO deteriorates with low temperatures, the containers should be well isolated, especially in the countries where winters are quite cold. Otherwise low temperatures will solidify the oil making it difficult to empty the container.

One of the factors that varies most among the analyzed collection systems is promotion. According to feedback received from people responsible for household collection systems in different countries that we interviewed for this report, choosing right media is critical. At the same time, when asked for the most efficient promotional channels, their answers varied significantly. In the Netherlands, the promotional campaign encompassed an array of different channels and the person interviewed was unable to distinguish the most effective one. Instead, they said that it is rather the omnipresence of advertising, brochures and radio programs that makes the campaign successful. In Spain and Portugal information sessions for inhabitants proved to attract a lot of attention as people could easily ask questions and demand explanations. In Italy, newspaper articles describing the project in details and mapping the nearby collection points turned out to be an effective means of promoting the household UCO collection.

Analysis of everyday habits can also be useful as, according to the people interviewed, inhabitants are willing to bring their UCO bottles or containers to the shopping malls,

PROXIMITY OF FINAL BUYERS

As the economic factor is extremely important in the household collection, proximity to final buyers of UCO is crucial as it allows for saving costs on logistics.

supermarkets or open air markets as they go there regularly and do not need to make an additional trip. In the Netherlands, schools also proved to be an effective location for UCO collection points. In Spain, containers located in the streets are highly popular.

The climate also influences some aspects of the household collection, for example the location of the collection points and the type of containers used. In regions where the temperatures can be extreme, either very low or very high, the containers have to be well isolated to prevent freezing of the oil (in the case of very low temperatures) or unpleasant smell in hot climate. Additionally, they should also be located inside in order to avoid 24-hour exposure to extreme weather conditions.

While determining the frequency of collection and the number of collection points we should not forget about the cooking habits of people in the analyzed region. There are some countries where people use more oil as they eat more fried food while in some regions limited amount of oil is used as fried dishes are much less popular. This is one of the decisive factors while estimating the financial viability of the household collection system in a given region.

Last but not least, people's mentality is one of the decisive factors that influences the success or failure of such an initiative. In countries where recycling of other materials is a well engraved habit, inhabitants will be more willing to add UCO to their recycling routine. At the same time individuals who are not used to recycling will need some time and motivation to adjust to collecting UCO. Here, some incentives such as discounts for edible oil, for example, can be helpful.

SEPARATION OF UCO AND OTHER OILS

It is important to educate people that they cannot mix veg oils and animal fat with mineral oils as then they cannot be recycled. Collection in bottles and not in bulk also prevents from spoiling bigger quantities of oil.

Implementation of a household collection system

Apart from the experiences coming from countries that have already established household UCO collection systems to some degree, there are some general guidelines that have to be taken into consideration. In order to simplify, we have grouped them into four different factors: geographic, financial, awareness and operational. They are described in greater details in the following sections.

FOUR TYPES OF FACTORS TO CONSIDER

Geographic factors

Population and population density can help to determine the number of collection points needed in a given region. It can also help to schedule the potential frequency of oil collection whether centralised or decentralised.

The type of dwellings dominating in a given area influences the type of collection used. Decentralised collection can often work better in less densely populated areas with more single family houses. UCO can be picked up together with other types of waste to minimize the costs. At the same time people do not have to make a trip to a collection point which, in case of areas with lower population density, can be located quite far.

The choice of type and location of the containers will depend on the climate, yet, this was already described in more detail in the previous section.

Awareness factors

Are there any promotional programs already in place? If yes, how is it possible to enhance their effectiveness? If there are no such programs, they should be launched even before starting the collection system to make people aware of the necessity to recycle UCO. Survey among inhabitants about most used promotional channels for such initiatives can be a good start. Contacting other organisations carrying out similar programs to get some information about media used can also be a good idea.

Choice of groups to target with the promotional materials is also an important aspect. The majority of interviewed collectors believe that children are the best audience as they learn fast and they have enthusiasm for acting and helping the environment. It is also a long term investment as shaping habits of children is easier and more durable. Later they will pass them onto their children. Thus school education might be an important part of the success of household collection projects across Europe.

Financial factors

As operational costs of household collection system are quite high compared to UCO collection from the professional sector, it is very important to estimate whether it is possible to collect enough oil to cover the costs. This is, however, not an easy task as the quantities collected are extremely hard to predict and may vary from month to month. Thus, the operational side has to be adjusted in practice to achieve financial viability.

In the case of existing UCO household collection projects, the organisers succeeded at getting the financial and organisational help from local authorities in preparing the promotional campaign across the targeted region. This reduces the costs and helps get people's attention. Other sponsors, as well as companies willing to pay for advertising their products, e.g. edible oils, on the containers distributed to individuals, can also significantly lower the total costs of the collection.

Operational factors

Finally, we have to take into consideration operational factors that will influence the daily operation of the collection system. In Italy, for example, the founders of the system Per Olivia claimed that it took them a lot of time to convince the local authorities and get the permission to place the UCO containers in public spaces. In Spain, it was the contrary as the collectors found it much more difficult to get the agreement of private shopping centres to put their containers inside the malls.

The number of collectors willing to undertake the household UCO collection is also an important factor as these companies already have the equipment, human resources and know-how to make the project work.

MAJOR COSTS TO CONSIDER

The list of major costs to consider while calculating the financial viability of a household collection system was made using the information obtained from interviews carried out with people involved in existing UCO collection from households and from analysis of outcomes of several pilot projects. **The real cost of each of the items listed below will depend largely on the country, yet, their weight in the total cost of establishing a household collection system should be similar across all Member States.**

There is also a number of solutions that can bring partial reduction of some of the costs. A more detailed overview is presented in the table below:

Exhibit 22: Major costs of household collection system

Weight in total cost	Cost	What does it include?	Possible reduction?
	**Awareness campaign**	Providing information about UCO recycling possibilities	Involvement of schools, media, etc. as partners
	**Packaging**	Containers in collection points and small containers distributed to people	Placing advertisements on the small containers, using oil / water bottles
	**Logistics**	Transporting UCO from collection points to the cleaning place	Co-operation with the local waste collecting companies
	**HR**	Picking up UCO, checking and emptying the bottles	Co-operation with the local waste collecting companies
	**Issues**	Thefts, damages, contamination with mineral oils	Minimizing the probability of each issue
	Place	Renting place for collection points in supermarkets, etc.	Placing more collection points in public areas, schools, etc.

It is extremely hard to get any type of financial data about the collection as this information is often considered confidential. However, some of the expenses connected with promotional campaigns were revealed after the projects were over. A brief overview of two campaigns is presented in the table below:

Exhibit 23: Costs of promotional campaigns

Project	Channels used	Total cost	Number of people targeted	UCO collected per person
EMAC, Portugal	leaflets, 100 posters, newspaper articles, 1 outdoor billboards, 24 UCO container itself, 650 funnels, action on the streets of the city center: distribution of leaflets and free funnel to help pour the UCO from the frying pan to the bottle, one short movie at multimedia outdoor.	**€1,200**	**10,000**	**0.9 kg**
Resitejo, Portugal	leaflets, 5 local newspaper advertisements	**€1,024**	**5,000**	**0.03 kg**

These are costs for relatively limited local campaigns that cannot be easily extrapolated to estimate the investment necessary for a national campaign. Estimating the financing needed for such an extensive campaign like the one in Belgium will depend on a number of factors: the channels used, the country in which the campaign will be launched, target group, environmental consciousness of the inhabitants, size of the population, etc. In Belgium, the promotional campaign itself cost around 1 million euro (the details of the campaign are described in greater detail in part 4). 59% of the money was spent on national media: 50% on TV and 9% on advertising in newspapers. The remaining 41% covered additional activities such as lotteries, distribution of free funnels, leaflets, etc.

FACTORS INFLUENCING COSTS

As the citizens in most of the Member States are not aware that UCO can be recycled, **the precondition for success is a well-organised information campaign**. This, however, can be costly as it should target the majority of people living in the area, use a multitude of channels, extend for a longer period and be quite frequent, at least at the beginning. The costs, however, can be partially mitigated by involving media, local authorities, schools and by getting sponsors involved in the commercial part of the project.

Placing the collection points in supermarkets and shopping malls is more convenient and effective, yet, increases the costs as these are privately-owned places. These costs can be lowered or fully eliminated if the containers are placed in the streets, parks, schools, etc. However, collectors in Belgium and the Netherlands, for example, claim that **containers placed in shopping centres are much more effective than the ones in the streets.** So, in that case, lower cost might result in smaller collected volumes.

The more collection points there are and the more widely distributed they are, the higher the costs. Yet, if they are too far from housing areas, people get discouraged from properly disposing of their oil and the project becomes financially challenging. Yet, the experience of already existing systems proves that placing the containers in most frequented places is more important than providing higher number of containers. People are willing to bring their UCO while they go shopping, for example, but are not willing to

The precondition for success is a well-organized information campaign

make a separate trip just to throw their UCO into the dedicated container.

The choice of decentralized household collection system also increases the costs due to higher needs for human resources. These can be mitigated by choosing the centralized system instead which is cheaper and easier to co-ordinate. In Spain, however, there was an attempt made at reducing the costs of decentralized system by employing handicapped people to collect the oil from individual houses and thus getting some financial support from the state.

Specially designed containers distributed to the inhabitants can be costly even if they are reusable as they have to be well sealed, they cannot break easily and have to prevent the smell from going out of the container. To reduce the cost collectors can find companies that would like to put their advertising on the container and thus cover its cost. Inhabitants might also be encouraged to bring their UCO in plastic bottles used before for vegetable oil or water. These are not as comfortable to use as specially designed containers, yet, they are easily available to everyone and are free from the point of view of the collector.

Summary of the findings

The majority of the practices described in this section are, to a large extent, culture specific and will have to be adjusted depending on the country or region of application. Therefore, **it is necessary to make a thorough local research on the habits and customs of people in a given area before deciding on the household collection strategy**.

Some of the issues and solutions are universal and will generally apply to all countries, for example, safety concerns, protection of the containers from damages, leaking, etc. Involving numerous market players such as local governments, waste companies, water-cleaning plants, etc. is also always helpful in faster development of the household collection system.

The necessity to make the collection process as simple and user-friendly as possible is also a priority across all Member States. Moreover, people have to understand well why it is important for them to recycle UCO instead of pouring it down the drains. They need to see the reason and the results.

Finally, financial planning of a household UCO collection system will also depend on the situation in a given region. It will be dependent on the level of development of the UCO collection that is already in place, on the involvement of waste collection companies, local authorities, market prices, etc. It is hardly possible to get detailed information about costs that already established collectors have, yet marketing and promotion seems to be the major ones.

PROACTIVE MEMBER STATE SUPPORT: CASE STUDY

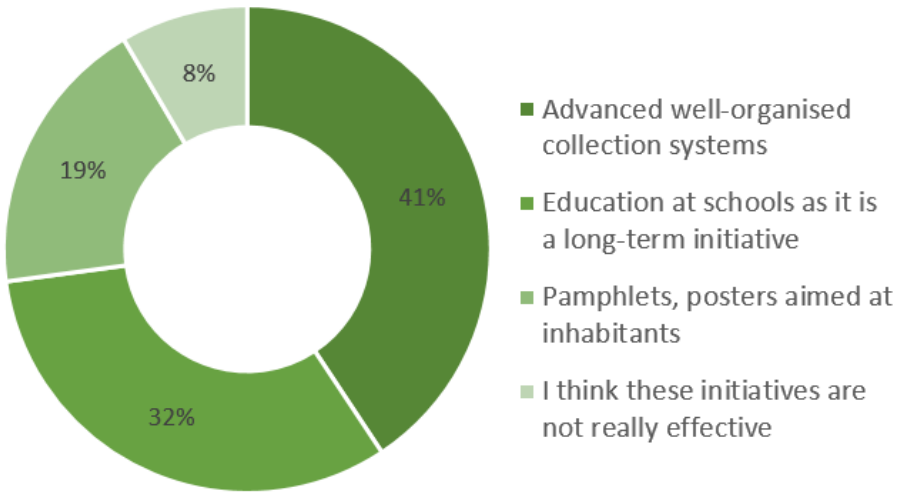
Analysis of chosen promotional campaigns

The absolute pre-condition for any household UCO collection system to work is convincing people to collect and properly dispose of their oil. Financial viability of the system depends largely on the quantities collected. In order to maximize the percentage of household UCO resources that get collected, a successful promotional and informational campaign is necessary.

In a survey carried out among collectors in the EU we have asked them what types of activities could help develop the industry and convince people to recycle their UCO. **41% of respondents believe that a well-organised collection system would encourage people to collect and properly dispose of their UCO.** This is proven by the experiences in Belgium and the Netherlands where, together with the development of the system, the number of people collecting their oil grew significantly.

32% of the respondents said that development of household UCO collection depends on the education at schools as it is a long-term initiative. Finally, 19% of people filling out the survey claimed that various types of pamphlets, posters, etc. aimed at inhabitants can increase the success of household UCO collection systems.

Figure 24: What type of promotion could help to develop the industry and convince people to properly dispose of their UCO at home?



Understanding the importance of communication with the inhabitants while developing the UCO collection system, each of the countries or organisations launched some

kind of promotional campaign. However, the campaigns vary largely between countries in their duration, extensiveness and results.

The Netherlands and Belgium run the most extensive campaigns involving all kinds of media channels. They are both organised on national level and target all groups of people.

In **Hungary and Slovakia**, the campaigns are limited to petrol stations where the containers are placed. The target group for now are mostly car users fuelling their vehicles at MOL and Slovnaft stations. Unless the promotional activities are extended and collection points placed also in other places, the reach of the collection system will be limited.

In **Denmark**, the campaign was launched under the Recoil project, yet, the pilot there was not successful and the initiative was abandoned.

In such countries as **Spain, Portugal, UK or Sweden**, the informative campaigns are run on local levels and their size varies between municipalities.

The promotional campaign in **Austria** covers more than half of the country's territory, yet, is much less complex than in Belgium, for example. The Austrians rely mostly on informative brochures distributed in public places, posters and advertising on the UCO containers.

Fliers and newspaper articles are among the most used promotional channels. However, many others are also used:

UCO CONTAINER

Advertising placed directly on the containers in the streets to increase their visibility

POSTERS AND BILBOARDS

Placed around the cities: in the streets, shopping malls and on the buses for maximum exposure

NEWSPAPERS

Articles and advertising in local newspapers allow for transmitting detailed information on the reasons for UCO recycling, location of the collection points, usage of the collected UCO and significance of the project

SPECIAL PROJECS

Lotteries, prizes, etc. organised as incentives to convince people to collect their UCO

BROCHURES AND FLIERS

Distributed to inhabitants with post, in supermarkets, etc.

INFORMATION SESSIONS

Organisation of meetings, information points, theatre plays, etc. to inform people about harmful effects of pouring UCO down the drains

Distribution of free containers for UCO collection

MERCHANDISE

Distribution of pens, cloth bags, stickers, notepads, etc. with information of UCO recycling possibilities and facts about UCO

VIDEOS AND RADIO ADVERTISING

Video spots shown in TV but also in buses and other public places

Radio spots

BELGIUM: THE OIL GHOST CAMPAIGN

Belgium went beyond a traditional campaign and opted for creating a **widely recognisable image for the whole initiative**. They cooperated with a professional advertising agency to design for them a concept of the Oil Ghost that gave an identity to the campaign of Valorfrit. It was used in all media channels, from pamphlets to TV spots in order to increase the visibility of the initiative and make people more familiar with the whole concept.

The storyline behind the campaign is that the Oil Ghost is a threat for the pipelines and therefore should stay in the UCO container. The hunt for the Oil Ghost is on and the TV spots present the development of the events. The last spot was an interview with the Ghost and had two versions: one for the northern part of the country and one for the South of Belgium.

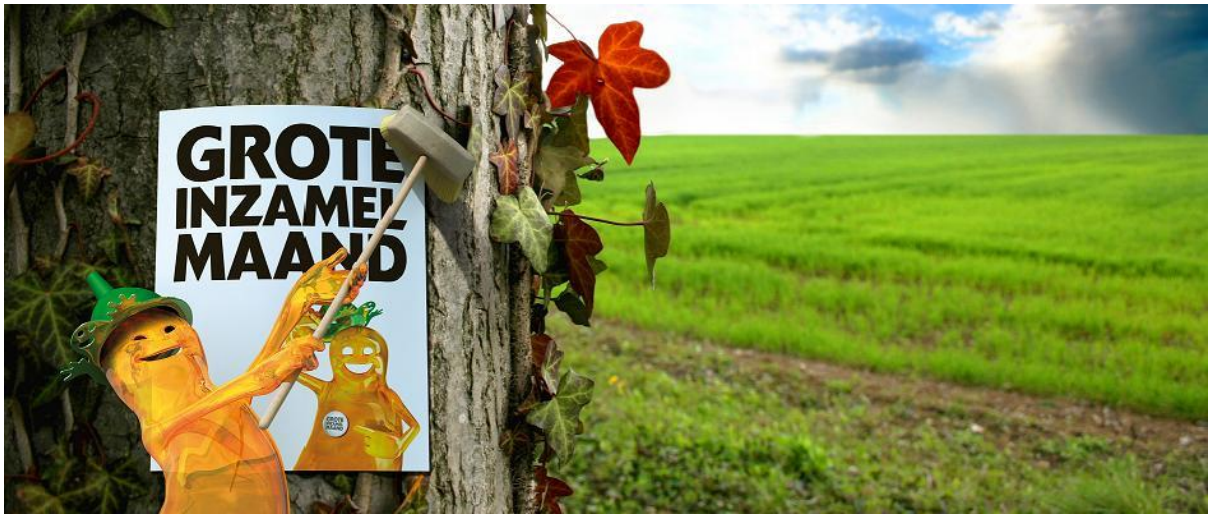
Research showed that in Wallonia, people are more easily convinced to recycle UCO when presented with harmful effects of pouring the oil down the drains. In Flanders, however, recycling itself is the main motivation. This shows that **the campaign, in order to be maximally successful, has to be tailor made due to cultural differences.**

The key channels used in the Belgian household UCO promotion were TV and magazines. They were chosen due to their wide target audience and visual aspect. Magazines, in addition, gave the possibility to transfer more content. Therefore, they complemented each other very well.

In addition, special funnels were distributed (700,000 units) among inhabitants as constant reminders of the necessity to recycle UCO at homes. The Ghost Oil character was placed also on the UCO containers, collection points, posters across the country (more than 2,600 displays), etc. to further entrench the collection habit among the Belgians.

In order to give more incentives to the individuals they also organise “Mois de la Grande Collecte” (Month of Great Collection). Each inhabitant bringing at least one litre of UCO can enter the lottery to win bicycles, movie tickets, or a trip to New York. Such initiatives are organised regularly to create habits of collecting UCO at homes.

Figure 25: Examples of materials used in Belgium


GROTE
INZAMEL
MAAND


MAAND
CINEMA
GROTE INZAMEL MAAND


ze hebben mij de fles ingedraaid

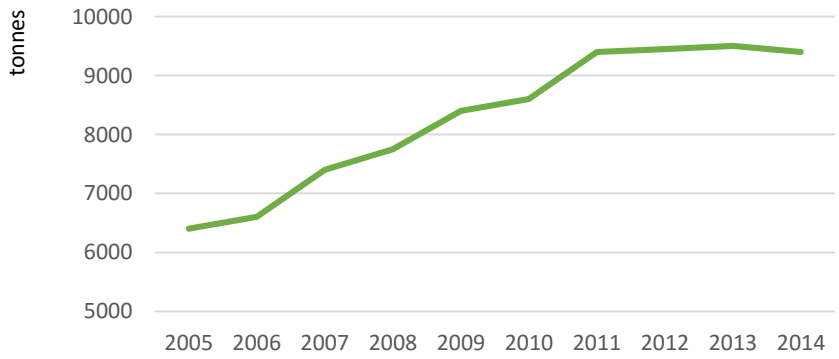

Oh non, un jour ils m'ont attrapé
avec un entonnoir,
© ComicHouse.nl

59% of the budget for the promotion is spent on TV spots and magazine coverage. The media budget is not distributed evenly between the regions as 40% was allocated to promotion in Flanders (60% of the Belgian population) and 60% in Wallonia and Brussels (the remaining 40% of the population). The division of the budget was made on the basis of number of people still not recycling UCO at homes. The target group of the promotional campaign were people between 25 and 54 years old.

The campaign was financed with the money coming from the fees collected from veg-oil producers who had to subscribe to the system, however, recently the subscription is free which puts in question the financing of the marketing campaign.

The graph below shows how the collection of fats and oils from households has grown over the years since the campaign was launched. The recent decrease in collection volumes is mostly due to falling veg-oil consumption at individual households. Overall, we can conclude that the promotional campaign in Belgium was highly effective, increasing the collection volumes by nearly 50%.

Figure 26: Development of UCO household collection in Belgium



DENMARK: LACK OF SUCCESS

Denmark ran a promotional campaign from November 2013 to May 2015. It was focused on the municipality of Viborg and the town of Ørum but at the same time the aim was also to involve national media and bring attention of all the country to the project.

During the first three months the promotion consisted of:

- Invitation leaflets sent to the inhabitants of Ørum about the open meeting about the project
- Newspaper ads in Viborg Municipality with information about the pilot project and the benefit of collecting UCO
- Press release in national media about the pilot project including invitation for journalists to attend the open meeting
- Creation of open Facebook group for continuous updates and a possibility for consumers to give feedback on their experiences with collection and participate in a contest to win prizes
- Delivering of collection buckets with directions leaflets to all households in Ørum.

The second part of the campaign involved:

- Follow up press release after open meeting
- Second round of ads in local media to remind people about the project
- Continuous communication of collection progress via the RecOil website and Facebook group to show that the project can work
- Delivering teaching materials about recycling of UCO/fat to all schools in the municipality in order to have school children influence parents to participate (available to schools all over the country by request)
- Posters placed in proximity of collection points in order to create awareness
- Open meeting 2: Review of the experiences of participants
- Drawing of the winners of the contest from the Facebook group.
- National press release on the results of the project
- Articles about the project, its results, people's experiences with collection

Figure 27: Examples of materials used in Denmark

Forsøgsordning i Viborg Kommune
I Viborg Kommune kan alle borgere indtil 15. januar 2015 hente en fedtespand på den lokale genbrugsplads, indsamle deres fedt i spanden og aflevere det igen til genbrug. Så bliver det omdannet til biodiesel af Daka og solgt på benzintanke i hele Danmark.

Bidrag til indsamlingen og hjælp os med at finde ud af, om det er en god ide!

FRA FEDT TIL BIODIESEL ELEVHÆFTE

RECOIL

Hvis vi skal begrænse CO_2-udledningen med det samme, er vi nødt til at finde på noget, som kan bruges i de biler, vi allerede kører i. Fedtaffald kan faktisk bruges i mange af vores biler i dag – nemlig dem, der kører på dieselolie – og affald vil vi fortsat lave i dagligdagen, så derfor kan man kalde det en vedvarende energikilde.

Mange ved ikke, at der er rigtig meget energi i fedtaffald. Faktisk er der kun 6% mindre energi i fedt, end i den dieselolie du kan købe på benzintanken. Det kan du altså køre næsten lige så langt på, hvis det bliver lavet om til biodiesel.

Man kan nemlig ikke bare fylde fedtet direkte i tanken – det ville ellers være dejlig nemt.

For at lave fedtet til biodiesel skal man udover fedtet tilsætte to ting; metanol og kaliumhydroxid. Det gør man på en stor biodieselfabrik.

Biodiesel kan laves af alle typer fedt. Mange steder producerer man for eksempel biodiesel lavet af rapsolie, der kommer fra rapsplanten med de flotte gule blomster, som du kender fra markerne om sommeren.

FØRSTE GENERATIONS BIODIESEL (1.G)

Det kaldes første generations biodiesel, når man bruger planter, som er dyrket til det ene formål at lave energi. Når planter gror, bruger de en mængde CO_2 til at vokse, og det er den samme mængde, der frigives, når olien brændes af som biodiesel i motoren. Derfor kaldes energien fra raps CO_2-neutral. Men hvis man tæller det energiforbrug med, som bruges på at dyrke og høste marken med store traktorer og transportere og forarbejde rapsfrøene samt det rene vand, man bruger til at vande planterne med, er det ikke længere en rigtig god ide. Samtidig kan man ikke dyrke mad på de marker, som bruges til raps, og det er ikke så godt, når der er mange mennesker og dyr i verden, der skal have mad.

ANDEN GENERATIONS BIODIESEL (2.G)

Anden generations biodiesel er meget bedre. Det er nemlig ikke lavet af planter, som kunne spises, men af affald fra landbrug, madproduktion, restauranter eller affald fra vores egne køkkener. Hvis vi alle samler vores fedtaffald sammen i en "fedtespand" i stedet for at putte det i skraldespanden eller i vasken, så kan det laves om til biodiesel, som vi kan putte i vores biler. Så kan vi undgå en masse CO_2-forurening, fordi vi ikke behøver at bruge lige så meget dieselolie i bilerne.

The campaign has been highly focused on a local level, yet, with fair amount of attention from national media. It was regular and consistent through the whole period. The campaign covered multiple channels: TV, newspapers, direct meetings, school education, etc. In spite of all the efforts, the pilot project in Denmark proved to be unsuccessful as the quantities collected were scarce. The only issue while carrying out the promotional campaign was the cost of sending promotional materials via post as in Denmark it is very expensive compared to other countries in the EU. This definitely limited the target audience reached by the campaign as this kind of advertising is popular and efficient in Sweden, for example.

In spite of all the efforts, the pilot project in Denmark proved to be unsuccessful

In a survey carried out among inhabitants of the municipality in which the pilot project was run, some people claimed that they had no oil to dispose of. Danish people tend to have a healthy diet and do not usually fry a lot. However, this can be misleading. Many of the people claiming they have no oil, for sure do not realise that after all they have some UCO that they simply put down the drains. The quantities might not be high but it is hard to believe there is no oil at all.

It is hard to determine whether it was the campaign itself that failed or the collection system in the form introduced in Denmark was not convenient enough to convince people to properly dispose of their UCO. This shows, however, that in order to re-introduce the idea in Denmark, much more background analysis has to be done on the organisational part of the possible household UCO collection system.

ITALY: PER OLIVIA

In Italy, Adriatica Oli, a private UCO collecting company, started household collection supported by a well-thought-out promotional campaign already in 2004. The campaign is called Per Olivia and its key mission is informing people about the benefits of proper disposal of UCO at homes and shaping oil recycling habits among the inhabitants of Italy. They work in close co-operation with local authorities and schools.

Their informative activity is divided into two focus groups: adults and children in primary schools. For adults, they organise a number of events moving from locality to locality. These events predominantly consist of:

- Meetings with people during which the representatives of Per Olivia explain the benefits of recycling UCO at homes and the so far achieved results in order to encourage people to join.
- Audio-video shows organised with the help of Olivier, a special truck designed for this purpose. It is parked in town squares, parking lots, marketplaces or other public spots in order to increase the visibility of the campaign. People can come and ask questions about the UCO collection.

All these activities are organised with the help and permission of local authorities. According to the interviewed person from the Per Olivia campaign, convincing the authorities to co-operate is often a challenge. However, they say that it is getting easier with time as the campaign is becoming more and more successful.

When it comes to involving and educating children, Per Olivia organises:

- Educational days to explain children the importance of recycling oil
- Olii@mpiadi, which is a competition between schools for who will collect more UCO per student
- Various tournaments and competitions with prizes for children thematically related to UCO recycling

In addition, they have an active Facebook page where people can see all the upcoming events and all the news as well as results of the so called Olii@mpiadi. Their initiatives are well-covered by local media: newspapers and local TV channels which helps them reach wider audience.

Figure 28: Examples of materials used in Italy

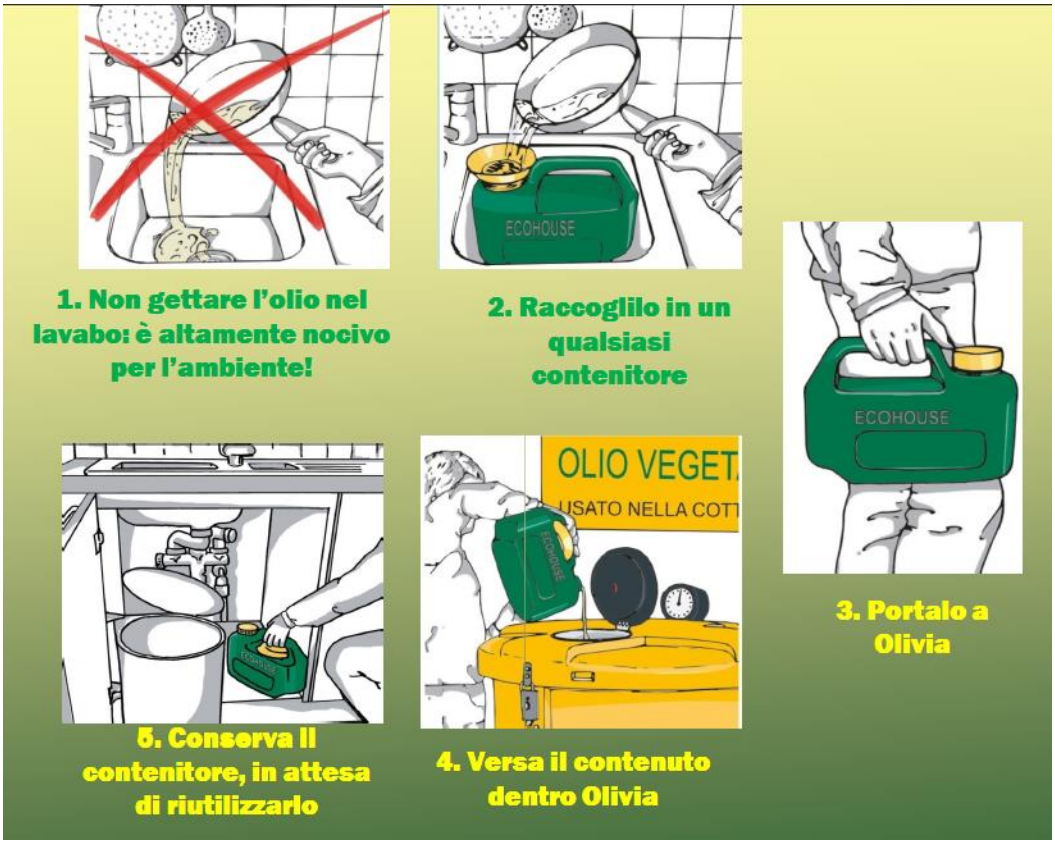
OLII@MPIADI

DATI DI RACCOLTA OLII@MPIADI ASCOLI A.S. 2015-2016 - GENNAIO / MAGGIO 2016

ISC	PLESSI	UNITA' LOCALE	NR BAMBINI	TOT BIMBI PER ISC	Q. RACCOLTO Kg	Q. RACCOLTO Kg per isc	Kg PRO CAPITE	Kg PRO CAPITE per isc	% DI RACCOLTA	N. DI RITIRI	PUNTEGGIO	CLASSIFICA
lucioni	VIA SPERANZA	VIA SPERANZA	59	59	460	460	7,80	7,80	37%	3		
asc oli centro	SAN DOMENICO	L.GO GIARDINO D'INFANZIA	38	332		625	0,00	1,88	0%	1		
	ASCOLI CENTRO MALASPINA	VIA MALASPINA ANGOLO VIA ALFIERI	294		625		2,13		50%	3		
borgo solestà	S.SERAFINO DA GALIE	VIA S. SERAFINO DA MONTEGRANARO	105	105	20	20	0,19	0,19	2%	2		
suore concezionis te	SUORE CONCEZIONISTE	VIA S. GIACOMO 3	117	117	130	130	1,11	1,11	10%	2		
preziosissimo sangeu	ISTITUTO PREZIOSISSIMO SANGUE	VIA PAUSOLA	74	74	20	20	0,27	0,27	2%	2		
			687		1.255	1.255						

TABELLA AGGIORNATA AL 22/02/2016


Olimpiadi - Una gara entusiasmante


1. Non gettare l'olio nel lavabo: è altamente nocivo per l'ambiente!
ECOHOUSE
2. Raccoglilo in un qualsiasi contenitore
ECOHOUSE
3. Portalo a Olivia
OLIO VEGET
USATO NELLA COTT
4. Versa il contenuto dentro Olivia
5. Conserva il contenitore, in attesa di riutilizzarlo


facebook
Sign Up
Email or Phone
Password
Log In
Per Olivia
is on Facebook.
To connect with Per Olivia, sign up for Facebook today.
Sign Up
Log In
Create Page
Per Olivia
Community
Timeline
About
Photos
Countdown
More
1,045 likes
Per Olivia
Giovedì 3 marzo Per Olivia farà tappa alla scuola di via Speranza di Ascoli Piceno. Spiegheremo ai ragazzi come fare la raccolta differenziata degli oli vegetali esausti e perché è così importante farla propria.
Countdown

Summary of the findings

As the examples described in the previous section showed, the promotional activities vary greatly between campaigns depending on a number of factors. Cultural differences influence greatly the choice of promotional strategy. Belgium, for example, decided to change the ending of the TV spot depending on the region in which it was going to be broadcasted. This attitude shows a lot about the importance of cultural and geographical adjustment.

Financial possibilities of the organisers also play a major role in the choice of the type and reach of the campaign. Unless a multitude of stakeholders, both from private and public sector, are involved, the campaign on a national scale, like the one in Belgium, is hard to launch.

The choice of target audience is also important as some may prefer to focus more on children, like in the case of Per Olivia, while others will try to involve all the inhabitants.

The selection of the key information to broadcast may also vary. For some of the target groups it is crucial to know why it is important to recycle their UCO while others are more motivated by getting to know all the disadvantages of improper disposal of the oil. This was heavily underlined by the campaign organisers in Belgium. It has to be determined in advance whether a given target audience is more motivated by positive or negative information.

Cultural differences influence greatly the choice of promotional strategy

It is important, though, that the campaign has a long-term plan in order to make sure that people develop a UCO recycling habit. Therefore, the campaign should be repeated in some form and should also provide people with feedback on the results. The frequency of the recurring campaign will depend largely on the results, habits of the target audience, advancement of the collection systems, etc.

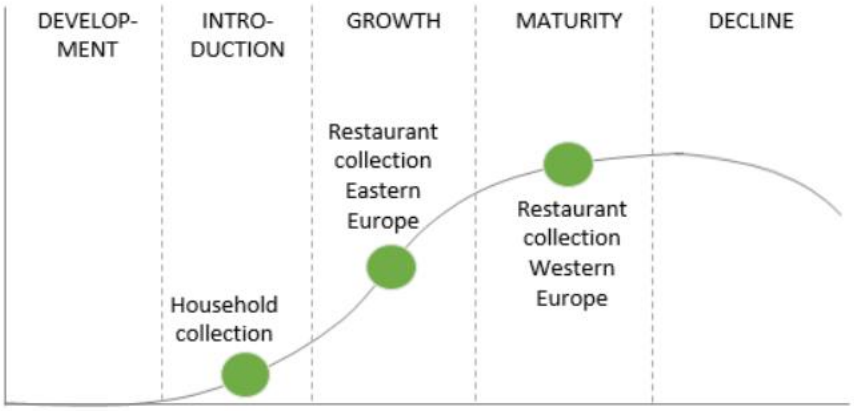
Last but not least, it is important to involve people in the collection as much as possible so that they understand why they need to do it and what improvements it can bring.

ESTIMATION OF UCO RESOURCES FROM HOUSEHOLD AND PROFESSIONAL SECTORS

UCO resources and collected volumes across the EU

Based on the analysis of the household UCO collection systems in Europe carried out in the previous parts of this study, we can see that the sector is only in its early stage of development. At the same time, collection from restaurants, food producers, etc. is already well-developed, especially in Western Europe where the sector has already achieved its maturity. In Eastern Europe, however, UCO collection from the professional sector is still in its growth stage and there is much room for development.

Exhibit 29: Maturity of the UCO collection sector in Europe



UCO MARKET: HOUSEHOLD COLLECTION

Household UCO collection has been, so far, introduced only in some Member States. Moreover, the development stage of these systems varies greatly across countries. While in Belgium and the Netherlands the collection system is well-developed covering all the territory of both countries, UCO collection in Slovakia or Hungary is only in its early stages of development. There are countries where only pilot projects have been introduced, e.g. Greece or Denmark. Finally, in some Member States there seems to be no major activity related to UCO collection from individual households, e.g. Poland or France.

While estimating the resources of UCO coming from households, **the key factor to take into consideration are dietary habits of people**. These will influence the consumption of vegetable oil per capita and the percentage of consumed oil that is fried vs. used for salads, baking, etc. In some countries, e.g. Spain or Belgium, people traditionally consume more deep-fried dishes which increases the per

capita UCO resource. At the same time, in countries such as the UK, for example, we can observe an increase in consumption of ready-made meals. This will decrease the per capita oil consumption at households as heating up such dishes generally does not require any additional ingredients.

It has to be noted, though, that **collecting 100% of the estimated resources is hardly possible.** Setting up household collection systems in urbanized areas is much easier than in the countryside where houses are spread across large areas of land and people are not willing to drive to the nearest collection point to dispose of their UCO as that collection point might be in the nearest town or city. In some countries, especially in those where recycling is a widely-accepted habit, people will more naturally add UCO collection to their daily routines. Others might do it less regularly. Additionally, some of the UCO might get stolen or contaminated by mineral oil.

The key factor to take into consideration are dietary habits of people.

HOUSEHOLD UCO: QUANTITIES COLLECTED

In many cases, it is possible to obtain the quantities collected from households directly from the people responsible for the collection. This is the case with Belgium, the Netherlands or Austria, for example. Data about individual pilot projects is also readily-available. There are, however, countries in which household collection is organized by several local collectors and waste disposal companies at the same time and they do not have the obligation to report the collected quantities. This is the case of Sweden, for instance. In such a situation, we have to rely on the estimations made by people involved in the collection there because no statistics are available.

HOUSEHOLD UCO: RESOURCE ESTIMATION

By UCO resources here we understand the used cooking oil produced in each country by individual households. As there is data available about the quantities of vegetable oil sold to individual consumers in each Member State, the major difficulty is to establish the percentage of oil that remains and can be collected. Following the calculations of ADEME, we assumed that 30% of all the oil used at homes can be recycled.[3]

The quantities of veg-oil sold do not include olive oil due to the fact that in majority of countries in Europe people do not use this type of oil for frying. However, we made an exception for four countries: Spain, Portugal, Italy and Greece, where we based our calculations on both veg oil and olive oil.

Given the fact that the percentage of oil that will be left for recycling depends largely on the dietary habits of people, we decided to amend our calculations for several of the Member States. It has to be noted, though, that the percentage of remaining oil is only a rough approximation based on the difference with the habits of French people as measured by ADEME.

In **Scandinavian countries (Sweden, Denmark and Finland)** we decreased the percentage of left-over UCO to 25% after consultations with people involved in the collection there. Scandinavian people traditionally eat less fried food than other European nations. They are also very health-conscious.

[3] Gomy, Catherine and Gregoire Thonier, *Etude Des Filieres Des Sous-Produits Des IAA Pouvant Etre Utilises Pour La Production De Biocarburants (Graisses Animales, Huilesalimentaires Usagees Et Sous-Produits Devinification)*, 2015.

We increased the ratio to 40% for Spain, Greece, **Belgium and the Netherlands** as in these countries people consume large amounts of deep-fried food. In Belgium and the Netherlands, it is mainly due to French fries being part of traditional cuisine.

The **UK** is a separate case where we set the ratio at 25%. Even though fried food is largely popular there and constitutes part of the traditional cuisine, the fast growing popularity of ready-made meals limits the usage of oil at homes.

All these calculations helped us arrive at the potential resources of UCO at individual households in each of the Member States. It has to be remembered, though, that due to the fact that the calculations are based and depend on such factors as culinary habits and individual preferences, the results are only rough estimations.

Exhibit 30: Estimations of household UCO resources across the EU (in tonnes)

Country	UCO collectable household resources	Collected UCO	% collected
Italy	156,000	15,000*	9.6%
Germany	65,000	1,209	1.9%
France	52,000	0	0.0%
Spain	232,000	5,000	2.2%
Romania	49,000	0	0.0%
Poland	47,000	0	0.0%
United Kingdom	42,000	8,600*	20.5%
Hungary	29,000	400	1.4%
Bulgaria	27,000	0	0.0%
Portugal	30,000	1,000	3.3%
Czech Republic	16,000	500	3.1%
Croatia	12,000	0	0.0%
Belgium	13,000	8,300	63.8%
Slovakia	10,000	360	3.6%
Netherlands	12,000	3,600	30.0%
Austria	7,000	2,352	33.6%
Greece	20,000	14	0.1%
Lithuania	6,000	0	0.0%
Latvia	4,000	0	0.0%
Estonia	4,000	0	0.0%
Slovenia	4,000	0	0.0%
Finland	3,000	0	0.0%
Sweden	3,000	1,400	46.7%
Denmark	2,000	1	0.1%
Ireland	2,000	0	0.0%
Cyprus - modelled	4,000	0	0.0%
Malta - modelled	2,000	0	0.0%

Luxembourg - modelled	1,000	0	0.0%
TOTAL	**854,000**	**47,736**	**5.6%**

* The figures for Italy and the UK come from the estimations of collectors. However, we find them very high and quite unrealistic when compared to the statistics on the Dutch collection, for example, where the household recycling of UCO is already relatively well organized. That is why, in the later parts of the study we used lower numbers based on interviews with people responsible for collection in these countries.

HOUSEHOLD COLLECTION: RESULTS

In our estimations we have shown resources of UCO possibly available and collectable in each Member State. As described in details above, it is generally 30% of all the veg oil sold in the country.

In 14 countries of the EU there is no household UCO collection. These are small countries such as Lithuania or Estonia but also high-potential countries such as France. Greece and Denmark have been part of the Recoil project, yet the collection there has not been popularized beyond the pilot project towns. Thus, the quantities collected there constitute less than 1% of the estimated resources.

Czech Republic, Slovakia and Hungary are in the process of introducing and popularizing household UCO collection on their territories. The process, however, is quite slow, the number of collection points is not high enough and the promotional campaigns are not very successful. People in these countries do not yet have a well-entrenched habit to recycle paper, glass, etc., let alone UCO.

The total percentage of household UCO collected in the EU is below 6%

Germany started introducing the Austrian household collection system but it did not yet spread beyond South-Eastern localities of the country and covers a relatively small territory. According to the available data less than 2% of UCO resources from German households are actually collected, which leaves big growth potential.

Austria, the Netherlands and Belgium have the most well-organized collection systems. However, while in Belgium around 60% of UCO is already being collected, Austria and the Netherlands collect around 30% of the resources which leaves big growth potential.

In Spain, Portugal and Sweden we can observe a number of locally organized collection systems. The number of UCO collected from Spanish households comes from official country statistics while the data for Portugal is modeled on the Spanish figures as exact statistics were not available. We can see that the collected UCO still constitutes a small percentage of the actual resources which leaves much room for improvement. In Sweden, however, nearly ½ of UCO is already being collected. It is to a large extent based on the already well-entrenched habit of Swedish people to recycle all their waste, however, there is no national-scale system but rather local ones.

The figures for Italy and the UK come from the estimations of collectors. However, we find them very high and quite unrealistic when compared to the statistics on the Dutch collection, for example, where the household recycling of UCO is already relatively well organized. That is why, in the later parts of the study we used lower numbers based on interviews with people responsible for collection in these countries.

All in all, the total percentage of household UCO collected in the EU is estimated around 5-6% which shows that there is still a lot to be done to develop that sector.

UCO MARKET: PROFESSIONAL SECTOR

In some European countries there are as many as 60-80 companies collecting UCO from restaurants, hotels, food producers, etc. However, in majority of the countries there are 3-5 leaders who hold 70-80% of the market, others being only small local companies. As many of the collectors are small family-owned businesses, it is difficult to obtain detailed data about how much oil they collect every year. This information is often considered confidential.

In Western Europe, the catering sector is well-covered by collectors. The majority of UCO there is already being collected as the network of collectors is well developed. Quite a big potential of additional UCO that is not yet captured exists in Eastern European countries where only a few collectors per country are present. Also countries with well-developed tourism have bigger UCO collection growth possibilities.

The differences between UCO collection across Europe result mainly from the level of development of the countries, ecological consciousness of their inhabitants and rules governing UCO collection. Currently, also in Eastern Europe, people start seeing the importance of recycling and the value of UCO as a commodity. Therefore, the sector keeps on developing.

PROFESSIONAL SECTOR: QUANTITIES COLLECTED

In order to estimate the quantities of UCO collected per country from the professional sector, we carried out a series of interviews with collectors across Member States and analyzed their monthly offers. This allowed us to have an overview of the UCO offered by the collectors in each country and arrive at an estimation of yearly quantities collected.

The results were then cross-checked with the estimations made by collectors about the quantities collected in their countries. This information was obtained either via interviews or through survey carried out at the beginning of this study. Finally, the numbers were verified against data available through other similar studies in order to get the sense check of the results. unfortunately, in most countries, there is no obligation to report the quantities of UCO collected and thus there is no readily-available data to use.

Exhibit 31: Professional sector UCO collection and resources across the EU (in tonnes)

Country	UCO collected	Estimated possible growth potential	Total resource
Italy	59,000	20%	71,000
Germany	140,000	15%	161,000
France	44,000	20%	53,000
Spain	65,000	20%	78,000
Romania	19,000	40%	27,000
Poland	32,000	30%	42,000

United Kingdom	100,000	15%	115,000
Hungary	4,000	30%	5,000
Portugal	22,000	20%	26,000
Czech Republic	10,000	30%	13,000
Croatia	3,000	30%	4,000
Belgium	29,000	15%	33,000
Slovakia	4,000	30%	5,000
Netherlands	60,000	15%	69,000
Austria	15,000	20%	18,000
Greece	21,600	20%	26,000
Lithuania	3,000	20%	4,000
Latvia	2,000	30%	3,000
Estonia	1,500	30%	2,000
Slovenia	3,000	30%	4,000
Finland	4,000	30%	5,000
Sweden	8,000	20%	10,000
Denmark	5,000	20%	6,000
Ireland	12,000	20%	14,000
Cyprus	1,000	40%	1,000
Malta	500	40%	1,000
Luxembourg	2,000	20%	2,000
TOTAL	**675,600**		**806,000**

Exhibit 32: Household UCO collection as percentage of total UCO collection (in tonnes)

Country	Household collection	Professional collection	Total	% collected from households
Slovakia	360	4,000	4,360	8%
Hungary	400	4,000	4,400	9%
Denmark	1	5,000	5,001	0%
Sweden	1,400	8,000	9,400	15%
Czech Republic	500	10,000	10,500	5%
Greece	14	21,600	21,614	0%
Austria	2,352	15,000	17,352	14%
Portugal	1,000	22,000	23,000	4%
Belgium	8,300	29,000	37,300	22%
Netherlands	3,600	60,000	63,600	6%
Italy	7,000	59,000	66,000	11%
Spain	5,000	65,000	70,000	7%
United Kingdom	5,000	100,000	105,000	5%
Germany	1,209	140,000	141,209	1%
TOTAL	**36,136**	**542,600**	**578,736**	**6%**

PROFESSIONAL SECTOR: UCO RESOURCES

As UCO resources we understand here the used cooking oil produced in each country by:

1. Restaurants: fast food bars, traditional places and catering
2. Food-processing industry
3. Supermarkets and hypermarkets

In the professional sector around 70% of produced UCO can be collected.

While trying to arrive at best estimation of potential UCO resources coming from the professional sector we evaluated several methods. The bottom-up methodology based on the calculation of number of UCO producing establishments and the quantities of UCO they produce does not give credible results as there is no reliable data on the number of bars and restaurants in each Member State. We tried to estimate the potentially collectable resources by applying a top-down methodology and starting from the veg-oil consumption per country. However, there were several issues with this method again due to lack of reliable data. The main issue is that there are no available statistics on veg-oil consumption by sector for each of the Member States. As a result, we decided to rely on market experts and collectors (3-5 per country, depending on availability) in each of the countries to estimate the not-yet-captured quantities of UCO. We have carried out a survey sent out to collectors in all Member States as well as made several phone interviews with main market players in some of the countries. This allowed us to arrive at the rough estimations of the total market size in the EU.

Exhibit 33: Total resources across all Member States (in tonnes)

Country	Household resources	Professional resources	Total resources	% coming from household
Italy	156,000	71,000	227,000	69%
Germany	65,000	161,000	226,000	29%
France	52,000	53,000	105,000	50%
Spain	232,000	78,000	310,000	75%
Romania	49,000	27,000	76,000	64%
Poland	47,000	42,000	89,000	53%
United Kingdom	42,000	115,000	157,000	27%
Hungary	29,000	5,000	34,000	85%
Bulgaria	27,000	8,000	35,000	77%
Portugal	30,000	26,000	56,000	54%
Czech Republic	16,000	13,000	29,000	55%
Croatia	12,000	4,000	16,000	75%
Belgium	13,000	33,000	46,000	28%
Slovakia	10,000	5,000	15,000	67%
Netherlands	12,000	69,000	81,000	15%
Austria	7,000	18,000	25,000	28%
Greece	20,000	26,000	46,000	43%

Lithuania	6,000	4,000	10,000	60%
Latvia	4,000	3,000	7,000	57%
Estonia	4,000	2,000	6,000	67%
Slovenia	4,000	4,000	8,000	50%
Finland	3,000	5,000	8,000	38%
Sweden	3,000	10,000	13,000	23%
Denmark	2,000	6,000	8,000	25%
Ireland	2,000	14,000	16,000	13%
Cyprus - modelled	4,000	1,000	5,000	80%
Malta - modelled	2,000	1,000	3,000	67%
Luxembourg - modelled	1,000	2,000	3,000	33%
TOTAL	**854,000**	**806,000**	**1,660,000**	**51%**

PROFESSIONAL SECTOR: RESULTS

While assessing the potential resources for each of the Member States we estimated the still possible total collection growth of each of the markets based on interviews carried with market experts. The professional collection sector is not yet very well developed in Romania, for example, where we believe 40% growth is still possible. In Cyprus and Malta, according to our estimations, the total collectable resources are also around 40% bigger than the volume currently collected. In these countries the potential to capture is still high because of the not so well developed collection sector and well-developed tourism.

Growth potential of around 30% is still possible in the Eastern European countries where the UCO collection system is not yet covering all the professional sector. These are small countries such as Lithuania, Latvia or Estonia but also bigger ones like Poland, for example. Well covered markets such as Italy, France or Portugal can still grow by approximately 20%. Germany, UK or the Netherlands have a very mature collection sector so the growth there should not be bigger than 15% of what is already being collected.

According to our estimations around 84% of the collectable UCO resources produced by the professional sector are already collected in the EU. The sector is quite mature in Europe, especially in its Western part. Yet, the potential to capture should still be around 130,000 tonnes per year.

In the 14 countries that have some household collection activities, only around 6% of total UCO collected volumes comes from households. On the EU scale, it is even below 6% that comes from households.

Out of total UCO resources in all the Member States, around 50% come from households. This varies between countries. In countries with well-developed tourism, more UCO is produced by the professional sector. The same is true about the countries that are big producers of processed food. At the same time, poorer countries have higher UCO production at individual households.

UCO collection sector until 2030: possible scenarios

The oil consumption in the EU is falling down[4] which is caused mainly by growing health awareness among Europeans. At the same time, the ecological consciousness of people is growing and they pay more attention to recycling.

The potential growth of UCO collection is easier to estimate in the professional sector than in the case of households. It is because the former is generally regulated by law while the latter depends on a number of factors that are difficult to measure, e.g. recycling habits, cooperation of local authorities, urbanization, etc.

PROFESSIONAL SECTOR: 2030 PREDICTIONS

UCO collection from the professional sector is already quite mature in Europe and the growth possibilities are limited. On the one hand, the fall in veg oil consumption will decrease the UCO resources in the EU. On the other hand, the increased production of ready-made food is growing, which increases the amount of oil used in the professional sector and decreases the oil used at homes as people replace cooking meals with heating up ready-made ones. However, due to lack of detailed data, we decided to disregard the possible changes in oil resources in the professional sector as we expect their influence to be marginal here.

As shown in Exhibit 3, the possible estimated growth of the UCO collection from the professional sector is around 20% which means around 130,000 tonnes still to capture. However, it is difficult to say whether it is possible to achieve that growth within the next 5, 10 or 15 years.

HOUSEHOLD COLLECTION: 2030: PREDICTIONS GIVEN NO PROACTIVE SUPPORT

Veg oil consumption at households is expected to keep falling in the long run. This will decrease the potentially available UCO resources and collection volumes given no proactive support coming from the Member States. Unless there is an organized campaign introducing and promoting the collection of UCO at homes, individuals will not take the initiative themselves. Therefore, we assume that without proactive support, there will be no real growth in the quantities collected by country. Taking into consideration the decrease in veg oil consumption, the collection at households in the EU could fall down by as much as 7%.

[4] Euromonitor International, *Passport stats on vegetable and seed oil retail volumes.*

Exhibit 34: Estimated UCO collection volumes from households in 2030 given no proactive support from Member States (in tonnes)

Country	UCO household resources 2015	UCO household resources 2030	Collected UCO 2015	Collected UCO 2030
Italy	156,000	150,000	7,000	6,000
Germany	65,000	65,000	1,209	1,000
France	52,000	50,000	0	0
Spain	232,000	239,000	5,000	5,000
Romania	49,000	52,000	0	0
Poland	47,000	47,000	0	0
United Kingdom	42,000	51,000	5,000	5,000
Hungary	29,000	30,000	400	0
Bulgaria	27,000	27,000	0	0
Portugal	30,000	32,000	1,000	1,000
Czech Republic	16,000	17,000	500	0
Croatia	12,000	13,000	0	0
Belgium	13,000	13,000	8,300	8,000
Slovakia	10,000	10,000	360	0
Netherlands	12,000	13,000	3,600	3,000
Austria	7,000	8,000	2,352	2,000
Greece	20,000	15,000	14	0
Lithuania	6,000	6,000	0	0
Latvia	4,000	4,000	0	0
Estonia	4,000	5,000	0	0
Slovenia	4,000	4,000	0	0
Finland	3,000	3,000	0	0
Sweden	3,000	4,000	1,400	1,000
Denmark	2,000	3,000	1	0
Ireland	2,000	3,000	0	0
Cyprus – modelled[5]	4,000	5,000	0	0
Malta - modelled	2,000	3,000	0	0
Luxembourg - modelled	1,000	1,000	0	0
TOTAL	**854,000**	**873,000**	**36,136**	**32,000**

HOUSEHOLD COLLECTION: 2030: PREDICTIONS GIVEN PROACTIVE SUPPORT

These are only rough estimations of possible household UCO collection growth until 2030 as the factors influencing the development of such systems are hardly measurable. The

[5] Modelled due to lack of exact data of veg-oil sales

response of people, commitment of local authorities or changing dietary habits all influence the pace at which household collection develops in a given country, yet, they are impossible to fully account for in the calculations.

In order to arrive at some estimations, we have based our calculations on the experiences of the already existing programs. Therefore, following the example of Belgium, we assumed that countries which currently have no collection system could arrive at 20-30% of their resources within the next 15 years. In Belgium, they captured above 60% within a shorter time frame yet we decided to stay at 20-30% as the Belgium case is very special due to the fact that the country is small with high percentage of people living in urbanised areas. Therefore, collection there is easy to organise. There is also a well-developed network of collectors that could easily add household collection to their services.

We decided to use the 30% in the case of a few small countries such as Luxembourg, Malta, Lithuania, for example as the collection there should be relatively easy to organise. In the case of countries where the UCO collection in the professional sector is less developed, we decided to lower the percentage to 15% as household collection will be more difficult to organize there. It will be also more challenging to convince people there that they should add UCO recycling to their daily habits.

In the case of countries with already relatively organised household collection, we estimate that the growth potential could be around 10% of the currently collected volume. The estimation was based on the Belgian experience. For Italy we increased the percentage to 20% as the initiatives there are not coordinated yet and better organisation of the systems could further increase the effectiveness of the collection.

Exhibit 35: Estimated UCO collection volumes from households in 2030 given proactive support from Member States (in tonnes)

Country	UCO resources 2030	% collected in 2030	Collected UCO in 2030
Italy	150,000	20% growth	18,000
Germany	65,000	20%	13,000
France	50,000	20%	10,000
Spain	239,000	20%	47,800
Romania	52,000	15%	7,800
Poland	47,000	15%	7,050
United Kingdom	51,000	20%	10,200
Hungary	30,000	15%	10,045
Bulgaria	27,000	15%	9,044
Portugal	32,000	20%	9,253
Czech Republic	17,000	15%	5,920
Croatia	13,000	15%	4,249
Belgium	13,000	10% growth	9,130
Slovakia	10,000	15%	3,009
Netherlands	13,000	10% growth	3,960

Austria	8,000	10% growth	2,587
Greece	15,000	15%	2,250
Lithuania	6,000	30%	3,704
Latvia	4,000	30%	2,102
Estonia	5,000	30%	2,442
Slovenia	4,000	15%	967
Finland	3,000	30%	1,750
Sweden	4,000	10% growth	1,540
Denmark	3,000	15%	632
Ireland	3,000	15%	542
Cyprus - modelled	5,000	30%	869
Malta - modelled	3,000	30%	439
Luxembourg - modelled	1,000	30%	423
TOTAL	873,000		**188,707**

The above estimations are very optimistic and assume maximum involvement of all the actors of the supply chain.

Summary of the findings

UCO collection from the professional sector is already mature in Europe therefore the growth potential is limited. We estimate that currently around less than 700,000 tonnes are being collected yearly in the EU while the potential still left to capture is around 130,000 tonnes. This is what we estimate to be collectable volumes.

Household collection is only in its introductory stage and has big growth potential in the EU. We estimate that currently less than 50,000 tonnes of UCO gets collected per year from households across Europe. At the same time, potential resources should be at the level of 800,000 – 900,000 tonnes per year. This results in around 800,000 tonnes of UCO still to capture. However, as household collection has to be organized from scratch in majority of the countries, capturing all the resources will take time and require a long-term development scenario. We estimate that until 2030, maximally around 200,000 tonnes per year could be collected in the case of active and continuous support of Member States. Yet, this is a very optimistic calculation.

CONCLUSION

Recycling of used cooking oil is gaining more and more attention as its improper disposal contaminates water and causes sewage blockages. Collection of UCO from restaurants and catering companies as well as from food producing units is already quite well-developed in the EU, however, recycling at individual household is still not very popular in most of the EU countries. But every year, more and more people realize that used oil is not only a waste but also a resource and can be recycled and reused. Therefore, it is important to further develop the household UCO collection system and promote oil recycling in the EU.

It is clearly visible that only Belgium, the Netherlands and Austria managed, so far, to develop comprehensive large-scale UCO collection systems for individual households. The collection in Sweden is working very well, however, these are locally organized systems and no country-level organization has been introduced. In some countries such as Italy, Spain, UK, for example, there are some initiatives aimed at establishing a household UCO collection system but they are far from the Dutch or Belgian initiatives that cover the whole territory of each of the countries. Judging by the success of these two national systems, there is a major need for country support in order to successfully launch a national household collection system.

It has to be remembered, though, that the organization and functioning of the systems are, to a large, culture specific and have to be adjusted depending on the country or region of application. Therefore, it is necessary to make a thorough local research on the habits and customs of people in a given area before deciding on the household collection strategy.

Some of the issues and solutions described in this report are universal and will generally apply to all countries, for example, safety concerns, protection of the containers from damages, leaking, etc. Involving numerous market players such as local governments, waste companies, water-cleaning plants, etc. is also always helpful in faster development of the household collection system.

The necessity to make the collection process as simple and user-friendly as possible is also a priority across all Member States. Moreover, people have to understand well why it is important for them to recycle UCO instead of pouring it down the drains. They need to see the reason and the results.

Finally, financial planning of a household UCO collection system will also depend on the situation in a given region. It will be dependent on the level of development of the UCO collection that is already in place, on the involvement of waste collection companies, local authorities, market prices, etc. It is hardly possible to get detailed information about costs that already established collectors have, yet marketing and promotion seems to be the major ones.

The extent of promotional activities varies greatly between campaigns depending on a number of factors. Cultural differences influence greatly the choice of promotional strategy. Belgium, for example, decided to change the TV spots depending on the region in which it was going to be broadcasted. This attitude shows a lot about the importance of cultural and geographical adjustment.

Financial possibilities of the organisers also play a major role in the choice of the type and reach of the campaign. Unless a multitude of

stakeholders, both from private and public sector, are involved, the campaign on a national scale, like the one in Belgium, is hard to launch.

The choice of target audience is also important as some may prefer to focus more on children, like in the case of Per Olivia, while others will try to involve all the inhabitants.

The selection of the key information to broadcast may also vary. For some of the target groups it is visibly more important to know why it is important to recycle their UCO while others are more motivated by getting to know all the disadvantages of improper disposal of the oil. This was heavily underlined by the campaign organisers in Belgium. It has to be determined in advance whether a given target audience is more motivated by positive or negative information.

It is important, though, that the campaign has a long-term plan in order to make sure that people develop a UCO recycling habit. Therefore, the campaign should be repeated in some form and should also provide people with feedback on the results. The frequency of the recurring campaign will depend largely on the results, habits of the target audience, advancement of the collection systems, etc.

Last but not least, it is important to involve people in the collection as much as possible so that they understand why they need to do it and what improvements it can bring.

Household collection is only in its introductory stage and has big growth potential in the EU. We estimate that currently less than 50,000 tonnes of UCO gets collected per year from households across Europe. At the same time, potential resources should be at the level of 800,000 – 900,000 tonnes per year. This results in around 800,000 tonnes of UCO still to capture. However, as household collection has to be organized from scratch in majority of the countries, capturing all the resources will take time and require a long-term development scenario. We estimate that until 2030, maximally around 200,000 tonnes per year could be collected in the case of active and continuous support of Member States.

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