



# ANALYTICAL STUDY ABOUT WASTE OIL COLLECTION NETWORKS



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## **1. INTRODUCTION**

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Apart from being an important raw material for the production of biodiesel, kitchen waste oils are strong agents of contamination in water and soil. Among other aspects, they can be toxic for aquatic or soil life when they are absorbed through skin or gills, they can damage the respiratory system, as well as get skin and feathers dirty. Furthermore, they difficult the gaseous exchange with the atmosphere, preventing the breathing process in living beings, even suffocating micro organism communities and destroying their habitats, causing their death.

In order to avoid environmental problems due to a wrong management of this waste it is important to dump it properly. In this sense, the waste oils shouldn't be dumped through sewers, because it makes the purification system more expensive and it difficult the best treatment for this kind of products.

So the use of these kinds of oils in the production of biodiesel looks like a good way to avoid the problems that a wrong management carries, creating a better alternative to the traditional fossil based fuel.

In Spain, the use of biodiesel in cars is almost new. The first Spanish biodiesel facility started working in Cataluña in 2002, and now there are twenty five petrol stations that sell this product in the community, about two hundreds in all the country.

Since then, the interest for the biodiesel has grown significantly. More and more companies begin to work in its production, and others have seen business transporting the waste oils to the biodiesel plants.

At the moment, the collection system is not very developed in Spain. According to the law related to wastes, the local administrations have to manage the urban wastes, which is the category that includes the vegetable waste oil. It's up to the towns the collection, the transport and, at least, the elimination of the urban wastes in the way the present law orders.

However, although the City Councils are committed to carry this process, they don't have to go beyond, so in many cases only a non-selective collection is carrying out, and when is not, a private company, previous agreement with the city council is who collect for free this kind of waste.

But more and more companies are becoming interested in the collection of this waste. In the other hand, public administrations are starting to be aware about the problem that the vast volumes of this waste dumped in the public sewers can generate.

Although the waste oils can be used with other goals, like home made soap production, the most appropriate solution seems to be its use as raw material for biodiesel production. In this study the waste oil collection networks of the participant regions are analyzed and compared.

## 2. EXISTING WASTE-OIL COLLECTION NETWORKS IN EACH AREA

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### BURGOS (SPAIN)

#### Companies in charge of collection

The current private waste management company in charge of the collection of waste-oil in the province of Burgos is Tagús Burgos (Tratamiento de Aceites y Grasas Usadas), whose facilities are located in the Industrial Area called “Los Pedernales”. It is registered in the Regional Register of Waste Managers (G.R.N.P. CL 41/01) and its contact data are the following:

TAGUS BURGOS, Tratamiento de Aceites y Grasas Usadas  
Carretera N-I, Km. 234  
09195 Villagonzalo Pedernales (Burgos)  
Telephone: 947 257014  
Fax: 947 257014

#### Waste oil collection systems used

The waste oil collection system starts from the moment when oil becomes waste, this means after they are used. In general we are talking about oil and fat used for frying. The producers/owners of waste-oil must contact the waste-oil management company and request them a collection point. These collection points are usually metal and plastic containers at the producer’s place. Depending on the producer and the quantity of waste-oil it produces, the management company supplies different types of containers:

- **Municipal Clean/Green Spots**

In some municipal waste management facilities called “Clean Spots” and owned by municipalities, the waste-oil management company puts big containers (1.000 litres volume) where waste-oil from citizens and small producers is stocked. This waste is monthly collected by the company. The main municipal “Clean Spots” in the province of Burgos are located in the cities of Burgos (Punto Limpio Norte y Punto Limpio Sur), Briviesca, Medina de Pomar, Villarcayo and Aranda de Duero. In Burgos, the City Council distributed in 2005 several specific small containers (2,5-litre bottles) between citizens in order they can collect the waste-oil at home and bring it to the Clean Spot.



*1.000 litres container  
for Municipal Clean Spots*

- **Markets and Shopping malls in Burgos City**

There are some big markets in the capital of the province where big containers (250 and 600 litre-volume) for the collection of waste-oil can also be found. As Green Spots are usually located in the outskirts of the city, these collection points make the citizens' deposit of waste-oil easier. These markets are Mercado Norte, Mercado Sur, Mercado G-9 and Galerías México.

- **Restaurant activity**

Restaurants and other hotel industry owners can choose the most suitable container to stock waste-oil according to their production and space availability of the place, but the most common system is using metal containers of 50 and 200 litres volume. Almost 850 restaurant establishments from the whole province use the provincial waste-oil collection and management network. The waste-oil from restaurants is collected by the management company periodically, depending on the needs of each establishment. Apart from the programmed collection routes, the restaurants can request for specific collection services if the containers are full.



*200 litres container  
for restaurant and hotel industry*

- **Municipal Urban Waste Collection Points for Recycling**

A new provisional collection service is now being offered to municipalities. The waste-oil management company places 200 litre-containers at the public urban waste collection points for recycling. In these points people can usually find specific containers to deposit glass, paper and plastic wastes. Nowadays, the management company has waste-oil collection containers in the municipal waste collection points of four towns of the province. Once the municipal technicians check that the container is full, the management company is called and they collect the waste-oil.



*Waste-oil container placed at the  
municipal urban waste collection point  
for recycling*

● **Other collection points**

The local management company also collects waste-oil used for frying in other different places with a high production of waste-oil. These places are mainly schools and factories with their own dining room. Some of these factories are Metalibérica, DFS, Explosivos Río Tinto, Nuclenor, etc. Moreover, there are some food industries in the province which produce high quantities of waste-oil used for frying (Eurofrits, Cofrits, Matutano, etc.). The local management company also collects this waste-oil. The type of container depends on the needs of each facility.

All the collection points described have their own specific container/s. At the end of 2007, the total number of collection points in the province of Burgos was around 1.100. The local management company collects the full containers with different periodicities depending on the type of point (weekly, monthly or once each two months). In any case, the collection is established in different routes around the province:

- Burgos City: ten different routes.
- Rest of the province: eight different routes.

<b>WASTE-OIL COLLECTION NETWORK IN THE PROVINCE OF BURGOS</b>  <b>COLLECTION ROUTES</b>	Route Bernardas	Burgos City
	Route Avda. del Cid	
	Route Bernardillas	
	Route Centro-Llanas	
	Route Ctra. Valladolid	
	Route Fuentes Blancas	
	Route Gamonal 1	
	Route Gamonal 2	
	Route Plaza de Vega	
	Route S. Pedro de la Fuente	
	Route Aranda ciudad	Rest of the Province
	Route Aranda provincia	
	Route Melgar	
	Route Miranda	
	Route Pradoluengo	
	Route Ctra. Santander	
	Route Ctra. Soria	
	General weekly route	General
	Clean Spots and Markets	

**Future processing of the waste oil collected**

Once the collectors transport the oil collected to the stocking area, located in the company facilities in Villagonzalo Pedernales, the waste is analysed and treated to eliminate water and big impurities and it is then delivered to the main biodiesel production plant in the North of Spain, Bionor Transformación. This plant is located in the neighbouring province of Alava, and uses waste-oil and pure vegetable oil as raw material for the production of biodiesel. One of its main suppliers of waste-oil is Tagús Burgos, the local waste-oil management company.

**Main problems and difficulties found by the waste-oil management companies in the process and possible solutions to overcome them**

The main problems and difficulties found by the waste-oil management company in the development of the collection network are related to the refusal of many waste-oil producers (restaurants, factories, etc.) to use specific containers to keep the waste-oil in their establishments. According to the local management company's opinion, local authorities should force these establishments to contract waste-oil management services if they want to obtain their Business License. Another important barrier is the lack of specific budgets from local authorities aimed at improving the current collection network. Burgos Provincial Energy Agency will work in the improvement of the collection network during the duration of PROBIO Project. In these sense, big department stores and city councils will be contacted in order to propose them the establishment of new collection points.

## **AVILA (SPAIN)**

With a length of 26 months, between May 2004 and February 2006, it was developed a European pilot project across the program ALTENER called " Local & Innovative Biodiesel "Place and Innovative Biodiesel ", with the participation of public organisations and companies from seven countries of the European Union coordinated by the Regional Entity of Energy from Castilla y León (EREN - Spain). The principal aim of the project was the development of specific actions for the collection of vegetable used oils on domestic level, promoting the biodiesel production on regional level, a well as the analysis of the biodiesel characteristics obtained from several kinds of vegetable oil, in accordance with the conditions of each region, as well as to establish a recommendations set on more suitable mixtures of different sorts of oils and fats, which assure a biodiesel production on high quality, helping to reach the fixing aim by the European Directive 2003/30, relative to the promotion of biofuels use in transport, fixing in 5,75 % the consumption minimal percentage of fuels for the year 2010.

Developed pilot experience in Castilla y León was carried out in ten localities, in the province of Avila it counted on the County Council of Ávila collaboration, across the Energy Agency of the Province of Avila, as well as on the Town hall of the city.

Between the selected localities there were Avila City, Arévalo, Casillas, Navalunga, Piedralaves and Sotillo de la Adrada.

The collection systems that were in use in the project were:

- Mobile units based on a draft programme
- Fixed Points: urban containers with 600L. of capacity
- Collection in schools with small containers
- Collection in neighbours' communities with small containers

The project was reinforced by a diffusion campaign by means of divulgate chats, information at the foot of street, delivering door-to-door, mass media, etc.

At the same time there was realized a capture of samples campaign and chemical analysis of recycled oil, being detected pollution by spillages of mineral oil used habitually in vehicles in the urban containers.

With the obtained information from this pilot plan "Local & Innovative Biodiesel" the following conclusions could be obtained:

- Evaluation of recycling potential in Castilla y León, being estimated in 3.000 tons per year in the domestic sector and 6.000 t/year in the institutional sector and hotel management
- Comparative Study of collection methods used, being considered the fixed collection controlled for the domestic sector as the best system.
- Cost structure definition of collection and management of the used oil, obtaining 0.238 €/litre for average routes of 250km in which 1.000litres are gathered
- Sensibility Study which analyzes the profitability of collection system, deciding minimal quantities that promote the crossed distance, for instance for 100km it should gather a minimum of 400litres, or for 350km a minimum of 1.400litres.

### **Companies in charge of collection**

At present and fruit of the accumulated experience in the previous pilot project, there are carried out the collection tasks of fried dish oils. In the province of Avila between the companies in charge of this task, the main one it is a private organization, named EMPLEODOWN SLU, it is a question of an Authorized Manager of residues for the Junta de Castilla y Leon, that this realizing the service of used oils collection in Avila City and its province to retail level, this company is subcontracted by the public administration to realize this labour, it has the particularity that the most of its personnel are people with psychic disability by what an objective double is obtained of diminishing and valuing the residue and on the other hand the socio-economic integration of this group.

### **Waste oil collection systems used**

Collection in the province of Avila is realized distinguishing the following groups:

- Collection in neighbours' communities
- Restaurants, Residences and Schools

In the first case, a few containers are delivered to the neighbours in order to they deposit in them their fried dish oil and the workmen of the company in charge of the collection are those who spill it to the containers.

The periodicity depends on the type of place and the geographical location can be of weekly / fortnightly or monthly.

The means which it counts on realizing this collection are: a vehicle, cars to move individually the cans that can be 25 or 50litres and a central store.

### **Existing collection points and location**

Points where the collection is carried out are in Avila City and the province:

In Avila City they exist depending on the week of the month, a few certain points of agreement to the attached picture:

RECOGIDA DE ACEITES COMESTIBLES USADOS					
A PARTIR DE LA SEMANA COMPLETA DE CADA MES - HORARIO: Mañana de 11,00 a 14,30 y tarde 17,00 A 19,00 h.					
	M A Ñ A			T A R D E	
1.ª semana	11,00 a 12,00 horas	12,00 a 13,00 horas	13,00 a 14,30 horas	17,00 a 18,00 horas	18,00 a 19,00 horas
Lunes	Corte D. Bander - Tres Torres	Enrillo San Esteban	Collegio San Esteban	Herreros (Mojos) 19-42	Hiper CI La Alcaz
Martes	Plaza San Lorenzo - Plaza Santiago	De la Cruz, 13	Plaza del Pello	Mta. Sta. Rosalva - Jesús San Pedro	Hiper CI St. Jovito Galán
Miércoles	Fuente de Ulla Andilla	Valle del Carrizo, 15	Hiper CI La Serrita	Sola - De las Barandales	La Riego - Hermana de Antonio
Jueves	Luz San - Estrella de Somoza	Refor. Barde - Mta. Sta. Sotomil	Collegio Ulla VI	Mta. Sta. Sotomil - Avda. Juan Pablo II	Mta. Sta. de Somoza - Del Valle
Viernes	Jesús San Pedro - Dr. Jesús Galán	Sargento Provisional, 4	Sargento Provisional - Folla Polca	Hiper CI Dote Castro Babilado	Plaza Sta. Teresa S. Pedro del B.
2.ª semana					
Lunes	Do. Barcos Cuadernos - Sto. Toribio	Th. Muñoz Castellanos - Pedro Dominguez	Arredó de la J. Universal, 12	Agustín Rodríguez Salgado, 2-19	Veneto de las Mareas 8-10
Martes	Agustín Rodríguez Salgado, 22	Agustín Riquelme - CI Ganarín	A. Riquelme Salgado - Heredia de las Mareas	Alfonso Corrales	A. Riquelme Salgado - Hermano Caleros
Miércoles	Hermano Caleros, 27-31	Hermano Caleros, 26	Hermano Caleros, 48	Trinidad Castilla - Crisóbal Balboa	Hermano Alcazar - Reina Isabel
Jueves	Plaza de la Estación, 18	Fernández - P. de la Estación	Plaza D. Ganarín, 16	Cuadros de la Mancha - Pedro Isidoro	Cooperativa de la Mancha - Cerro Ochoa
Viernes	Capitán Alvaro Viga, 30	Bilbao - Castillo de la Riba	Cardenal Casanova - Donde Galindo	Cardenal Casanova - Cruz Capilla	Hiper CI Sagrado D. Alonso
3.ª semana					
Lunes	Virgen María 18-20	Capilla Polca - Fiosa	Capitán Polca, 17	Plaza San Roque - Jacinto Benavente	Plaza San Roque - Fontiveros
Martes	Alfonso de Mendive-Riviera II.ª Donda	P. San Roque - Alfonso II el Sabio	Plaza San Roque - Hermano Caleros	Castro de las Chapas	Hiper CI De los Mares
Miércoles	Santa Cruz Tenorio, 9	Virgen de la Purísima, 11	Collegio Conservadores de Castilla	Plaza Marina	Hiper CI Padre Victoriano
Jueves	Plaza San Francisco	San Pedro de Alcázar, 8	Collegio Pinar Palanca	Juan Pedro Babilado (S. Pio XII)	Narco el Quijote - Virgen Consolida
Viernes	Castellano Elmita S. María	Industria	Collegio Escasación	Plaza San Andrés	Hiper CI Ajates
4.ª semana					
Lunes	Plaza del Ejército	Candileja, 1	Plaza Santa Ana	Plaza Salamanca	Hiper CI Eduardo Manjón
Martes	Virgen del Espalido - Conilla y Lave	Avenida de España - Castilla y León	Fuente Saizalongo	Avenida España - Ciudad de Caceres	Ciudad de Caceres
Miércoles	Plza. de Millares - Sánchez Marino	Parque - St. Calixto	Plza. Sarrallos - De las Cogotas	Veneto del Espalido, 31	Polifuncional de la Ramonada, 8
Jueves	Plza. de los Reyes - Santa María del Rey	Plza. Sotomil - Carrera Juan Aguirre	Alcazar Pedro García Babilado	Milaga - Sánchez Marín	Plza. Sotomil - Milaga
Viernes	Plaza Santa Teresa	Mercado de Aballos	Collegio Santa Teresa	Cta. Comarcal (La Viga)	Voleibol (El Pradillo)

**EMPLEODOWN S.L.**

LAS SEMANAS INCOMPLETAS DE CADA MES SE RECOGERÁ EN LOS BARRIOS ANEXIONADOS

In the province of Avila the localities which at the end of 2007 it is proceeding to the collection are detailed later

- |                                 |                            |
|---------------------------------|----------------------------|
| 1 ALDEA DEL REY NIÑO            | 19 MAELLO                  |
| 2 AMAVIDA                       | 20 MARTIHERRERO            |
| 3 ARÉVALO                       | 21 MUÑANA                  |
| 4 ÁVILA                         | 22 MUÑO GALINDO            |
| 5 BARCO DE ÁVILA                | 23 NAVAHONDILLA            |
| 6 BARRACO                       | 24 NAVALMORAL DE LA SIERRA |
| 7 BARROMAN                      | 25 NAVALUENGA              |
| 8 BERROCALEJO                   | 26 PADIERNOS               |
| 9 BURGOHONDO                    | 27 PIEDRAHÍTA              |
| 10 CRESPOS                      | 28 RIOCABADO               |
| 11 EL BARRACO                   | 29 ROBEDILLO               |
| 12 FONTIVEROS                   | 30 SAN PEDRO DEL ARROYO    |
| 13 HERNANSANCHO                 | 31 SERRANILLOS             |
| 14 LA ADRADA                    | 32 SOLOSANCHO              |
| 15 LA COLILLA                   | 33 SOTILLO DE LA ADRADA    |
| 16 LA HORCAJADA                 | 34 TIÑOSILLOS              |
| 17 LAS NAVAS DEL MARQUÉS        | 35 VILLANUEVA DE ÁVILA     |
| 18 MADRIGAL DE LAS ALTAS TORRES |                            |

### Future processing of the waste oil collected

This organization once deposited the cans their stores, which at present are dispersed geographically, it delivers the product gathered to residues managers who are those who finally sell this product as raw material to the biodiesel plants of production. Between these intermediate managers there are BIOGRASAS, S.L. that gathers and delivers ECOSYSTEM XXI, S.L. to treat it as raw material for the biodiesel obtaining and on the other hand RAVUSA gathers and delivers to BIODIESEL CASTILLA LA MANCHA also to produce biodiesel.

Nevertheless it is working to be able to have in an immediate future of a central store that simplifies the logistic labours between the company in charge of the collection and the later managers.

**Main problems and difficulties found by the waste oil management companies in the process and possible solutions to overcome them**

With general character there is a lack of civil implication, which it is trying of overcoming with a campaign of direct diffusion that includes the insertion of wedges in the radio sensitizing the population in general. The result is being very positive and it supposes an effect of increase of the awareness. In any case, since point of improvement it detects a major information and training of the citizens.

On the other hand fruit of the experience with the pilot project, there were detected problems of inadequate spillages, as the fact of depositing the package or the spillage of mineral oils, which was spoiling the rest of the content in the container and therefore making it useless. This problem it excelled with the personalized collection, it tries to come in situ to the collection instead of arranging containers in the street, logically in those cases in which it is possible, assuring of this way the control of the spillage.

In our province and due to the low temperatures registered in winter, which can come to the 15 ° C under zero, also there are cases of beginning of frosts in the spilt product, which impedes its later manipulation, it is a question of solve with the mentioned measure previously of personalized collection, increasing the frequency in addition of the used materials in the manufacture of the containers (though this is a measure for long-dated).

## **HUELVA (SPAIN)**

In the province of Huelva, there are different companies dedicated to the waste oil management:



**Gestión Integral del  
Agua Costa de Huelva  
S.A. (GIAHSA)**  
Ctra. Huelva-Aljaraque.  
A492 Km4  
21110 Aljaraque, Huelva  
959 492 100 – Tfno.



**Oleonuba S.L.U.**  
Centro Especial de Empleo  
C/Federico Molina, nº 10  
21007 Huelva

**Bionorte S.A.**  
Polígono Industrial La  
Florida,  
Parcela 71-72  
San Martín del Rey Aurelio  
Asturias

GIAHSA is a public company in the Mancomunidad Costa Huelva, who manages the purification and the supply of water and the solid waste collection. This company has a waste oil transfer centre in its classification plant in Trigueros. There, the waste oil is stored and pre-treated (dehydration and suspended solids reduction), sending it later to a biodiesel production plant in Asturias (called Bionorte). They started this collection in 2007, becoming partner with Oleonuba, a specialized manager.

Oleonuba is a special centre which Works with handicapped people from Huelva, and it's promoted by AONES (Asociación Onubense para la Normalización Educativa y sociolaboral), association who fight for the physic handicapped people working integration. It

has been declared “of public interest” in 2007. Oleonuba’s main activity is the waste oil collection, and its store and transfer to the recycling plant in Giahsa. This company started this kind of collection in 2003, getting clients and asking to city council to collect in its towns.



**Reciclados Barroso**  
C/Toneleros, nº 71  
San Juan del Puerto  
Huelva

**VERDEGRAS,S.L.,**  
C/ Camino de los  
Enamorados, 5-4ºB,  
Puerto de Sta. María, Cádiz  
956876658, 956876441



**Bionor Transformación  
S.A.**  
Polígono Industrial  
Lacorzanilla  
LZ-2, Parcela 9, 01218  
Berantevilla - ALAVA

Reciclados Barroso is a small company in Huelva also dedicated to the waste oil collection in the province, selling them later to Verdegas, company from Cádiz dedicated to the waste oils collection and valuation. This company also collects oils in the province of Huelva. The waste oils are sent to the Verdegas valuation plant in Cádiz, and after the treatment, they are sent to a biodiesel plant in Álava, Bionor Transformación.



**Rograsa S.C.L.**  
Oficinas y planta  
Polígono Industrial El Prado Parcela R-56,  
Nave 2, 06800 Mérida Badajoz  
Teléfono Oficina y Fax: 924 38 92 44  
Móvil: 636 47 93 01  
email: [info@rograsa.net](mailto:info@rograsa.net)

**BIODIESEL ANDALUCÍA 2004, S.A (BIDA)**  
Ctra. Fuentes De Andalucía-la Campana, Km  
4,5  
41440 Fuentes de Andalucía (Sevilla)  
Tlfn: 954899016/7  
[escapatevirtual@prodetur.es](mailto:escapatevirtual@prodetur.es)

Rograsa is a company in Extremadura which has been working in the waste oil collection in Huelva for six years. They work mainly in the capital and coast. Once the oils are collected, it is sent to the store and recycling plant in Sevilla, for its treatment. After this treatment, it is sent again this time to the biodiesel production plant, BIDA, placed in Sevilla too. It's interesting that this company uses its own biodiesel production technology.

**Asociación Madre Coraje**  
Delegación de Huelva  
C/Diego de Almagro  
21002 Huelva  
Teléfono: 959.251.983



Madre Coraje Association is a Non-Governmental Organization, founded aiming to the development, mainly in Perú. It has been declared “of public interest” and it has been authorized like Dangerous Waste Manager (AN-0120). Its mission is to cooperate in the development of the poor communities in Peru and other

Latin-American countries.

This Association supports the environmental protection in Spain, since 2000, through the collection, classification and recycling of pollutants products, vegetable waste oil included, which is sent to Peru to make soap.

With the recycling, Madre Coraje gets enough money to send humanitarian help and to support their projects.

#### **Fundación Doñana 21**

Calle El Pocito, 10  
21730 - Almonte (Huelva)



It's a Foundation in the public sector in Andalusia. Since 2005, they are improving the energy sector, emphasising in the fight against the Global Warming, the renewable energy promotion and the energy efficiency.

During 2008 they are planning to improve the use of biodiesel in the region with an awareness campaign in the petrol stations. There, clients will be able to give their waste oils, obtaining discounts in biodiesel.

#### **Collection Proceses**

The normal process for the companies dedicated to collect the waste oil is to use mixture vehicles to carry out the routes. Fifty litres bins are shared out and replaced when they are full. These bins must be secure and they must be placed in restricted areas.

After the collection, a delivery note specifying the origin and destination of the waste is given to the owner, together with a waste collection accreditation, so the owner could show them to the official administration who asks for it.

The collection of these waste oils is totally free.

This collection is done in certain establishments in the hotel industry, in chosen spots inside the towns, home collection, in associations and neighbour's communities and in clean spots established by the Administration.

#### **Collection in establishments.**

The hotel industry is committed to give the waste oils they produce to a specialized manager. To make this real, Giahsa have started a campaign with information about the benefits of recycling vegetable waste oil and the possibility of convert it to biodiesel. In the leaflet the steps the companies have to follow to let a specialized manager to collect the waste oils for free using a simple phone call are detailed explained.

The normal way is to establish organized routes in which ate oils are collected once per week, per fifth teen days, per month, two months... being usual collect them once per month. Specific routes can be establishes as well, gathering those companies out of the main route.

#### **Collection in specific spots.**

In the province of Huelva, some agreements have been set among companies and city councils, establishing spots in the towns where the citizens can carry their waste oils.

In Nerva, for example, four spots have been established, splitting the town in four areas for the inhabitant's added comfort and convenience. These spots have been set in two schools, a sport facility and in the city market.

The emptying of the waste oil's bottles in the bins can generate a problem if other kind of waste are dumped, like mineral oils, that can ruin the rest of the oil. Because of that, there are town like Ayamonte in which the decision has been to let the citizens throw the waste oil in their own recipients directly in the bins, instead of emptying them in to the bins. This creates the additional work of verifying the content, so a minimum cost has been established by the company.

Many city councils have developed awareness campaigns to persuade the citizens to go to those points and to spread the habit of recycling this kind of home generated waste, in environment's benefit. In order to achieve this goal, they have used leaflets, posters and related info in their websites.



*An example of Oil Bin installed in the City Market's back. Ayamonte.*



*Examples of posters and papers related to the waste oil collection. Almonte.*

### Home collection

This kind of collection is not usual in the province. However, there are companies interested in try this type in small towns where is more common the one-floor houses.

A notable case is Lepe. In this town, with a previous agreement with the City Council, Oleonuba achieved to employ a handicapped person for the collection door-to-door of waste oil and other products (batteries, mobiles phones...). The track is done in one month and a half or two months. There was an awareness and information campaign. This person has been working in this job for two years and a half, working part-time and collecting about a thousand litres monthly. It looks like this experience has been totally successfully.

Also, Oleonuba is waiting to sign a new agreement with the Huelva City Council to experiment with this new way in a small area of the capital, assuming this one a cost per inhabitant.

### Collection in neighbour's communities and associations.

In 2003, the Huelva City Council worked in awareness campaigns directed to neighbour's communities. Nowadays, almost all of them have a special bin, letting the neighbours take their waste oil there, getting good results.

**No tires tu aceite. Ahora, nosotros lo reciclamos.**

Si reciclas tu aceite de cocinar usado, su utilidad se multiplica, y sus efectos nocivos para nuestro medio ambiente desaparecen. Porque, adecuadamente tratados, los aceites vegetales se convierten en una materia prima muy útil para la elaboración de pinturas o combustibles biodegradables. Ahora, podrás ayudar a conservar nuestro entorno de una forma muy fácil.

**Sólo sigue estos 5 pasos:**

1. Busca un recipiente grande en el que puedas guardar tu aceite usado.
2. Cada vez que tengas aceites vegetales de cocina que ya no vayas a usar más, no los tires. Deposítalos en el recipiente.
3. Cuando el recipiente esté lleno, llévalo a tu asociación de vecinos. Ellos almacenarán tu aceite y te devolverán tu recipiente.
4. La empresa Rograsa, en colaboración con el Ayuntamiento, pasará por tu asociación de vecinos para recoger el aceite usado y utilizarlo para fabricar pinturas y combustibles.
5. Vuelve a llenar tu recipiente, vuelve a llevarlo a tu asociación de vecinos, y así, estarás colaborando con la conservación de nuestro medio ambiente.

Ahora, reciclar tu aceite de cocina usado es más cómodo que nunca. Colabora y ayúdanos a conservar nuestro entorno. Cuida Huelva con nosotros.

**Ayuntamiento de Huelva**  
Concejalía de MEDIO AMBIENTE

In the neighbour's communities, it's usual to speak first with the president about the advantages and profits of the waste oil recycling. Afterwards, an announcement is done

using the mail boxes, and the situation of the bin is established (in the building basement, in a near pub, in the neighbour's community's headquarter...)

### Collection in clean spots

A clean spot is a city facility properly equipped for the collection and the temporal storage of some types of domestic wastes, vegetable waste oil included.

The citizens use these spots in free and volunteer way, cooperating to the environment protection.

The goals in these spots are:

- To achieve a right treatment for every waste, giving priority to recovering, recycling and revaluation over the elimination in rubbish dumps.
- To separate the wastes which needs a special treatment, and which cannot be dumped into the normal sewer system, to avoid problems in the equipments and environmental problems.
- Take advantage of the materials, so we can save energy.
- Involve the citizens so they were part of the good environmental practices.

Clean Spots are facilities for the collection of specific city wastes, according to the provisions of the Main Territory Plan of Andalusia's Urban Waste Management (PDTGRU). The use of these spots contributes to the environmental improvement in the region, getting a lower number of illegal dumps.

The province of Huelva counts at the moment with seven clean spots; two of them in the capital city, the rest in Valverde del Camino, Punta Umbría, Cartaya, Matalascañas and Ayamonte, not being operative these last two.

In the upcoming time, and according to the Main Provincial Waste Plans, the province of Huelva will have thirty clean spots in the south area (although is important to mention that not all the clean spot can receive the same kind of wastes).

### **Main problems found related to the waste management**

- The first problem consists in the lack on awareness in the population, whom don't understand the negative effects that the wrong management of this waste generates. So is absolutely necessary to launch awareness campaigns, because the present campaigns are only related to paper, plastics and glass. Also exists the added problem of even if the citizens are aware, they don't know what to do with to oil they don't dump. Most of them don't know about the clean spots, and this doesn't seems to be the best option, because we can assume that most of the citizen are not going to take their wastes to the spots by car. What looks like the best solution is the recycling in neighbour's associations and neighbour's communities. Anyway, more information campaigns are necessary.
- In the other hand, the companies who collect waste oils have found problems in the way people store the waste oils, sometimes mixing it with other types of oils, which is very damaging for the bins. Because of that, some companies prefer that people put the oil in their bins in some kind of recipient, so they can check it later to make sure that is the right king of waste oil. But this kind of solutions creates additional costs.

- Finally, the companies in this sector complain about professional intrusion in their activity. Probably they refer to some small companies that, among other activities, they collect waste oil illegally, which difficult the estimation of the real volume of waste oil collected in the province.

## **POMURJE (SLOVENIA)**

Since 2004 there exists a Statute about wasted table oils and fats treatment (The environmental protection law) in Slovenia, which defines obligatory treatment of wasted table oils and fats, that are collecting from kitchens, industry, trades, services, education activities, health services and other services. After this Statute it's not allowed to mix wasted oils with other wastes, pour them into the public canalization sumps or waters. Wasted table oils should be collected in the special plastic boxes or plastic cases, as the acid doesn't appear so quickly in those. After giving away wasted oils, these boxes have to be disinfected.

The causer of the catering industry wasted oils (who daily prepares more than 20 meals) has to collect its wasted oils separate from the other wastes, temporary store them and afterwards to pass them to the wasted oils collector or directly to the wasted oils processor enterprise. The causer has to prepare the plan for wasted oils treatments and make it the evidence of the wasted oils examination possible. There are special contracts between the causers, collectors and processing enterprises.

The collector of the wasted oils has to have a special license from the Ministry of the Environment and Spatial Planning. The Ministry determines the area, where the collector has to collect the wasted oils. The collector has to have waterproof cases for collecting the wasted oils and has a possibility to clean and disinfect those cases. He has to have also special designed vehicles and assured processing of wasted oils. The collector has to control the records of the wasted oils he received and the records from the processors of wasted oils. The collector is obliged to prepare an annual report for the Ministry about wasted oils collection for the past year. The inspectors from the Inspectorate for the Environment and Spatial Planning of Republic of Slovenia are usually exercising control over the case.

The municipality of Maribor is the first one in Slovenia, who is implementing the wasted oils collection project for the production of the ecology friendly fuel- biodiesel. In September 2002 the municipal's company "Snaga" has started collecting wasted oils and fats, which are then exported to Austria for the further processing of those oils into biodiesel. That biodiesel is going to be used for the vehicles of the municipality and most probably for their local busses as well.

According to the information of the Ministry of the Environment and Spatial Planning, Agency of the Environment and Spatial Planning 2007, are currently 22 wasted oils and fats collectors in Slovenia. In the Pomurje region there are actually three municipal companies, who is collecting the wasted oils and fats, such as:

- Saubermacher & Komunala d.o.o.,
- Biotera Domžale d.o.o.,
- Saubermacher Slovenija d.o.o.

The company Saubermacher & Komunala has a contract with both Krieger Maribor and Ekol Kranj processing enterprises. They also have contracts with restaurants, hotels, canteens... According to the contract they collect the wasted oils once a month and the bigger quantities, as from the thermal resorts, by the agreement.

The municipal company Saubermacher&Slovenija is executing the wasted oils collection on the contract base with the wasted oils causer, by the agreement namely using the special 50 liters cases. They pick up the wastes from the causer directly, exchanging the full cases into empty ones. All the other causers can bring the collected wasted oils directly to the collecting center of the company.

The production of biodiesel in the Pomurje region has also started by entrepreneur and innovator Jože Jerič with the Intercorn Trading, who is primarily trading the seeds. In the spring 2004 he has prepared a project about supplementary processing of the oil rape, soya and sunflower seeds into biofuels. Jože Jerič is using the oil rape grown by the farmers of the Pomurje region; around 2500 tons per year – which means 850 tons of biodiesel and much more in the future. The Intercorn Trading is also preparing a project for buying a cogeneration device to produce the electrical and heating energy from wasted pig fat, which is more potential and not so complicated. In the Pomurje region there are a lot of people still occupied with farming and stockbreeding, so they using pig fat by cooking. It makes 10% of those housekeepings, who are using the pig fat instead of table oils. However, the quality of the pig fat is not sufficient and the admixture of the oil rape is needed. Pig fat is processing into biofuel, which is used for the less pretentious engines at those factory devices, which are operating uninterruptedly. The technology is being developing and the modification of wasted oils and fats into energy is nowadays very important.

It is necessary to inform the causers of wasted oils (housekeeping, companies) about waste oils delivery as much as possible, as the future of the collected wasted oils is pointed to modification into »green« diesel fuel.

It is necessary to organize the waste oil collection network in the future, so it wouldn't be any wastes. The causers of wasted oils could buy the vegetable-table oils by 50% lower price and the rest 50% would pay the processing enterprises, otherwise it doesn't pay. So the causers would buy the vegetable oils at lower price and could use it for frying only once. The vegetable oils, that have been used more than once, are losing its viscosity, because of oxidation, and it becomes more difficult for modification into biodiesel, as more admixtures are needed and connected with higher costs. The wasted oil would be collected in special cases and taken to the processing enterprises, where it would be modified into biodiesel. The biodiesel made of wasted oils in comparison with the biodiesel made of oil rape is worse quality, that is why the costs of the production of the first one are higher.

It is also important that the wholesale price of biodiesel made out of wasted table oils is 11-15% lower from the price of biodiesel made of oil rape (by selling to the petrol stations). That price also depends on the price of the fuel oil, which is cheaper than biodiesel and it's being used more often.

The biggest problem by the wasted oils and fats collection is a wrong storage, so they are going spoilt or the causers are mixing them with the other wastes, what is forbidden. The problem appears also by using the table oils, that have been used for multiple fryings, which are more complicated and more expensive for modification into biodiesel. The municipal companies are facing the problem with the causers, who gives away »not clean« wasted oil

(sediments, foil), what means additional costs for the company by the manipulation with the wastes.

## **ABRUZZO (ITALY)**

### **Waste management companies**

In Regione Abruzzo there are four waste management companies, they are listed below:

- § ABRUZZO OLI di Mariani Giancarlo Via V. Moretti, 56/bis F.ne S. Lucia Roseto degli Abruzzi TE 085/809007
- § FRAMAR Srl PROGETTI E SERVIZI Via Modiglioni, 2/6 – 66020 S. Giovanni Teatino CH 085/4981433
- § S.A.I.D. Sas di Lino di Giosia & C. Via T. Grossi, 7 – 64025 Pineto TE 085/9461289 Fax. 085/9461421
- § Adriatica Oli srl - Contrada Cavallino 39 - 62010 Montecosaro (MC) - P.IVA 00456860436 - Tel. +39 0733 229080 Fax: +39 0733 229093

### **Waste-oil collection systems used**

The collection of “vegetal waste oil” can be organized in any urban area, through specific agreements signed with authorized management companies. These companies must be included in a Provincial Register, in compliance with the Legislative Decree 22/97 art.31 e 33. In Teramo Province this is partly already organized through the distribution of small containers to families (3-5 lt), to condominiums (50 lt) and to restaurants, canteens, infant schools etc...(100-200 lt containers). This system is a door to door collection, with a specific time table in order to collect as much oil as possible. (Source: Teramo Province Report)

The waste oil collection system starts from the moment when oil becomes waste, this means after they are used. In general we are talking about oil and fat used for frying.

The producers/owners of waste oil and fat must stock it and deliver it to CONOE (National Compulsory Consortium for waste oil collection and treatment).

Usually, it is stocked in metal or plastic containers at the producers' place. The management companies that must be included in a National Register of Environment Managers, they periodically collect waste oil using trucks and with specific timings previously agreed upon with the owner.

Oil collection can be developed in two ways:

- Suction: a tank lorry sucks waste oil from the containers of the owners/producers.
- Collection of the containers: Full drums are collected and a new drum is supplied.

The collectors transport the oil collected to the stocking areas where it is analysed and treated to eliminate water and big impurities and it is then delivered to those companies that use it to obtain new industrial products. (Source: CONOE Report).

### **Restaurants containers**

Restaurants owners can choose the most suitable container to stock waste oil according to the monthly production and space availability of the place.

The containers can be placed both inside and outside the restaurants (in an area that is not accessible to the public). If a big quantity of product is produced bigger cisterns are available. Used containers: 36 lt. tank



Wide opening containers from 60, 125, 200 and 230 lt.(see picture).

Total opening containers. The dimensions of the lid are in line with European standards, they are easy to move and to pile up. They are resistant to the majority of chemical products. The drum and the lid are perfectly shock resistant.

High density polystyrene containers. They have a high molecular weight, they are very resistant to chemical products. The seal is made of Zinc and steel.

### Containers for condominiums



OLIVIA® is a fixed street container for waste oil collection, to be placed in the separate waste collection site.

#### *Outside container*

It is a 500 lt. Outside container with a security system to avoid spilling. It is made of polyethylene and it is shock and acids resistant. The material is one piece only without any welding. It can be cleaned and decontaminated. It is specific for permanent exposure to atmospheric agents. It includes a hermetic seal and a removable upper lid. The collection container can be placed inside. It is closed with a pressure lever lid and a clasp lock  
The upper diameter is 95 cm. and the height is 110 cm.

#### *Inside container*

The inside container holds 217 lt is airtight, watertight with hermetic seal. It is homologated in compliance with the law ONURID- ADR for safe stocking of dangerous liquids. It is made of anti corrosion steel with a removable upper lid. The gasket is high quality, it is provided with a lever lid and external closing ring.  
Diameter 60 cm. Height about cm.90.

#### *Funnel*

The funnel is integrated inside the container and it is shaped to avoid spillage.

### Family containers

From 2,2 to 5,5 lt. To be distributed to families

### **Existing collection points and location**

At the moment the waste oil collection takes place at the producers' themselves. At the restaurants there are specific containers where oil is stocked as mentioned above. More or less once a year the companies collect the product.  
At the moment there are no public collection areas.

### **Future processing of the waste-oil collected**

#### Projects and Programming for waste oil collection

The "Road Show IntercettiamOli" is a national travelling communication campaign, promoted by CONOE (National Compulsory Consortium for waste oil collection and treatment) which aims at involving different stakeholders (local authorities, local transport companies, category associations) to inform and raise awareness on environmental problems connected to waste oil management and a correct collection and treatment.

In 2006 the campaign involved two Italian regions: Regione Marche e la Regione Abruzzo.

The meeting organized by Regione Abruzzo on 19th Ottobre 2006 in Pescara concentrated on the actions that local authorities and management bodies should take to dispose waste oil properly.

These are the main identified actions:

- A regional memorandum to local bodies and category associations in order to inform about this kind of product;
- The definition of a technical directive to organize the separate waste collection of waste oil. It must be compulsory for "big producers" and it must grant facilities to families;
- More controls to assure the respect of the law obligations;
- The signing of a Protocol Agreement to spot those ones involved in the waste oil management (those who collect, recycle, dispose) and to raise awareness on the problems connected to waste oil. This agreement must define specific commitments to start new regional initiatives for waste oil recovery and recycle.

Regione Abruzzo is working on a Regional Plan for wastes, where also waste oil will be included. There will be two public calls: one aimed at enhancing separate collection, the other one to award the municipalities in Abruzzo that will better manage recycling matters.

### **Main problems and difficulties found by the waste-oil management companies in the process and possible solutions to overcome them**

The companies that we contacted did not point out specific problems because the amount collected is not very big and oil is collected seldom. For example, the restaurants that take part in the waste oil collection delivers an average of 150 kg of waste oil which is collected once a year.

For sure the quantity of oil could be increased through information campaigns, incentives for those who participate in the collection (school canteens, restaurants, company canteens etc.) and public collection sites where also citizens can take their waste oil.

On the other hand, house collection still faces many problems, but some pilot projects showed that the situation can be much improved with synergic actions on behalf of the public administrations.

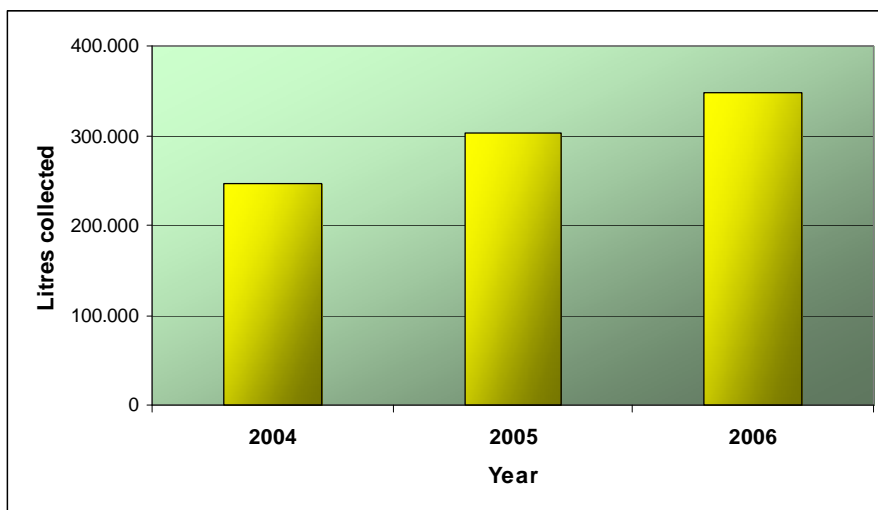
As to economic grants we are working at a national level in order to grant a free service for producers. This way the collection could double up to reach 100% collection.

### **3. CURRENT WASTE-OIL COLLECTION DATA**

#### **BURGOS (SPAIN)**

According to the data obtained from the local waste-oil management company, the collection of waste-oil in the province of Burgos during the last years is the following:

	2004	2005	2006
Route Bernardas	4.590	5.820	6.980
Route Avda. del Cid	7.620	8.680	9.450
Route Bernardillas	4.520	5.300	6.950
Route Centro-Llanas	4.100	5.790	6.040
Route Ctra. Valladolid	11.300	14.790	18.930
Route Fuentes Blancas	7.420	8.490	9.320
Route Gamonal 1	7.100	8.940	9.480
Route Gamonal 2	8.320	9.640	10.900
Route Plaza de Vega	9.690	11.120	12.460
Route S. Pedro de la Fuente	4.300	6.100	6.460
Route Aranda ciudad	14.900	14.600	16.970
Route Aranda provincia	22.460	26.900	29.700
Route Melgar	15.900	16.700	18.680
Route Miranda	6.900	7.590	8.160
Route Pradoluengo	4.230	5.690	6.520
Route Ctra. Santander	21.490	24.670	26.780
Route Ctra. Soria	8.900	11.200	12.480
General weekly route	78.900	84.200	98.100
Other		21.300	24.300
Clean Spots and Markets	3.560	5.600	8.500
<b>TOTAL (LITRES)</b>	<b>246.200</b>	<b>303.120</b>	<b>347.160</b>

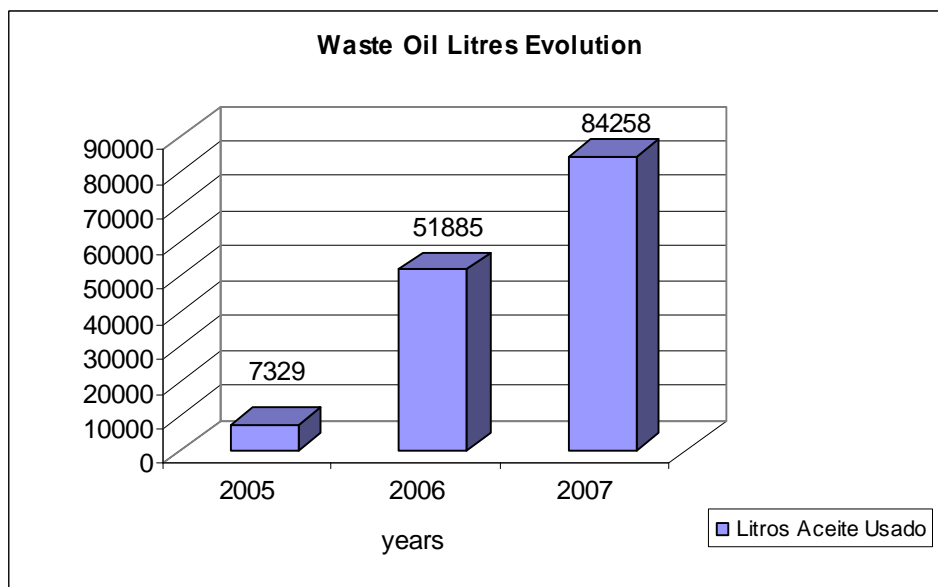


The graphic shows the increasing trend in the province during the last years.

## AVILA (SPAIN)

The used oil collection data in litres are the followings:

- Year 2005: 7.329 Litres
- Year 2006: 51.885 Litres
- Year 2007: 84.258 Litres (estimation according to information September, 2007)



The trend of agreement with the information of last two years is of an increase superior to 60%.

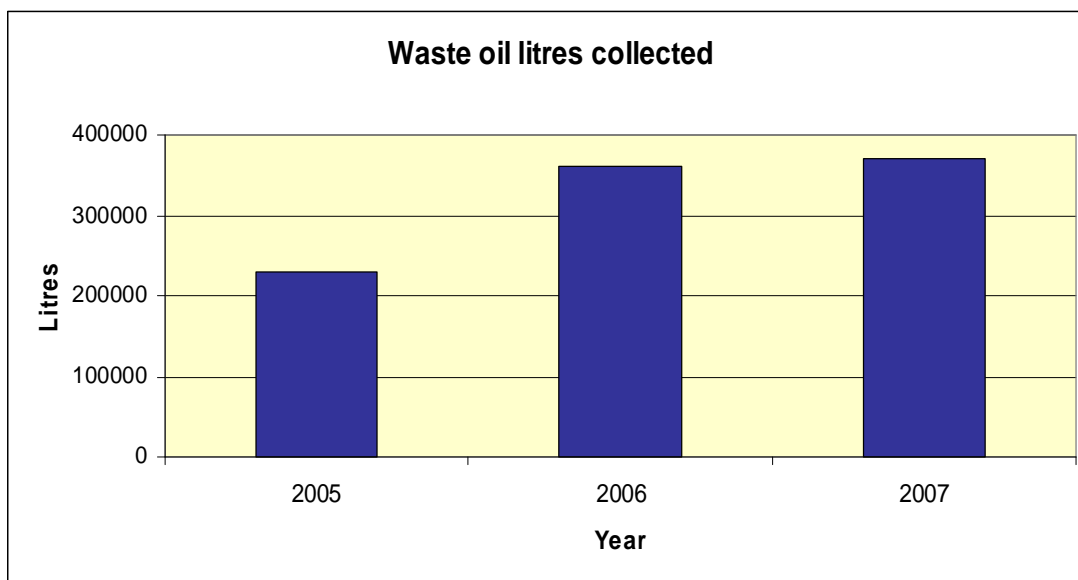
## HUELVA (SPAIN)

According to the data from different companies, we can estimate that the volume of waste oil collected in the last years is:

Years	2005	2006	2007
Litres	230.000	360.000	370.000

This data show how from 2005 to 2006 the waste oils collection grows significantly, possible due to the awareness campaigns of the different companies. However, in 2006 and 2007 the volumes were stable.

In 2008 a new increase in the waste oil collection is predicted, because of the arriving of a new big company in the sector (GIAHSA), which has the best facilities and logistics, and they will try to increase the collection with campaigns which are already on the way.



### POMURJE (SLOVENIA)

It is very hard to get the data about wasted oil collection, as the municipal companies keep their business secrets. On the basis of the sold table oils, we can only foresee the quantity of the previously collected wasted oils. But that quantity is hard to reach, because of the »black market«.

In the past the residents of the Pomurje region didn't collect the wasted oils and fats, but they throw it away together with the other wastes or they fed the pigs. Today it is already proved that it is harmful for human beings to eat pork, if the pigs were fed with wasted oils, as those oils contain dangerous acids for humans.

In Slovenia the data about wasted oils is collecting since the year 2002. Since the year 2004 the situation looks stagnant, because the »Statute about wasted oils and fats treatment« was issued and the inspectors are checking and punishing the users of table oils, who ignoring that statute, the. According to the statute, the users have had arranged the agreements with the wasted oils collectors. For the other users, who didn't make such agreements, some special measures are going to be defined. From the table below we can see, that has the quantity of collected wasted oils all over Slovenia is rising year by year, while in Pomurje region during the past two years it is decreasing.

Table 1: Collected wasted oils in tons

Year	Collected (in tons) – Slovenia	Collected (in tons) – Pomurje region
2002	163	13
2003	910	21
2004	1248	27
2005	1541	25
2006	1658	18

## ABRUZZO (ITALY)

### Italian data

YEAR 2006	QUANTITY(t/a)
Estimate of the quantity of waste produced every year	280.000
Estimate of the quantity of waste produced every year by restaurants	60.000
Quantity collected by the Consortium is 50% from restaurants	30.000

Total quantities collected every year in Regione Abruzzo:

YEAR	QUANTITY (kg/a)
2004	632.081
2005	661.500
2006	721.348

Source: CONOE

## 4. COLLECTION POTENTIAL IN EACH AREA

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### BURGOS (SPAIN)

According to the expectations of the local waste-oil management company, the collection network can be really expanded and improved.

First of all, local authorities should promote the installation of new municipal collection points because management companies ensure the quality of the service (collection periodicity, cleanliness and safety of the collection points, etc.). There are some municipalities that have installed collection containers in the municipal urban waste collection points for recycling and the results are being very positive.

Secondly, there are some big department stores in the province (mainly in Burgos City) with a high daily affluence of people. These places are really good locations for big collection points as many people who go shopping there find it easier to bring their domestic waste-oil than bringing it to the Clean Spots. If the local waste-oil management company can ensure the cleanliness and safety of the collection points, they will probably collect higher quantities of waste-oil in these commercial places.

On the other hand, promotion and dissemination activities to citizens are really important in order to convince them to recycle domestic waste-oil, not only as a waste management activity but also as a raw material supply for local biodiesel production. In this sense, Burgos City Council and the local waste-oil management company (in cooperation with other small city councils of the province) have been working in different awareness and dissemination campaigns, but it's considered that public authorities can intensify these activities.



*Examples of information and dissemination posters used in the cities of Burgos and Castriello del Val*

Taking all these issues into account we can estimate that the collection potential of the province of Burgos could reach 1 million litres a year.

## **AVILA (SPAIN)**

### New possible collection points

Increase of collection points passes by spreading campaigns that are carried out and by the means of which the company in charge of collection, nevertheless the number of points increases every year, besides the frequency of collection.

At the end of the year 2007, are numerous the hotels which join to the collection system since it supposes a way to avoid a residue that in another way it supposes a problem for them selves, this also happens with school centres, residences....etc.

### Estimated total potential

There are no data of potential litres, but as a reference we can take in account, for an period of 5 years, the 30% of waste oil is used for cooking, these data depend on the consume of oil per inhabitant / restaurant / education centres, it is just an estimation.

## **HUELVA (SPAIN)**

In Huelva, the waste oil collection is a brand new activity, so the number of dedicated centres is growing every year. In that sense, the amount of pubs, restaurants, establishments... those manage their waste oils and let the citizens to use them as well. Schools, markets, commercial establishments have joined to this initiative.

Nevertheless, in order to all these points to be useful, is absolutely necessary an awareness and information campaign, explaining clearly the advantages of this recycle process and where the citizens can take their waste oils.

Some companies have estimated that about the 50% of the waste oil is dumped in to the sewer system, so the significance of a good management becomes obvious, because, as one slogan of the awareness campaign said, "A litre of waste oils pollutes a thousand litres of water".

## **POMURJE (SLOVENIA)**

According to already existed legislation about wasted oil collection by the causes, who are daily preparing more than 20 meals, there is still a gap left in wasted oil collection by housekeepings and other causes. The »Statute about wasted oils and fats treatment« defines the wasted oil and fats collection in hotels, canteens, restaurants, therms, schools, etc. It would be necessary to organize the wasted oil collection also by housekeepings.

The municipal companies suggest to define the fixed days and the fixed collection points all over the municipalities in Pomurje for collecting the wasted oils by housekeepings and other causers. The housekeepings could also deliver their wasted oils to the nearest local causer, who are daily preparing more than 20 meals (hotels, restaurants, canteens,...) This should be certainly arranged by the legislation, otherwise those big causers won't be voluntarily interested with collecting extra wasted oils also from housekeepings and deliver it to the official collector.

In the Pomurje region it was the Saubermacher & Komunala company, who has begun acting in this direction by distributing the 3 liters cases between the pupils or students, who took those cases home and than return them filled up with wasted oils back to the school canteens. The Saubermacher & Komunala from their side all the collected wasted oils delivers to the processing enterprise. The residents of the Pomurje region can get such cases at the headquarters of the company. The housekeepings can deliver their collected wasted oils either to the headquarters of the company or to the fixed collecting point for dangerous wastes. At the same time the Saubermacher & Komunala is distributing the promotional leaflets about the wasted oils collection by housekeepings.



In this way more wasted table oils could be collected and processed into the biodiesel in the Pomurje region. The wasted fats could also be collected and delivered to the Intercorn Trading for heating and electrical energy production. The problem is also the lack of awareness between the residents of the Pomurje region, who are still not realize the importance of the renewable energy sources and that is why they don't support Mr. Jože Jerič and his biodiesel plant.

As it was mentioned before, it is hard to estimate the wasted-oils potential in liters, as the municipal companies are not giving their business information away. As Mr. Jože Jerič reports there are still many housekeepings, where wasted oils are pouring away together with the other wastes or into canalization.

## ABRUZZO (ITALY)

It is estimated that every year in Italy about 200.000 tons of waste oil, mainly domestic one, are discharged in the environment. It is about 50% of the national market.

SOURCE	QUANTITY (kg/a)
restaurants	1.200.000
families	1.900.000
<b>total</b>	<b>3.100.000</b>

Source: CONOE

New possible collection sites can be identified in those areas where citizens go often, for example commercial centres, municipal or condominiums collection sites. In particular fried oil, especially when reused, is very dangerous for humans' health, though not being catalogued as hazardous waste. For this reason waste oil collection apart from protecting the health of the citizens avoids the discharge of polluting oil into the environment"

## 5. THE COLLECTED WASTE OIL AS RAW MATERIAL FOR BIODIESEL PRODUCTION

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### BURGOS (SPAIN)

As explained in point 1, all the waste-oil collected in the province of Burgos is delivered to the Bionor Transformación biodiesel plant in Álava where it is used as raw material for biodiesel production. Until the beginning of 2008, this was the only production plant supplying biodiesel to the province of Burgos. Nevertheless, since there is a new small biodiesel production plant working since January 2008 in Castrojeriz (6.000 ton biodiesel/year) and there are other projects to build new plants in Briviesca and Villahoz, the waste-oil collected in the province could be an important raw material supply for them in case these plants accept waste-oil as raw material.

### AVILA (SPAIN)

There are no production plants of biodiesel in our province, in any case in agreement with the facilitated information by the nearby plants like BCLM Natura the use percentage of used oil at present in its facilities is 0 %, by the other hand the collection management company sell this product to other biodiesel production factories which use as raw material but in a low %, the most suitable is pure vegetable oil.

### HUELVA (SPAIN)

In province of Huelva, six new biodiesel plants are planned to be set. Two of them are already under construction and they will be working at the end of 2008 and beginning of 2009.

No one has plans of to use waste oils like raw materials for the biodiesel production. This is due to the short amount of waste oils collected at the moment. As it has been mentioned, the collection of this kind of waste is a brand new activity in the province, and these plants needs a constant amount of this raw material, so they cannot depend of a “new” material, never knowing if the next year they will have enough of it. However, is probably that with the passing of time, the companies become to set this new option, when the collection system was better and they can estimate the real volume of raw material that can be collected every year. The biodiesel production plants in Huelva will use oils from oil plants.

The oil recycled in the province is sent to the plants set in other places, in the same region as much in outside regions. No one of them uses waste oil exclusively. An example of this is the BIDA biodiesel plant, which is using an 80% of raw oil and a 20% of national waste oils. Also Bionor Transformación, main biodiesel production plant in north Spain, uses pure vegetal oil and waste oils (this in minor proportion) like raw material for the biodiesel production.

### **POMURJE (SLOVENIA)**

In year 2004 the prekmurien entrepreneur and innovator Jože Jerič, who is primarily occupied with seeds trading, had recognized the new opportunities for his own company Intercorn trading by preparing a bold project of additional activity for the processing of oil rape, soya and sunflower seeds into biofuels.

By the processing of the oil seeds into biofuels it is necessary to assure some bigger quantities of the process heat. That is why the Intercorn is planning to get a boiler for co-production of 1 MWh of electrical energy for the market and 1 MWh of heath energy for preparing of water and steam, needed for the mollification of cellular walls of the seeds in the estrification process of oils into biodiesel. For the turbine drive in the power plant they are going to use the leftovers of not estrificated fats in raw glycerin. They are developing the new process to abridge ties of the biodiesel molecules with the ultrasound, which will make possible the economical modification of the slaughterous fats into biofuels in the future. They are modificating and trading the raffinated glycerin as a high-quality food supplement to the cattles, to the oil cakes - an adequate supplement to the animal's fodder, as well as to potassium salt as a mineral manure in agriculture and horticulture. In spite of the fact that the courageous entrepreneur supported with subsidies still hasn't got the support from the local distributors of oil derivatives, Jože Jerič is looking forward to the future of the biodiesel in Slovenia.

The residents in the Pomurje region don't support Jože Jerič and they still don't realize the meaning of renewable energy sources, biodiesel and possibility of processing wasted oils and fats into biodiesel. Therefore the Intercorn Trading has open already its manufacture partly in Italy. The question of mooving another part of its manufacture also in Hungary is under consideration.

Yearly potential of the Intercorn Trading is 4.500 tons of oil rape for the processing into biodiesel. They don't produce biodiesel out of wasted oils yet, as they still haven't got the license from the Ministry of the Environment and Spatial Planning, where they have had applicated since May 2007. Another problem is that the part of their manufacture has been destroyed by fire this year, therefore the biodiesel production is impossible at the moment. The biodiesel plant will start operating either in February or in May 2008. They are planning also to modificate the corn into bioplastic, if they get the license.

The nearest biodiesel producer to our region is the TKI Rače in the Podravje region. The only Slovenian refinery Nafta Lendava has also been thinking about biodiesel production lately. They have prepared the investment plan and started with a process for the legal biodiesel production, applying to some ministries, mostly for the excise abolition. Within the plan, they have executed also some researches.

Besides the big processing enterprises in Slovenia there are also some non-registered small producers of biodiesel out of wasted oils. In the field of wasted oils processing into biodiesel there is also existing so-called »black market«. Under the we understand the not-registered processors of wasted oils into biodiesel. We assume, that they don't process a big quantity of wasted table oils in that »black market«, while we can not get the data. The demanders of wasted oils and home made biodiesel users are meeting in the internet, in the specific forums.

For the wasted oils modification into biodiesel all qualities of wasted table oils as a raw material are acceptable. However, if the oils were used of for multiple fryings, the process for eliminating the water, crumbs and other acids becomes more complicated. By filtering the spoilt oils we can eliminate the water, admixtures and acids. Wasted oils of worse quality with more saturable acids (fat) can be modified and later used for less complicated motors, aggregates, stabile motors, that can produce electrical and heat energy or can be used for the drives. At the plants, occupying with modification of fats into biofuels, it's reasonable to use its own cogeneration aggregate, as in this way the warming of the fuel for the viscosity increase in colder days isn't necessary. The more quality wasted table oils with less saturable acids can usually be modified into biodiesel by admixturing of the non-used oil rape, which can be used for the cars, busses, Lorries, etc.

### **ABRUZZO (ITALY)**

The last step is recovery of used oil. It can be turned into glycerine, biodiesel, lubricating oil or electric energy.

At the moment there are such plants that produce starting from collected waste oil, therefore it is impossible to make an estimate of the quantity of oil that can be used for this purpose.

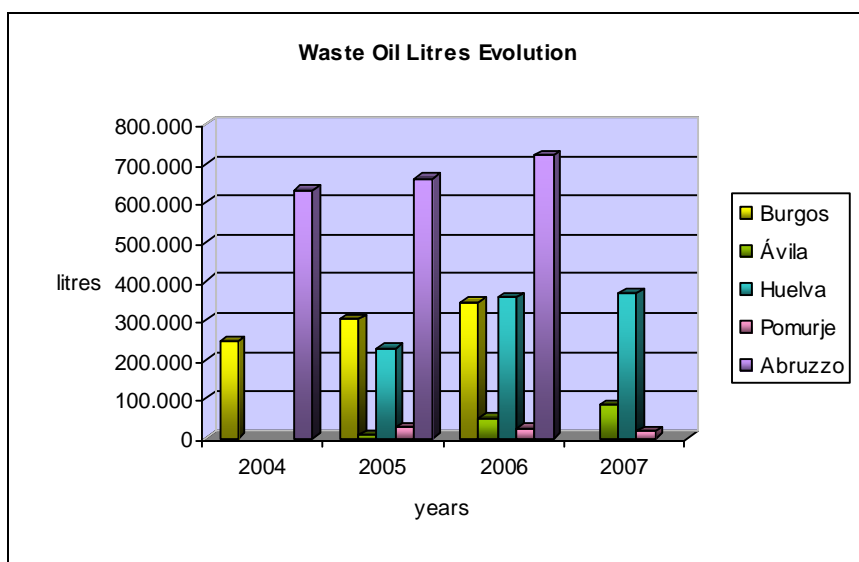
In Italy the majority of waste oil is recovered to produce lubricators, glycerine, ester methyl ester etc... The percentage depends on the market and therefore it varies every year.

In Italy, oil recovery to produce biodiesel is slowed down by the limited quantity of the product. In fact those plants require a constant amount of product in order not to change the conditions of the process. For this reason people prefer to use energy crops.

Some companies confirmed that a certain amount of waste oil are sent abroad, for example in Austria where there plants for the biodiesel production.

## 6. CONCLUSIONS

- The kitchen waste oils can pollute easily water and soil. To avoid these problems it is important to deposit them properly. Because of that, the use of these waste oils in order to produce biodiesel seems to be the best solution.
- In each area there are different companies for the collect for free this kind of waste. Normally, these companies have agreements with the public administrations of the different regions for the collection.
- The waste oil collection is being done in many points: in Municipal Urban Waste Collection Points for Recycling and in "Clean Points" established by the Administration, at home, in communities and neighbour's associations, in restaurants, bars, and in other points like as Markets and Shopping malls, Schools...
- The pilot projects were a good base of experiences about the best system used to do the collection in order to overcome the main problems detected.
- The main problems found in the waste oil management are:
  - o The lack of public awareness, so new information and awareness campaigns are necessary.
  - o Dumping in the wrong bin, what make the other content useless. Because of that, there are companies that allow people to throw the waste oil in to the bins, but inside a container, so the mix with other components is not possible.
  - o In some zones, due to the low temperatures registered in winter, there are cases of beginning of frosts in the spilt product, which impedes its later manipulation.
  - o Companies that illegally does this kind of collection.
  - o House collection still faces many problems, but some pilot projects showed that the situation can be much improved with synergic actions on behalf of the public administrations.
- From the data recovered in the last years about the volume of waste oils collected for the different zones, extracted the following graphic:



This graphic shows the increasing trend in the different areas during the last years, with the exception of the Pomurje region, in which the collection of oil has suffered a slight decline. Collection data in 2007 are not available in Burgos and Abruzzo.

- The waste oil collection is really a brand new activity, so probably the number of dedicated centres grows each year.
- For sure the quantity of oil collected could be increased through information campaigns, incentives for those who participate in the collection (school canteens, restaurants, company canteens etc.) and public collection sites where also citizens can take their waste oil.
- Normally, the waste oils are sent to biodiesel production plants that are outside the region. These plants use the oils in a very low proportion.
- On the other hand, sometimes waste oil recovery to produce biodiesel is slowed down by the limited quantity of the product. In fact those plants require a constant amount of product in order not to change the conditions of the process. For this reason many biodiesel productions plants prefer pure vegetable oils as raw material than waste oils.
- However, it is probably that at long time companies become to set this new option, when the collection system was better and they can estimate the real volume of raw material that can be collected every year.

## **7. DATA SOURCE**

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### **BURGOS (SPAIN)**

- Local waste-oil management company: Tagús Burgos
- Burgos City Council ([www.aytoburgos.es](http://www.aytoburgos.es))

### **AVILA (SPAIN)**

- EMPLEODOWN, S.L.U. (Authorized Manager of residues for the Junta de Castilla y Leon)
- ECOCYL (Authorized Manager of residues for the Junta de Castilla y Leon)
- EREN (Ente Regional de la Energía de Castilla y León)

### **HUELVA (SPAIN)**

- Junta de Andalucía (Regional Government), Environment Provincial Department
- City Councils: Valverde del Camino, Almonte, Ayamonte, Cartaya, Punta Umbría, Huelva
- Companies: Gestión Integral del Agua Costa de Huelva S.A. (GIAHSA), Oleonuba S.L.U, Reciclados Barroso, Bionor transformación S.A, Verdegras S.L, Rograsa S.C.L.
- Fundación Doñana 21
- Websites: [www.juntadeandalucia.es](http://www.juntadeandalucia.es), [www.bionorte.com](http://www.bionorte.com), [www.giahsa.com](http://www.giahsa.com), [oleonuba.iespana.es](http://oleonuba.iespana.es), [www.verdegras.com](http://www.verdegras.com), [www.bionor.es](http://www.bionor.es), [www.biodieselspain.com](http://www.biodieselspain.com), [www.rograsa.net](http://www.rograsa.net), [www.donana.es](http://www.donana.es), [www.puntaumbria.es](http://www.puntaumbria.es).

### **ABRUZZO (ITALY)**

- Environment Report CONOE 2006
- Waste Observatory Teramo Province Report