

ENERGY RECOVERY

Use in cogeneration equipment to produce electricity:

- **Recovery of energy in cement plants:** Pollutants such as polycyclic aromatic hydrocarbons, chloride hydrocarbons and heavy metals are destroyed in cement production plants.

Use as fuel for obtaining heat:

- **Fuel in plants producing bituminous conglomerates:** After removing water and sediments from the used oil, it can be used as a substitute for industrial gas oil in plants manufacturing bituminous conglomerates.
- **Fuel for heating:** The used oil is burned in furnaces specially designed for this type of fuel.

USED VEGETABLE OILS

Before re-using used vegetable oils, a **basic treatment** must be carried out consisting of repeated filtering, decantation and purification with heat treatment to obtain oils of increasing purity.

Obtaining bio-diesel:

Although the engines must be slightly adapted in order to use bio-diesel as a source of energy, this alternative involves the use of a waste as a source of energy and decreases the use of non-renewable energy.

Manufacture of industrial lubricants:

Mainly in steel plants.

Manufacture of surfactants:

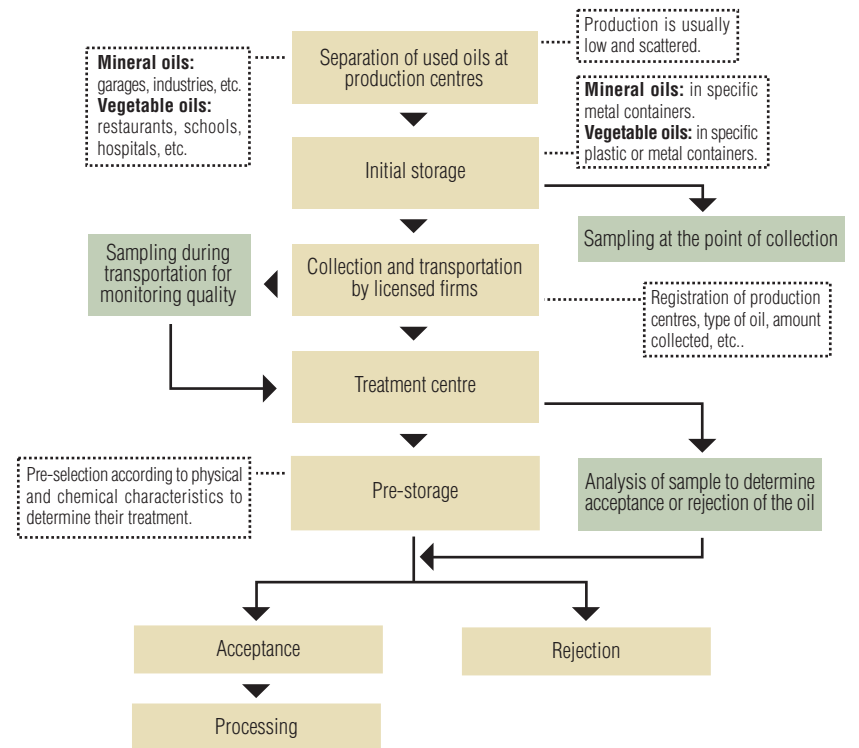
For production of soaps and detergents.

Use in direct or mixed combustion:

Use of calorific value in the oil as long as it is above 8,500 kcal/kg.

Collection logistics

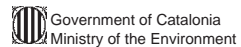
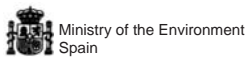
Separation at the source and establishment of systems for collecting and transporting used oils reduce costs and facilitate later processing for treatment and recovery of used oil.



Mediterranean Action Plan

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Possibilities for Recycling and Re-use of Used oils

CD

Castellano

English

Français

The Regional Activity Centre for Cleaner Production (RAC/CP) of the Mediterranean Action Plan has prepared this brochure in order to present processes and technologies that permit the re-use and application of used oils: both mineral oils from the industrial sector and vegetable oils from restaurant activities.

By **used mineral oil** is meant any industrial oil that has become inadequate for the intended use. It is a waste classified as dangerous because of the effects that it can have on health and the environment. Normally it is collected for later treatment.

By **used vegetable oil** is meant any oil that has served as raw material in cooking processes. They are usually eliminated through the public sewage system, causing malfunctions in treatment processes of urban wastewater.

Possibilities for recycling and re-use

USED MINERAL OILS

As first option in the re-use of used mineral oils, minimization at the source should be taken into account and then recycling considered, leaving to last possible use as a source of energy.

REPROCESSING

Reconversion using distillation processes, filtering and the addition of additives in the used oil to high-quality oil fit to be reintroduced in the same production process.

Advantages:

- The life cycle of the oil is extended.
- Reduction of the amount of used oil waste.
- Savings in the purchase of new oil.

RE-REFINING

Reconversion of used oil into basic oil fit for the manufacture of new lubricant oils.

Traditional processes for treating oils using **acid and earth** technologies involve high costs for investment in installations, generate a toxic waste (acidic sludge) difficult to manage and, because of the variety of used oils, it is almost impossible to obtain basic oils with the desired final quality.

As an alternative, processes of **vacuum distillation** are being introduced for used oils with previous dehydration, as well as processes of **hydrogenation** of the distilled products or processes combining **vacuum distillation** and **earth treatment**.

The products resulting from distillation and hydrogenation are about 60% basic oils and 8% light oils. Waste generated by those operations can be used as component for mixtures of asphalt; if it is not used in this way, it has to be destroyed by combustion in specialized plants.

Advantages:

- Metal content of basic oils is less than 1 ppm.
- Products and wastewater without chlorine or sulphur compounds.
- Wastewater with low Chemical Oxygen Demand.
- Waste fit for asphalt mixtures.

Technologies used in re-refining

	<i>Meinken</i>	<i>KTI</i>	<i>Mohawk</i>	<i>Berc-Niper</i>	<i>Prop</i>	<i>Safety Kleen</i>	<i>IFP</i>	<i>Snamprogetti</i>	<i>UOP DCH</i>	<i>Viscolube</i>	<i>RTI</i>	<i>Interline</i>	<i>Rose Kellog</i>	<i>Entra</i>	<i>Recyclon</i>	<i>Vaxon</i>	<i>CEA</i>	<i>Krupp Koppers</i>
Atmospheric distillation	1	1	2	1		1	1	1		1	2	3						
Chemical pre-treatment			1															
Demetalization					1													
Separation											1							
Extraction of solvent				3			4	2, 5				1	1					
Recovery of solvent				4				3				2						
Acid and earth treatment	2									4								
Vacuum distillation		2	3	2	2		2	4	3	2	3, 4	4	2	1, 2	1	1		
Chemical treatment									2					3	2	2		
Hydrogenation		3	4	6	3	3	3, 5	6	1	3			3					
Thin-film distillation	3					2								4	3	3		
Fractioning		4	5	5	4				4				4					
Earth treatment				7								5						
Autoclave, ultrafiltration																	1	
Hydrocarbon fumes under hypercritical conditions																		1

Note: The numbers indicate the sequence of the steps to follow for each technology.