



**GRECO INITIATIVE**  
GREEN COMPETITIVENESS

In the Mediterranean

## DIGITAL AUTO-AUDIT PLATFORM

LEBANON January 2010



Regional Activity Centre  
for Cleaner Production



GOBIERNO MINISTERIO  
DE ESPAÑA DE MEDIO AMBIENTE



Generalitat de Catalunya  
Government of Catalonia  
Department of the Environment  
and Housing



## *GRECO AUTO AUDIT PROJECT*

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### **GOAL:**

To develop a new and innovative “User Friendly” “Online System”, to help Mediterranean SMEs to drive, at no cost, their Cleaner Production Auto-Audits as a way to contribute to their autonomous efforts on implementing CP solutions (first step to be more Green Competitiveness)



## *GRECO AUTO AUDIT PROJECT*

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### **METHODOLOGY**

- Using a Decision Tree System on line, the entrepreneur can be driven to do its CP solution and take the appropriate actions to improve the business and while generating less environmental impacts.
- The Decision Tree will drive the seeker (the entrepreneur) to choose different possibilities to go in response to simple answers.
- Each solution will end on an attached “Work Instruction” on what to do and how to do it.
- The Decision Tree ends with information on best recorded practices generating substantial savings and low payback periods, as well as high return of investments.



# **GRECO AUTO AUDIT PROJECT**

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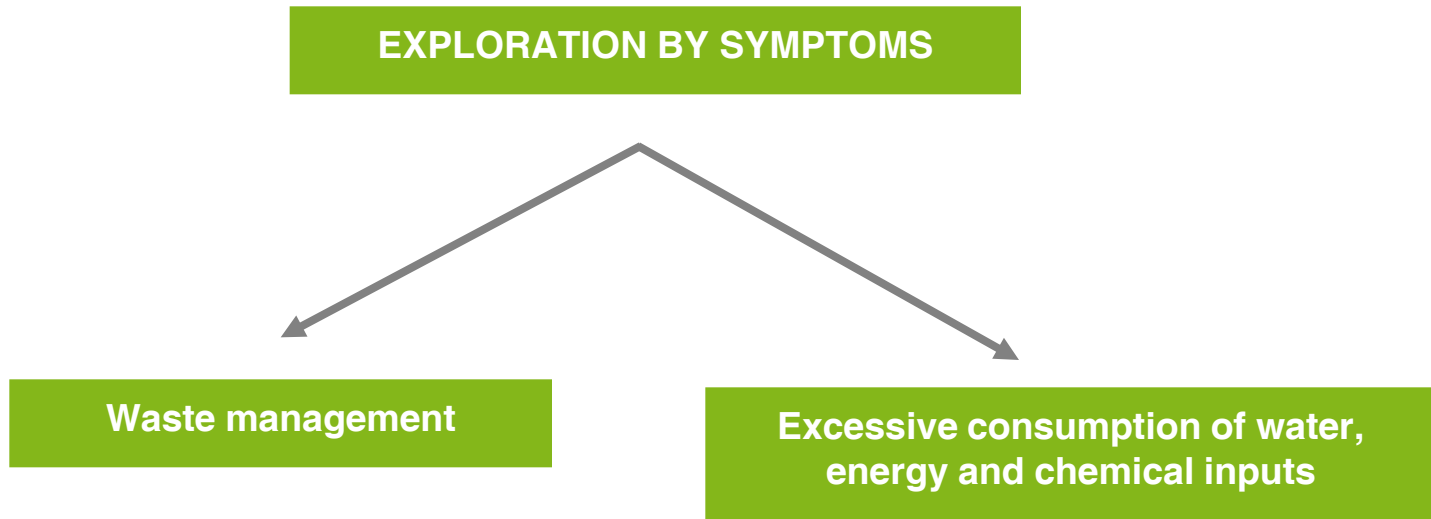
## **Two ways of proceeding with the Auto-audit:**

- Symptom's approach** (Environmental costs)
  - Waste Management
  - Excessive consumption of water, energy, raw material.....
  
- Techniques approach** (Eco-efficient techniques)



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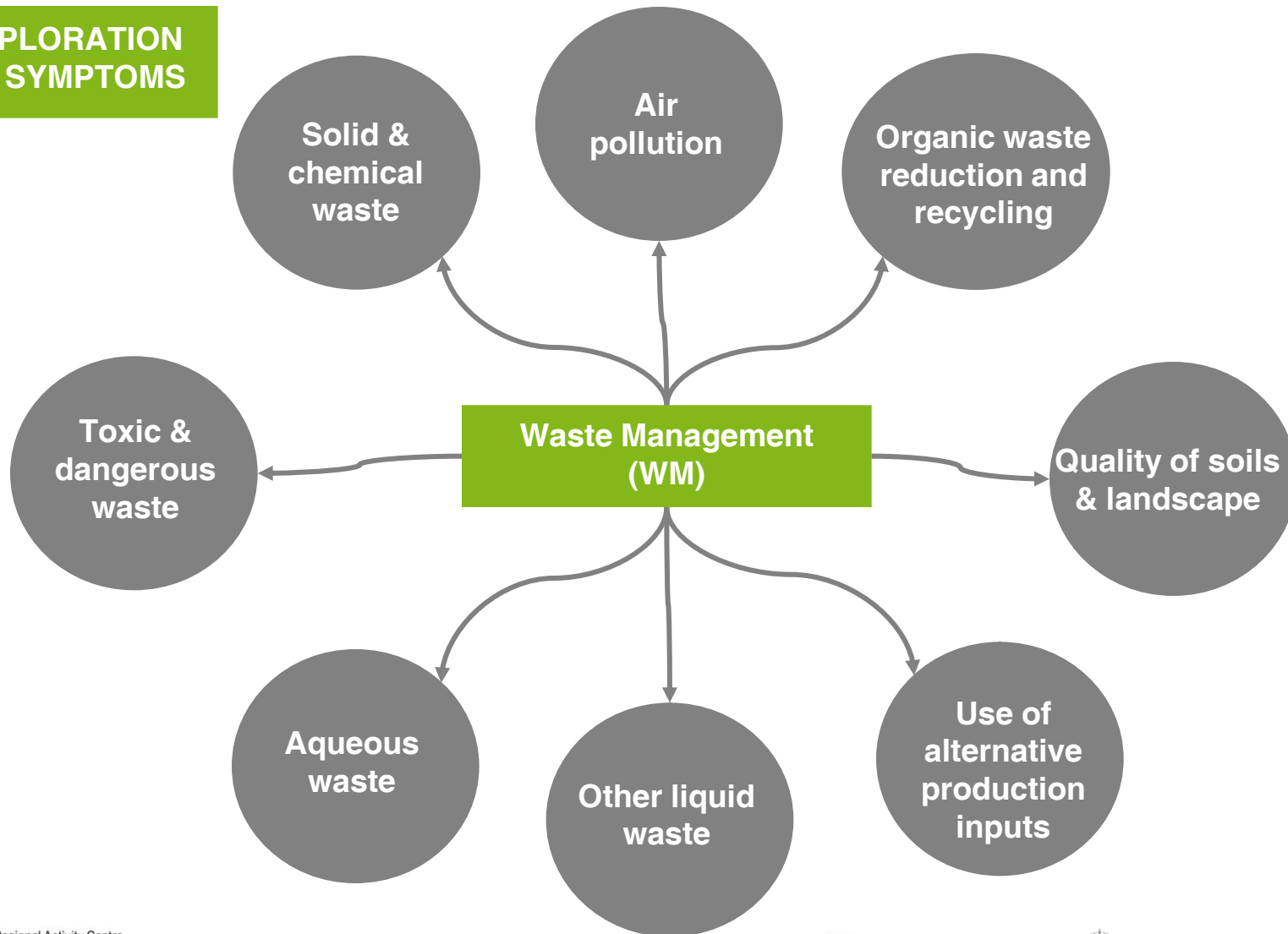
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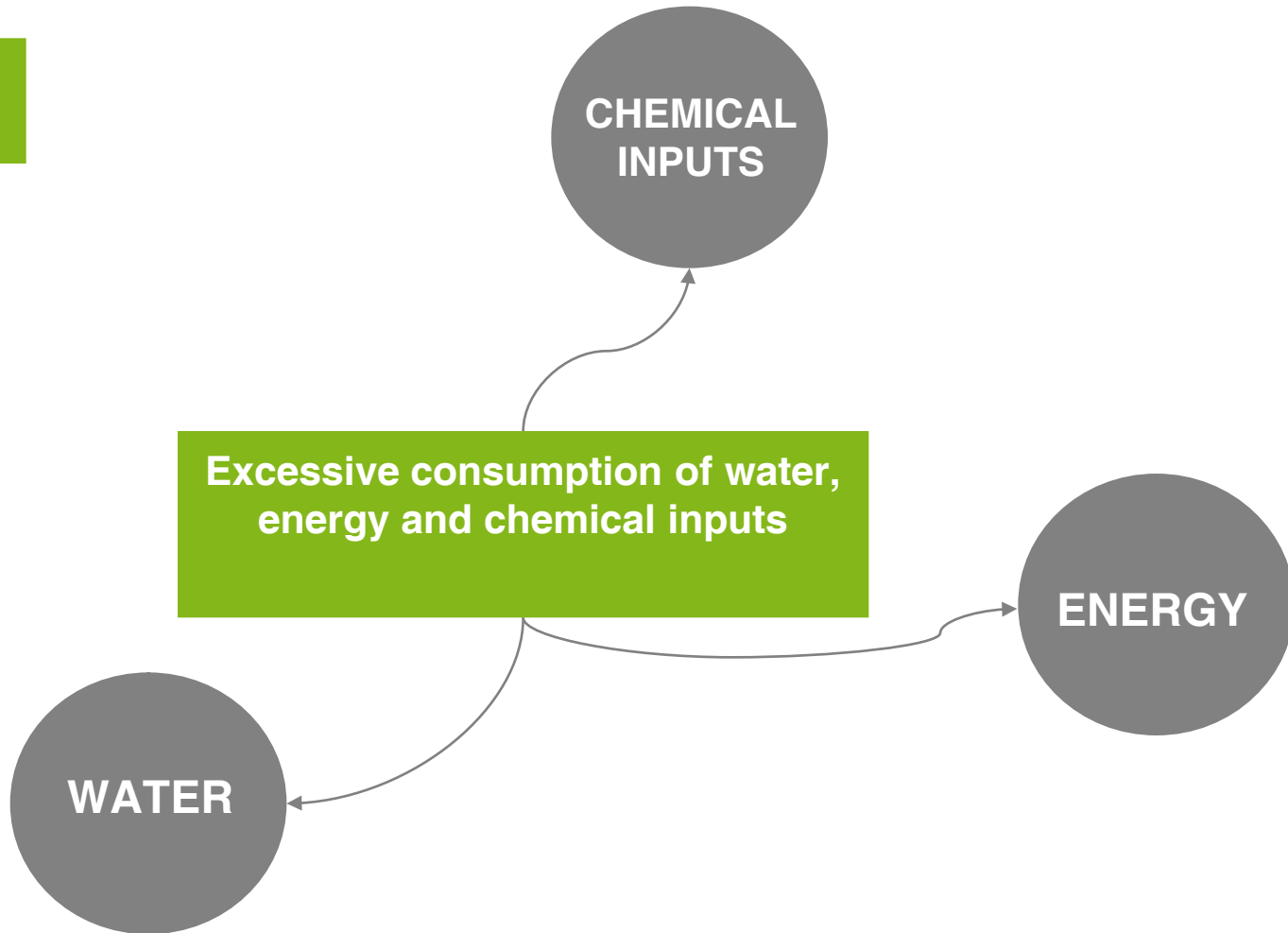
## EXPLORATION BY SYMPTOMS





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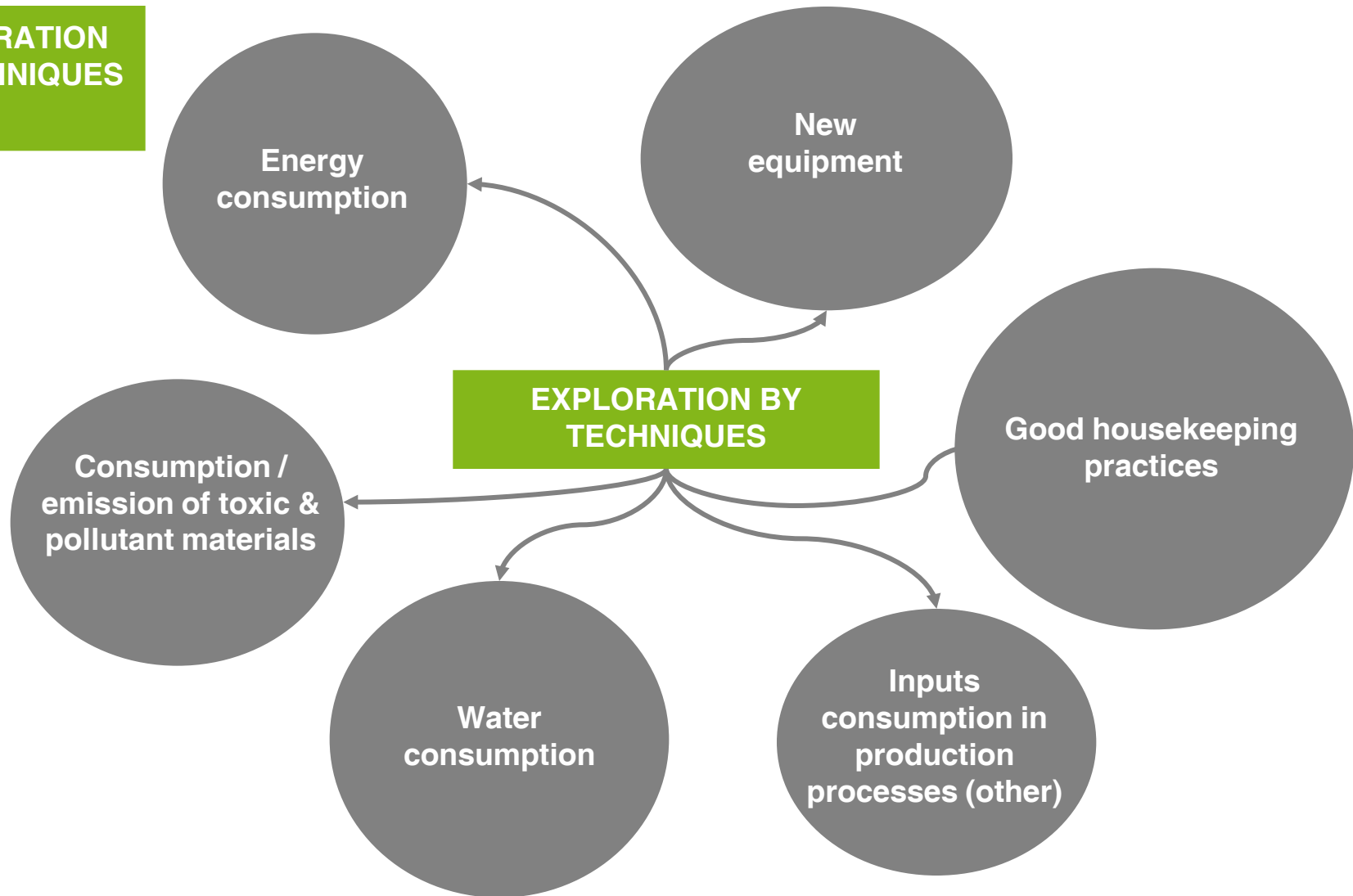
EXPLORATION  
BY SYMPTOMS





# GRECO AUTO AUDIT PROJECT

EXPLORATION  
BY TECHNIQUES







## Methodology; Example # 1

### Step # 1:

#### Audit On

- Water Savings
- Material Recovery and/or Saving
- Energy Savings
- **Good Housekeeping Measures**
- Alternative Product Designs
- Alternative Processes



## Methodology; Example # 1

### Step # 2:

#### Audit On Good Housekeeping-Measures

- Processes
- **Systems**
- Warehouses
- Heat & Cool
- Energy
- Gas Emissions
- Waste Treatment
- Furnaces
- Safety & Health
- Vehicles



## Methodology; Example # 1

### Step # 3:

#### Audit On Good Housekeeping Measures Systems

- **Cooling Water**
- **Process Water**
- **Information Systems**
- **Power Supply**
- **Heating Systems**
- **Chemical Systems**
- **Air Conditioning Systems**
- **Waste Treatment Systems**
- **Illumination Systems**



## Methodology; Example # 1

### Step # 4:

#### Audit On Good Housekeeping - Measures Systems - Cooling Water

- Pipe Lines
- Valves
- Drains
- Tanks



## Methodology; Example # 1

### Step # 5:

- Audit On Good Housekeeping - Measures Systems - Cooling Water - Pipe Lines**
  - **Layout Review: Work Instruction Number WPLR/0001/09**
  - **Existing Real Cases**



# GRECO AUTO AUDIT PROJECT

WORK INSTRUCTION NUMBER WPLR/ 0001/09

Water Pipe Layout Review

## GRECO AUTO AUDIT PROGRAM

The purpose of this WI is to check all the existing water pipe lines to see if there are segments suitable to reduce or eliminate.

It is important to check that all lines are strictly necessary and the size are the appropriate. Lines longer than necessary can produce lack of pressure and this will imply lower efficiency in the systems and/or water waste

### 1 \*- Review

- 1.1 Look for the water pipe line schemes of your premises
- 1.2 Divide each line into segments easy to review and check
- 1.3 Analyze every segment to decide whether that segment is strictly necessary and/or its length and size can be shorten.

### 2 \*- Operations

- 2.1 Every line has to have a real purpose and not to be suitable of being eliminated
  - 2.1.1 What is that segment doing in the system?
  - 2.1.2 Is that segment absolutely necessary?
  - 2.1.3 Can that segment be shared with another existing segment?

WORK INSTRUCTION Number WPLR/ 0001/09

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 Mediterranean Action Plan                    Tel.: 00 34 93 553 6790  
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WORK INSTRUCTION NUMBER WPLR/ 0001/09

Water Pipe Layout Review

## GRECO AUTO AUDIT PROGRAM

2.2 Every necessary line has to have the appropriate size and dimension

2.2.1 Can that segment be routed through another way shorter or easier to maintain?

Lines longer than necessary consume more water and are more feasible to have leaks where water can be wasted.

2.2.2 Does that segment have more elbows and connections than necessary?

Elbows and connections reduce pressure in the pipe and are the places where leaks are more feasible.

In case of sediments, they are likely to locate in those parts of the lines and they can produce corrosion, leaks and pressure losses

2.2.3 Is the size of that segment the right one?

Lines with more diameter than necessary consumes more water. Lines with smaller diameter than required need more pressure to do its job and waste energy by the time reduce the lifetime of the pipe.

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# Successful Experiences Example # 1

- Existing Real Cases with measures taken after a close check-up on the Water Pipe Line System and the benefits achieved.



# Action Plan

## GRECO AUTO AUDIT PROJECT

Med *Clean*  
*Propre*  
*Limpio*



EGYPT

No. 32

Pollution prevention case studies

### Industrial pollution prevention in the oil and soap sector

|                                     |  |
|-------------------------------------|--|
| <b>Company background</b>           | Sila Edible Oil Company (Fayoum, Egypt) processes and average of 68,000 t/y of seeds, mainly sunflower, corn, soybean and cotton, producing up to 24,000 t/y of first grade edible oil. The main by-products include around 40,000 t/y of dried meal (packaged in sacks and sold as animal feed) and approximately 1,800 t/y of soapstock and gums (separated by highspeed centrifuge).  |
| <b>Industrial sector</b>            | Oil and soap sector.   |
| <b>Environmental considerations</b> | Oil processing in the company is carried out in 5 main steps: <ul style="list-style-type: none"> <li>- Seed reception, separation of the broken seeds and storage.</li> <li>- Seed preparation and oil extraction. 50% of the crude oil content is extracted by using expellers and a seed cake containing around 30% oil is obtained.</li> <li>- Solvent extraction. The seed cake is sent to the solvent extraction unit (with hexane) where a solvent-oil mixture (miscella) and an extracted meal (2% oil content) are generated. Crude oil is extracted from miscella by a 3-stage evaporation system. The extracted meal is also desolventised and then toasted, dried and cooled. The hexane is recovered within the system and reused.</li> <li>- Refining of crude oil, which is degummed, neutralised with caustic soda (to remove fatty acids to generate soap stock), washed, separated by centrifuge and deodorised.</li> <li>- Packaging of primary oil and bottling.</li> </ul> |
| <b>Background</b>                   | By means of an industrial audit of the company carried out by the SEAM Project, the following pollution prevention opportunities were initially identified: <ol style="list-style-type: none"> <li>1. Reduction of steam losses as a result of damaged lines and valves and inadequate insulation.</li> <li>2. Reuse of broken seeds and hulls in the oil extraction process in the seed-receiving unit.</li> <li>3. Reduction of mazout leaks and spills.</li> <li>4. Segregation and reuse of the refinery wastewater, which has the highest organic load.</li> <li>5. Reduction of oil losses in the refinery due to leakage, in the storage unit and in the packaging area and losses of process chemicals in the refinery unit.</li> </ol>  |
| <b>Summary of actions</b>           | The following measures were put into practice, thus enabling a reduction in treatment: <ol style="list-style-type: none"> <li>1. Good housekeeping: <ul style="list-style-type: none"> <li>• Preventive Maintenance Programme (in-factory servicing of the expeller, modification of the packing of the cooling towers and steam trap modifications, repair of leaking or broken valves, damaged water pipes and damaged steam pipes, etc.).</li> <li>• Collection and recycling of split oil in the packaging unit, pumping it to a collection tank, where the oil is recycled to the refinery for reprocessing.</li> </ul> </li> </ol>   |

2. Process modification:
  - Reuse of fines from the preparation unit. The plant was originally designed to recycle sunflower seed fines back to the expeller. This step was modified to direct these fines immediately to the extraction plant, allowing a higher throughput of fresh seed in the expeller.
3. Material substitution:
  - Use of caustic soda solution instead of caustic soda when neutralising. Thus losses of caustic soda are reduced.
4. Water and energy conservation:
  - Upgrade steam network, rehabilitating the steam lines, tuning the boiler and improving the treatment of boiler feedwater, recycling the steam condensate, replacing faulty/broken valves, replacing/repairing steam traps and pipes and insulating hot water and steam pipes.
5. Reuse and recycling:
  - Recovery of hulls and broken seeds. They were originally collected and sold as animal feed. The process has now been modified so that they are collected using a screw conveyor and transferred to the preparation unit, where they are further processed.
  - Recovery of 10% of fatty matter from the final effluent. Fat is collected from the refinery effluent by a scraper, acidulated, split and then transferred to soapstock storage tanks.
6. Wastewater segregation:
  - Segregating of process effluents coming from the refinery. The remaining effluent produced by the company is used for land reclamation activities within the factory.

| Options                          | Benefits  | Savings (t/year) | Investment (€) | Savings (€ /year) | Payback period (months) |
|----------------------------------|---|------------------|----------------|-------------------|-------------------------|
| Preventive Maintenance Programme | Reduction of steam and water losses and process optimization  | 34               | 4,500          | 9,000             | 6                       |
| Oil recycling                    | Further production  | 13,92            | 750            | 10,500            | < 1                     |
| Reuse of fines                   | Crushing capacity has been increased  | 120              | 3,000          | 36,000            | 1                       |
| Use of liquid caustic soda       | Daily neutralisation costs dropped by 47%, reduced losses of caustic soda, reduced levels of corrosion, improved soapstock quality, better working conditions |                  | None           | 75,000            | Immediate               |
| Upgrade steam network            | Steam consumption reduction   | 3,600            |                |                   |                         |
|                                  | One boiler has been taken off the line (savings of mazout usage)  | 1,728            | 9,000          | 165,888           | < 1                     |
|                                  | Water consumption and maintenance costs reduction   | 28,800           |                |                   |                         |
| Recovery of broken seeds         | Extrn of oil  | 78               | 2,700          | 138,975           | < 1                     |
|                                  | Extrn of meal produced  | 595              |                |                   |                         |
| Fat recovery                     | Recovery of soapstock and reduced strength of wastewater  | 29               | 1,500          | 4,320             | 4                       |
| Wastewater segregation           | Reduction of effluent to be disposed of off-site  | 13,464           | None           | 5,400             | Immediate               |

#### Conclusions

With the implementation of these low or no-cost measures, the company achieved significant benefits. Maintenance costs were reduced by 10%, water consumption was reduced by 46%, wastewater treatment requirements were reduced by 66%, boiler fuel consumption was reduced by 48%, annual recovery of oil, soapstock and meal was valued at €207,795, and the company achieved discharge compliance.

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.

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Industrial pollution prevention in the oil and soap sector

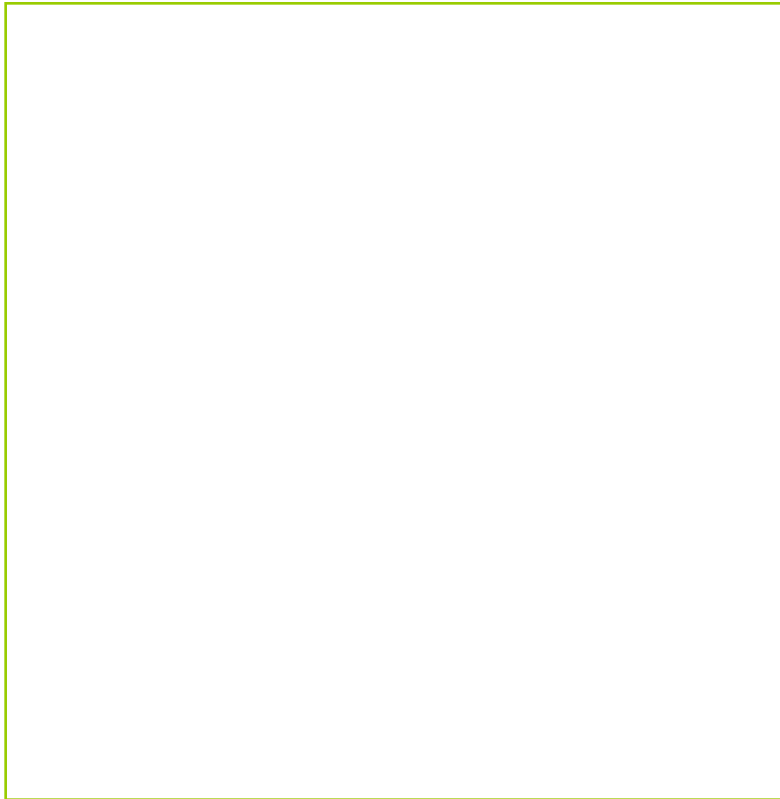




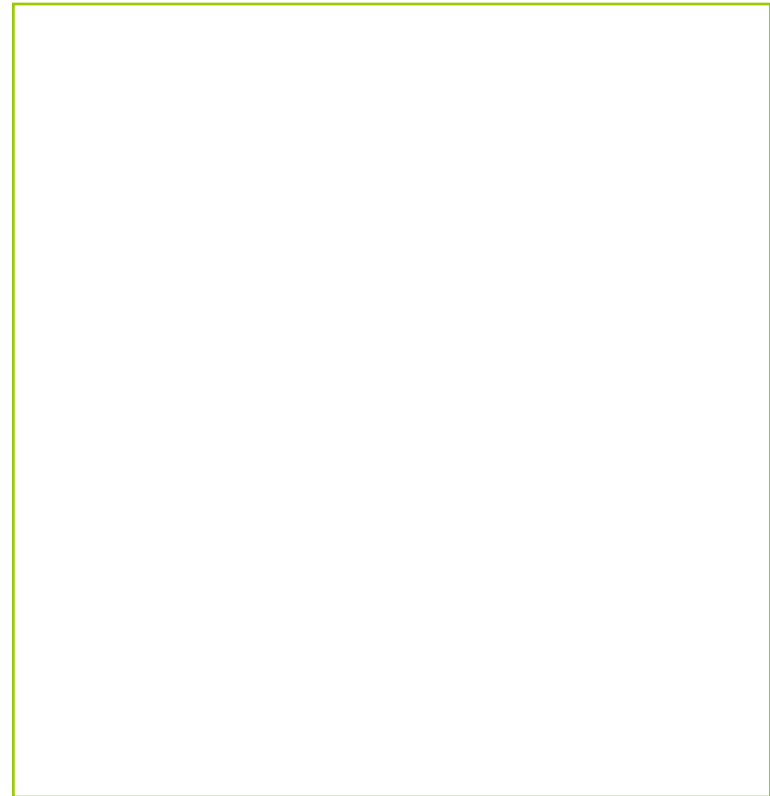
# Conclusions

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## OPPORTUNITIES



## CHALLENGES





## Regional Activity Centre for Cleaner Production

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