

**Market Promotion and Development of Eco-Processes for
Waste Oils and Petroleum Residues**
MARE (ECO/10/277237)

Deliverable 6.5

Market uptake and replication strategy



Project Data

Budget:

Total project's budget:	1.945.002 €
Eligible project's budget:	1.645.002 €
EC funding (%):	822.501 € (50%)

Duration:

36 months

01.09.2011 – 31.08.2014

Partners:

Coordinator:

(1) CYCLON HELLAS S.A.

Co-beneficiary:

(2) ECOLOGICAL RECYCLING SOCIETY (NGO)

Environmental problem targeted

- Waste oils and petroleum residues (WO&PR) represent a significant portion of the volume of organic waste liquids generated in Europe and worldwide.
- Estimated production of WO&PR is 200.000 tons/year in Greece.
- **In Greece, there are three legal methods to handle WO&PA:**
 1. Collection, possible pre-processing (eg. in ports or off shore, separated waters are discarded as is in the sea) and disposal at crude oil refineries for re-refining.
 2. Mixing with wood-chips for the production of stable secondary fuels with a relatively low heat capacity for disposal in cement kilns.
 3. Disposal via trans-boundary transportation abroad.
- WO&PR are often mixed with WLO affecting negatively the sustainable management of both waste streams.

Target

- Development of an eco-innovative & cost-effective process for material recovery from WO&PR.
- Development of broad dissemination activities targeting to the market replication of the proposed technique.

Objectives

- To promote an innovative, greener technique for the material recovery from WO&PR through thin film evaporation.
- To minimize the market obstacles and barriers for a greener treatment and marketing WO&PR.
- To promote the sustainable use of natural resources, specifically lubricant oils and petroleum, with a life-cycle approach, in order to decouple environmental impact from economic growth by regenerating and recycling WO&PR into a “new product” rather than extracting further resources.
- To contribute to the effective implementation of the EC Strategy on Hazardous Wastes, POPs and Natural Resources.

MARE promotes EU policies

- Directive 2008/98/EC on waste (Article 4, “Waste hierarchy”, (a) prevention, (b) prepare for re-use, (c) recycling, (d) other recovery eg. Energy and (f) disposal).
- Directive 91/689/EEC on hazardous waste.
- Regulation (EC) No 850/2004 on persistent organic pollutants (POPs).
- Directive 2008/56/EC Framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

Project structure

Work Packages
WP 1: Project Management
WP 2: Review and analysis of practices
WP 3: Technical requirements
WP 4: Processing Unit
WP 5: Environmental Impact Assessment & Cost Benefit Analysis
WP 6: Exploitation and Business Plan
WP 7: Dissemination

The Technology

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Description of the Technology

- Wiped Thin Film Evaporators (WTFE) are designed for slurry and viscous, temperature sensitive liquids.
- Widely used in food industry but never in WO&PR treatment.
- Material recovery of secondary products from WO&PR for reuse and recycle in existing industrial sites (crude oil refineries, asphalt extender producers, biological waste water treatment plants).
- A financial viable solution with significant environmental benefits.

Material recovery & annual capacity

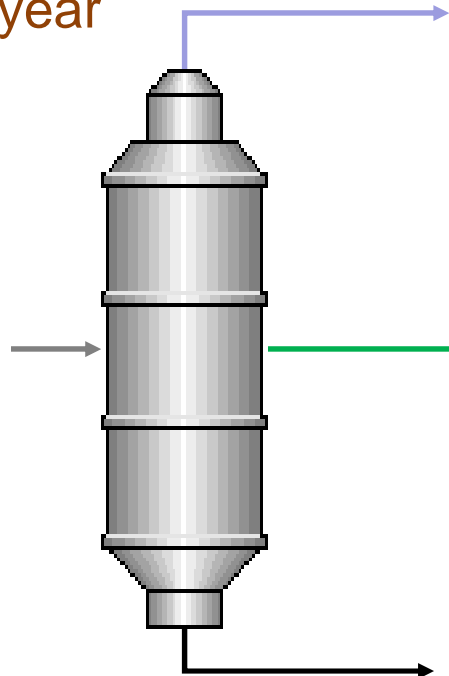
- A new processing unit based on an innovative thin film evaporation technology for recovery of materials from WO&PR:
 1. Water (20%) will be fed to existing CYCLON Waste Water Treatment Plant. Waste water may contain organic matter (oil, antifreeze, diluters, and emulsions) and more advanced treatment (e.g. biological) than existing practice (centrifuge) is required. Biological treatment in CYCLON's WWTP.
 2. Petroleum products (20%), free of solids and sludge will be supplied to crude oil refinery for further processing. Due to the high quality recovered fuel do not require sewer processing.
 3. Residual heavy fuel oil (60%), free of water and fuel, will be mixed with the residue of used lube oil re-refining process. This residue is utilized as asphalt extender (IPPC, BREF on Best Available Techniques for the waste treatment industries).

- The annual capacity of the new processing unit will be 2.000 tons of WO&PR.

MARE Unit / CYCLON Refinery

Processing capacity:
2.000 tn WO&PR/year

WO&PR



Wastewater (20%)

Traces of light H/C - Advanced biological treatment follows in CYCLON's WWTP (not simple centrifuge)

Petroleum products (20%)

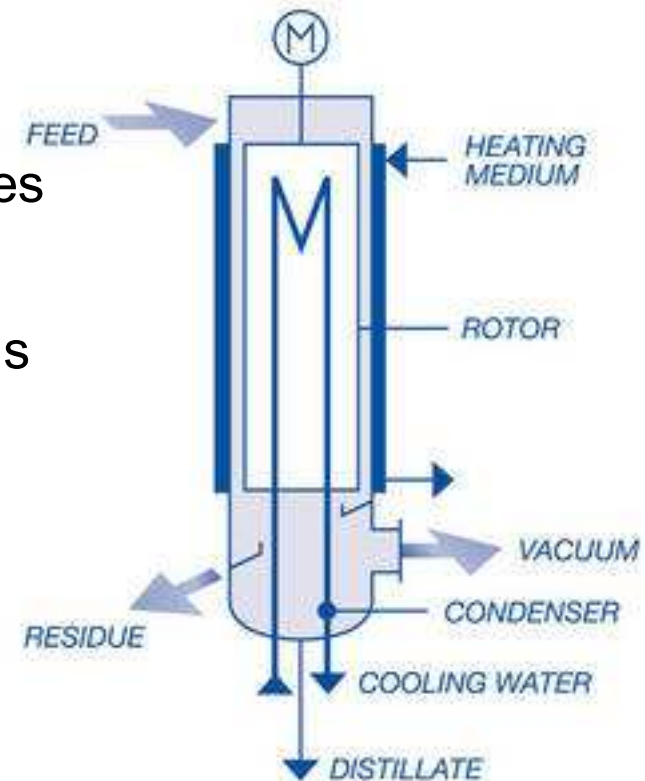
Rich in carbon chain C14 to C20, free of solids, sludge, not requiring sewer processing - Sold to crude oil refineries

Residual heavy fuel oil (60%)

Free of water and fuel which can be utilized as asphalt extender (IPPC, BREF)

Wiped thin film evaporator (WTFE)

- ✓ Short residence time (seconds) of the incoming liquid (WP&PR) that prevents polymerization of the organic compounds.
- ✓ Operation under high vacuum which reduces the operating temperature and energy demands.
- ✓ Excellent heat transfer as the process film is continuously agitated.
- ✓ Easy handlings of viscous fluids, as wipers pumps liquid down and create a thin film.
- ✓ Easy handling of dirty and fouling fluids, as wipers continuously agitate the film and prevent the creation of deposits.
- ✓ Maximum operating period before maintenance shut downs as a result of deposition of solids on the evaporator.



The Market

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The market – WO&PR in Greece

- Significant portion of organic waste in Europe and worldwide.
- More than 200.000 tons of WO&PR produced per year in Greece.
- WO&PR are collected as oily water and oily sludge or emulsions from oil/water separators, from fuel tanks, from sewers etc.
- Main producers of WO&PR are large industrial sites and ships.
- They are collected in ports, harbours and industrial temporary tanks.
- Three legal handling methods in Greece:
 1. Collection, possible pre-processing (e.g. oil/water decanter) and sold of oil phase to crude oil refineries for re-refining.
 2. Mixing with wood-chips for the production of stable secondary fuels, with a relatively low heat capacity, burned in cement kilns.
 3. Disposal via trans-boundary transportation abroad.

Market barriers

- The effective WO&PR regeneration depends on the minimisation of other mixture with the WO&PR stream.
- WO&PR are often mixed with WLO resulting to poor regeneration of both streams.
- Separation-at-source of WO&PR from other waste stream is required but not widely implemented.
- Separation-at-source requires some capital expenditure from producers (storage tanks, piping, decanters etc) that may not be willing to spend.
- Competition of raw materials - WO&PR is a valuable waste stream with some heating value so they are often reused as secondary fuel preventing thus its regeneration.

Market demand

- MARE Unit will produce a high quality petroleum product (20%), free of solids and sludge that do not need sewer processing.
- High demand from crude oil refineries to process that product towards final added value commercial fuels.
- MARE Unit will also produce a sludge (60%), free of water and petroleum product.
- High demand from asphalt producers that may use sludge to produce asphalt extender according the IPPC BREF for waste treatment industries.

Market competition

- In some EU countries, WO&PR and WLO are collected separately and follow different treatment path.
- In some EU countries all wastes derived from crude oil (lube oils, fuels, solvents, emulsion, residues and sludge) are collected and treated together for the production of low value fuels.
- The heating content of petroleum derived wastes increases the competition between collectors and final users, reduces non-collected quantities and favorites burning (reuse) instead of regeneration, with the latter being the top recycling priority of EU Policy.
- WTFE is not used in WO&PR treatment by any European industry to date.

Key External Actors for MARE Unit

Producers of WO&PR:

- Port Authorities
- Harbours
- Military organisations (navy, army, air force)
- Metal & heavy industries
- Energy suppliers

Collectors / managers WO&PR

Policy makers

Government environmental agencies

Target Group of MARE technology

- Crude oil refineries that will further process the MARE unit petroleum product (20%)
- Asphalt producers that will use MARE unit sludge (60%) to produce asphalt extender.

SWOT Analysis

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Strengths

- WTFE Innovative technology differentiates products of regeneration.
- WTFE adds quality and value in the downstream supply chain.
- Important market demand from crude oil refineries & asphalt extender producers.

Weaknesses

- Regeneration process in a pilot phase, so technology reliability is not fully tested.
- Regeneration collection in a pilot phase, so market reliability is not fully tested.
- High investment cost for the separation of WO&PR and WLO at source. This also consist a barrier to entry.
- Lack of reliable market data concerning sources, quantities, qualities and management facilities of WO&PR.
- WTFE operation requires industrial installations, utilities, waste water treatment facilities & experienced personnel.

Opportunities

- Environmental legislation is further being developed on the issues.
- Ability to invest in separation at source of WO&PR and WLO.

Threats

- Weak law enforcement regarding the separation at source of WO&PR from other waste streams.
- Competitive illegal management of waste oils & lubes (burning), supported by increasing prices of oil.

Marketing Strategy

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Marketing Strategy

1. Market selection – Targeted Customers

- Crude oil refineries that will further process the MARE unit petroleum product (20%)
- Asphalt producers that will use MARE unit sludge (60%) to produce asphalt extender.

Marketing Strategy

2. Product planning

- Petroleum products (20%), high quality, free of solids, free of sludge, not requiring sewer processing.
- Residual heavy fuel oil (60%), high quality, free of water, free of fuel.
- Provided with ADR certified trucks to end users.

Marketing Strategy

3. Pricing

- Petroleum product sold to Crude Oil refineries and priced on 'GASOIL 0,1%' Platt's price-index (est. 600 €/tn).
- Sludge sold to asphalt producers and priced on WLO market values defined from WLO producers, collectors and end users (est. 110 €/tn).
- Above pricing adds value to end customer.
- Pricing is consistent with its future use.
- Customer payment based on normal commercial agreements between parties

Marketing Strategy

4. Place

- B2B wholesale between existing companies.
- Industries operating in the same market and normally have existing commercial exchanges.

Marketing Strategy

5. Promotion

- **Positioning:** Premium products derived from petroleum wastes with physical and chemical characteristics suitable for the production of high added value end products – Providing raw materials with at a lower cost from existing alternatives.
- **Selling:** B2B Direct selling
- **Communication:**
 - Special contacts of B2B Sales Inspectors with Crudes Refineries and Asphalt Producers.
 - B2B communication channels already exists as MARE operators and MARE product Users operate in the same market and have existing commercial interchanges.

Replication

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Market Replication (1/2)

- Financial viability (NPV>0, strong IRR, low payback period).
- MARE pilot funding from ECO-INNOVATION as a strong environmental and technological marketing tool.
- Use of MARE stakeholder database.
- MARE website (www.mare.org.gr)
- CYCLON provides technology demonstration at EU level.
- UEIL Conference.
- MARE Conference.
- Promotion through GEIR to enable European cooperation on WO&PR management among EU re-refining industries.

Market Replication (2/2)

- Project leaflets & posters.
- MARE e-newsletters.
- Media campaign and press conferences.
- Promotion through Governmental Authorities and Organizations for Environmental Protection.
- Networking with EC co-funded environmental projects.
- Participation in EU Forum, dissemination events and Stakeholders event at EU level.
- Publication in environmental and petroleum industry magazines.



ECO-innovation

WHEN BUSINESS MEETS THE ENVIRONMENT



MAREO