Grant Agreement number: 262184-1

Project acronym: PROMETHEUS

Project title: “PRoductive On-site Membrane and Evaporator Treatment of High organic load Effluents: Unified System for industrial water and chemicals recovery and re-use”

Funding Scheme:

Date of latest version of Annex I against which the assessment will be made: July 2010

Periodic report: 1st

Period covered: from November 2010 to July 2011

Name, title and organisation of the scientific representative of the project's coordinator:

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Summary description of project context and objectives

This project aims the optimisation of treatment industrial waste waters from aluminium and rubber injection and extrusion processes, in order to avoid the discharge of these heavily polluted effluents to the environment.

The developed solution should be environmentally and economically sustainable, and it must allow its integration in the current treatment processes running at the industrial plants of partners. The new technology will retrofit the current treatment schemes.

The project aims the development of an overall two-step process (membrane processing + evaporation) which removes water from the original waste water allowing its reuse in the production process and/or its emission to the environment in such conditions that the European Legislation is complied.

Another objective is recover the water for re-use due to the high quality expected to obtain with PROMETHEUS treatment. It means the 99.5% for aluminum industries and 95% for rubber industries.

It is expected that the pre-concentration by membrane processing will save energy originating a positive impact on the overall cost of waste water treatment. The concentration of the membrane treatment unit is further concentrated by using a dedicated evaporator.

It will be performed a cost analysis of the process developed and it will be compared with the actual treatment processes which are used by the industrial partners.
Description of the work performed since the beginning of the project and the main results achieved so far

From the results obtained we may conclude that the processing of waste streams by nanofiltration represents the better option to processing waste waters from the industrial partners, Cikautxo and Fagor. In fact, the ability of this membrane to produce a permeate stream with low concentration of Total Organic Carbon (TOC), Chemical Oxygen Demand (COD) and metals assures that the permeat stream can be disposed (it complies with the European environmental legislation for industrial waste disposal) or reused in the productive process. This process presents high permeability and it requires small area of nanofiltration membrane in order to process the waste water originated. The combination of good retentive properties and high throughput of selected nanofiltration membrane determines its use for further studies and implementation of a pilot unit at industrial sites.

For instance, preliminary calculations indicate that 160 cubic meters of waste water produced by Cikautxo may be treated daily (20 h of nanofiltration treatment per day) using a small nanofiltration plant with only 145.5 m² membrane area (assuming a
permeability of 5.5 l/m² h Bar, according to results obtained under 10 bar pressure optimised transmembrane.

The concentrated stream of effluent was further treated by evaporation through a especially designed evaporator able to treat feed stream.

At this stage the challenge is the identification of the best conditions to the integration of the two operating units (nanofiltration and evaporation) in order to minimise the overall energy input and assuring the expected treated water quality.

![Figure 2 Membranes pilot plan](image)

**Description of the expected final results and their potential impacts and use (including socio economic impact and the wider societal implications of the project so far)**

The expected final result is a process that can be easily adopted by industrial companies which produce these types of effluents. The technological solution developed will allow minimise energy consumption necessary to treat these effluents,
obtaining a new scheme of treatment more sustainable from environmental and economical perspective.

The approach developed in this project has not only impact in the industries producing the effluents under study but also in other industrial producers with similar effluents.

**Consortium members**

- COHAN
- DELCO
- TMEM
- UREN
- FESlovensko
- IAI
- ETRMA
- IBET
- AQUATEAM
- ITAV

**Project website**

This publishable summary and other public information about PROMETHEUS project can be found in: [http://www.fp7-prometheus.eu/](http://www.fp7-prometheus.eu/)

**Current Status**

At the end of the nine month of Prometheus project, we have made strong progress towards achieving our project objectives and we are confident of meeting our overall project goals in the remaining 15 months of the project. The first period has focused on achieving the project scientific objectives. We have decided the best procedures between:

- Membranes system
- Selection of the membrane system and optimization of operating conditions
- Fouling prevention and flux recovery
- Membrane processing integration and validation
- Selection and design of evaporator. Optimisation of operating conditions
- Studies of different waste water compositions

**Result expectations and future work**
Once we have decided the best procedure of cleaning the waste waters, the first laboratory analysis will take place. After the integration of the different processes will be performed at Cikautxo facilities and therefore, the integration of the overall process will be validated. SME partners, COHAN, UREN, DELCO and TMEM will be in charge of manufacturing Prometheus technology at the end of the project. They will be able to provide this technology to treat waste waters from Cikautxo and Fagor. Thanks to the associations, ETRMA and IAI, this solution will be available for the overall rubber and aluminium industry.