Solutions for water recycling
Vacuum Evaporators and Concentrators
This is the great opportunity we have by using eco-technologies. Global production system is based on waste: the 80% of the energy and raw materials is getting loose. There are technologies so simple but exceptional at the same time, which allow us to generate electric power by the sun, the wind and the water. Or, speaking about wastewaters, there are systems giving the possibility to recover water, the most precious resource for humanity. **ECO-TECHNO** is the Italian Company who provides since 1984, solutions for wastewater treatment and water recycling. Thanks to the experience of 3000 installations all over the world, ECO-TECHNO is the partner for custom-made solutions.

In 2014, ECO-TECHNO growing, renewing itself, obtains international certifications to guarantee the quality of products through a safe and solid production process.

The mission of ECO-TECHNO is transmitting values and passion for people and nature that drives to environmental protection.
In our solutions, ECOonomy, ECOlogy and TECHNOlogy are in a perfect synthesis.

Our vacuum evaporators are highly automated with ON LINE monitoring via modem, and user-friendly speaking your language.

Our vacuum evaporators are one of the most innovative and efficient technologies for industrial water-based cleaning. Thanks to a simple and efficient configuration, this is a clean, safe and very versatile technology with low management costs, and in most cases also serve as a zero liquid discharge treatment system.

Our technology is recognized as BAT in the European Union directives.

The working principle: a natural process, simply perfect
Our proposal: it is never too late to make money.

<table>
<thead>
<tr>
<th><strong>WASTA WATER TO BE DISPOSED</strong></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Flow rate</td>
<td>liters/day</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>Current disposal cost</td>
<td>€/liter</td>
<td>0,080</td>
<td></td>
</tr>
<tr>
<td>Yearly working days</td>
<td></td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Yearly disposal cost without evaporator</td>
<td>€</td>
<td>211,200</td>
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<table>
<thead>
<tr>
<th><strong>CONCENTRATION OF WASTE WATER</strong></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Condensate (with respect to inlet raw waste water)</td>
<td>%</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Concentrate (with respect to inlet raw waste water)</td>
<td>%</td>
<td>5</td>
<td></td>
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<table>
<thead>
<tr>
<th><strong>EVAPORATOR SERIES ECO 12,000 DPM/3</strong></th>
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<tbody>
<tr>
<td>Daily concentrate</td>
<td>liters/day</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Concentrate disposal cost</td>
<td>€/liter</td>
<td>0,120</td>
<td></td>
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<tr>
<td>Yearly concentrate disposal cost</td>
<td>€</td>
<td>15,840</td>
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<table>
<thead>
<tr>
<th><strong>OPERATING COSTS</strong></th>
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</thead>
<tbody>
<tr>
<td>Thermal needs</td>
<td>kcal/h</td>
<td>110,000</td>
<td></td>
</tr>
<tr>
<td>Methane calorific val</td>
<td>kcal/Nm³</td>
<td>8,500</td>
<td></td>
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<tr>
<td>Methane hourly consumption</td>
<td>m³/h</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Methane cost</td>
<td>€/Nm³</td>
<td>0,350</td>
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</tr>
<tr>
<td>Hourly methane cost</td>
<td>€/h</td>
<td>4,53</td>
<td></td>
</tr>
<tr>
<td>Absorbed electrical power kW</td>
<td>kW</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>kW cost</td>
<td>€/kWh</td>
<td>0,14</td>
<td></td>
</tr>
<tr>
<td>Hourly electrical cost</td>
<td>€/h</td>
<td>2,10</td>
<td></td>
</tr>
<tr>
<td>Total hourly costs</td>
<td>€/h</td>
<td>6,63</td>
<td></td>
</tr>
<tr>
<td>Evaporator capacity</td>
<td>liters/h</td>
<td>500</td>
<td></td>
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<tr>
<td>Daily condensate flow rate</td>
<td>liters</td>
<td>11,400</td>
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</tr>
<tr>
<td>Chemicals</td>
<td>€/year</td>
<td>530</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>€/year</td>
<td>1,000</td>
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<tr>
<td>Specific treatment cost</td>
<td>€/liter</td>
<td>0,0145</td>
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<tr>
<td>Yearly treatment cost</td>
<td>€</td>
<td>36,457</td>
<td></td>
</tr>
<tr>
<td><strong>GUADAGNO ANNUO</strong></td>
<td>€</td>
<td>158,903</td>
<td></td>
</tr>
</tbody>
</table>

**Turning a problem into an opportunity to gain money.**
**Applications:**
many industries, one solution

<table>
<thead>
<tr>
<th>Field</th>
<th>Application</th>
<th>Some reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal contractors, landfill leachate</td>
<td>RO reject, leachate, brine, combined wastewater</td>
<td>ECOLEVANTE-WASTE RECYCLING, DE LUCA SERVIZI, VALLESABBIA SERVIZI, GENERAL FUSTI, WASTE ITALIA-ECOADDA</td>
</tr>
<tr>
<td>ZLD</td>
<td>Power plant, RO reject, desulphuration water, backwash of resins, concentrate from MVC evaporator, digestate, livestock wastewater</td>
<td>SORGENIA, ANSALDO ENERGIA, ENDESA, STORTI, ST.MICROELECTRONICS</td>
</tr>
<tr>
<td>Pharmaceutical, chemical</td>
<td>Cleaning process, heat-labile solutions</td>
<td>BAUSCH &amp; LOMB, ZAMBON, BIOLCHIM, ERCA MOERDIJK, GENTIUM, DELTA AGRAR</td>
</tr>
<tr>
<td>Food &amp; beverage</td>
<td>Cleaning water, recovery and concentration of sugar solution, brine, enzyme concentration, enrichment of grape must, flavourings</td>
<td>ALSO ENERVIT, BARILLA, CRASTAN, VINI CESANI, WILLAKENZIE EAST WINERY, SALUMIFICIO VALNURE</td>
</tr>
<tr>
<td>Cosmetic and plant extracts</td>
<td>Concentration of extracts, concentration of alcohol-based solutions, cleaning waters</td>
<td>COSMOSOL, VIS MEDICATRIX NATURAE, ABOCA, AQTAN, D. ULRICH</td>
</tr>
<tr>
<td>Aluminium surface treatment / coating</td>
<td>Wastewater from polishing, chroming, anodizing, pickling, painting, cleaning waters</td>
<td>ALUCOATING, DM PEINTURE, ELECTROLUX, PROFORM, OMIR, HYDRO ALUMINIUM</td>
</tr>
<tr>
<td>Plating and Galvanizing</td>
<td>Metals recovery (Chromium, Nickel, Copper) spent baths, backwash of resins, salt crystallization</td>
<td>SALICE, COLOMBO DESIGN, ZUCCHETTI RUBINETTERIA, EUROPLATING, FIOCCI PRYM, VITILLO</td>
</tr>
<tr>
<td>Mechanic and steel industry</td>
<td>Oil emulsions, vibratory finishing, cleaning baths, acids</td>
<td>MICHELIN ITALIANA, BERETTA ARMI, BEKAERT BRIDGESTONE, AVIO SPA, HONDA ITALIA, USAG, OTO MELARA, GROWERMETAL</td>
</tr>
<tr>
<td>Heat treatments</td>
<td>Quenching and tempering salts</td>
<td>METALTHERM, GALIMBERTI, OFFICINE RIVA, STT, MOLLIFICIO ADDA</td>
</tr>
<tr>
<td>Printing Industry</td>
<td>Ink-polluted water, cleaning printing cylinders, developing and fixing baths exhausted, engraving and chrome cylinders, grinding processes, processes of coloring</td>
<td>TETRAPAK, POLIGRAFICO ROMA, VITREAL SPECCHI, SAVERGLASS, EDITORIALE IL TIRRENO, SADA, ZECCA DI STATO (FRANCIA, RUSSIA, BRASILE, VENEZUELA, VIETNAM...)</td>
</tr>
</tbody>
</table>
Aftermarket & Service.

ECO-TECHNO ensures a quality trouble-free service for the entire life of the installation. The average life of our evaporators - 17 years - can be extended with regular maintenance programs. Service on call available.

Materials.

The use of high quality austenitic and super-duplex stainless steel for service in highly corrosive conditions allows excellent performance and strong resistance. The use of last generation instruments and technology allows an increasingly reliable use, granted for a long period.

1.4401 and 1.4404 Stainless Steel AISI316/316L
18/8 austenitic stainless steel enhanced with an addition of 2.5% Molybdenum, to provide superior corrosion resistance. 316/316L has improved pitting corrosion resistance and has excellent resistance to sulphates, phosphates and other salts. 316/316L has better resistance than standard 18/8 types to sea water, reducing acids and solution of chlorides, bromides and iodides.

1.4563 SANICRO 28 Sandvik
High-alloy multi-purpose austenitic stainless steel for service in highly corrosive conditions. The grade is characterized by:
- Very high corrosion resistance in strong acids
- Very good resistance to stress corrosion cracking (SCC) and intergranular corrosion in various environments
- High resistance to pitting and crevice corrosion
- Good weldability

1.4410 SAF 2507 TM Sandvik
Super-duplex (austenitic-ferritic) stainless steel for service in highly corrosive conditions. The grade is characterized by:
- Excellent resistance to stress corrosion cracking (SCC) in chloride-bearing environments
- Excellent resistance to pitting and crevice corrosion
- High resistance to general corrosion
- Very high mechanical strength
- Physical properties that offer design advantages
- High resistance to erosion corrosion and corrosion fatigue
- Good weldability

Titanium
Suitable for applications on corrosive wastewater, such as chromic acid.

Hastelloy
Nickel-based alloy, with high resistance to acid chloride, aluminium chloride and strong reducing agents in general.

Silicon Carbide
Synthetic material with high chemical resistance.

Incolloy
Nickel-based alloy, resistant to oxidation at high temperatures.

Nickel Alloy
Low carbon steel.
HEAT PUMP LT VACUUM EVAPORATOR

Main Features:

- Boiling vessel in A-316/316L. Completely detachable, easy access through manhole and sight glass with illuminator.
- Submerged heat exchanger.
- Side cooling section for condensation in closed loop.
- Vacuum circuit with pump.
- Automatic product inlet with modulating valve
- Automatic concentrate discharge
- Antifoam circuit with foam-detector.
- Automatic cleaning with water or chemicals.
- Comprehensive Control System with Siemens PLC and Control Panel.

ECO DPE HP 250-2500

Easy in installation, made to efficiently treat water-based solutions from 10 to 105 l/h at low temperature (35°C) to recycle water and raw materials or meet discharge limits. The DPE-HP can be completely custom-made in accordance to the specific treatment necessity.

Main applications

ECO DPE and DPC HP specially configured for industrial applications like:

- oil emulsions and release agents from die-casting
- quenching from heat treatments
- baths from galvanizing
- foamy liquids
- treatment of water-based solutions

ECO DPC HP 250-2500

Derived from ECO DPE HP series, it is configured for the direct treatment of chromic solutions. Made in Titanium and acid-resistant resins.
HEAT PUMP LT VACUUM EVAPORATOR

SUBMERGED HEAT EXCHANGER. DISTILLATION THROUGHPUT 10 to 750 L/H

ECO VS HP 250-18000
Easy in installation, made to efficiently treat water-based solutions from 10 to 750 l/h at low temperature (35°C) to recycle water and raw materials or meet discharge limits. The VS-HP can be custom-made in accordance to the specific treatment necessity.

ECO CR HP 250-18000
Derived from ECO VS-HP series, it is configured for the direct treatment of chromic solutions from 10 to 750 l/h. Made in Titanium and acid-resistant resins.

Main applications
ECO VS and CR HP specially configured for industrial applications like:
- die-casting
- quenching
- pharmaceutical and chemistry
- food & beverage
- and in general hazardous wastewater

Main features:
- Boiling vessel in A-316/316L. Completely detachable, easy access through manhole and sight glass with illuminator.
- Submerged heat exchanger. The heat exchanger can be completely removed for easy maintenance.
- Upper heat exchanger for the condensation of vapour.
- Vacuum circuit with pump.
- Automatic product inlet with modulating valve
- Automatic concentrate discharge with pump from vacuum.
- Antifoam circuit with foam-detector.
- Automatic cleaning with water or chemicals.
- Comprehensive Control System with Siemens PLC and Control Panel

Flow Diagram
ECO OC HP 250-20000

Multiple Effect Heat Pump Evaporator. It is the combination of the heat pump systems with the energy-saving typical of the “multiple effect” evaporators. It uses only electrical energy as power and exploits the thermal energy of vapour produced in the first boiler to heat the subsequent one.

Main applications
ECO OC HP evaporators suitable for the treatment of large flow rate of wastewater, where alternative energy sources are not available.
- die-casting
- quenching
- pharmaceutical and chemistry
- food & beverage
- and in general hazardous wastewater

Main features:
- Multiple boiling vessels in A-316/316L or special alloy.
- Submerged heat exchanger in the first vessel. The vapour produced is used to heat a second tube bundle heat exchanger.
- Condensation of vapour in closed circuit.
- Vacuum circuit with pump.
- Automatic concentrate discharge with pumps from vacuum.
- Antifoam circuit with foam-detector.
- Automatic cleaning with water or chemicals.
- Comprehensive Control System with Siemens PLC and Control Panel.
WITH SCRAPER FOR ENCRUSTING LIQUIDS. DISTILLATION THROUGHPUT 20 to 165 L/H

HEAT PUMP LT VACUUM EVAPORATOR
FOR SEVERE CONCENTRATION

**Main applications**

**ECO VR HP 500-4000**

Specially configured to concentrate encrusting water-based solutions from 20 to 165 l/h, it has an internal scraper to concentrate up to crystallization.

Specially recommended for fouling wastewater and high density watery solution treatment.

**ECO VR HP** specially configured for industrial applications like:

- glue and encrusting streams
- printing industry
- RO rejects
- Brine and brackish water
- ZLD

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**Main features:**

- Boiling vessel in A-316/316L or special alloy.
- Internal scraper controlled by gear motor to clean fouling and to improve the concentration degree
- Jacketed heat exchanger not in contact with the influent
- Upper heat exchanger for the condensation of vapour
- Vacuum circuit with pump
- Automatic product inlet with modulating valve
- Automatic concentrate discharge with valve or pump
- Antifoam circuit with foam-detector and automatic injection
- Comprehensive Control System with Siemens PLC and Control Panel

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Flow diagram:

- **CONDENSATE OUTLET**
- **CONCENTRATE OUTLET**
- **INLET WATER**
- **SCRAPER ENGINE**
- **CONDENSATION**
- **BEATING CHAMBER**
- **SUBCOOLER**
- **VACUUM PUMP**
- **CONDENSATE VESSEL**

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**FLOW DIAGRAM**
**HEAT PUMP LT VACUUM EVAPORATOR**

**Main applications**

ECO DRY HP evaporators designed to:
- ZLD
- severe concentration process
- recycle of salts
- recycle of metals
- concentration of plant extracts and flavourings

**ECO DRY HP 250 - 1000**

ECO DRY HP series evaporators are designed to obtain sludge, as well as the recovery of raw materials dissolved in the waste.

Version with scraping screw for semi-solid concentrate.

**Main features:**

- Horizontal boiling vessel built in A-316/316L or special alloy
- Side opening and full accessibility for manual removal of salts. At completion of the work cycle, vacuum is broken and manual download of the boiler starts, by using a scraper shovel (manual or automatic)
- Saddle jacketed heat exchanger not in contact with the influent
- Upper heat exchanger for the condensation of vapour
- Heat pump circuit designed for low-temperature evaporation with compressor. Ecological Freon gas type R407c or R134a
- Vacuum circuit with vacuum pump
- Automatic product inlet with modulating valve
- Antifoam circuit with foam-detector
- Comprehensive Control System with Siemens PLC and Control Panel
MECHANICAL VAPOUR COMPRESSION

ECO CMV SE
The ECO CMV or MVC - forced circulation evaporator based on the mechanical compression of vapour to optimize heat exchange and low energy consumption.

Main features:
- Mechanical vapour compression of vapour
- Forced circulation
- Low energy consumption
- Wastewater inlet and condensate outlet automated
- Control by Siemens PLC and operator panel

Main applications
ECO CMV SE evaporators are suitable for the treatment of:
- Oil emulsions
- Spent release agents from die-casting
- Vibratory finishing
- Pre-treatment for painting industry
MULTIPLE EFFECT VACUUM EVAPORATORS

ECO DPM 4000-30000

The vacuum evaporators ECO DPM are designed for efficiently treating middle to large flow rates by using any thermal source as power, and recycling the produced energy. Specially configured for hazardous wastewater, they are advisable anytime no maintenance is required.

Single or multiple effect configuration is possible.

Condensation with cooling tower or plate exchanger

Main applications

ECO DPM evaporators are particularly suitable for:

- Oil emulsions and release agents from die-casting
- Mechanic industry
- Vibratory finishing
- Leachate
- RO rejects
- Printing industry
- Spinning and weaving

Main features:

- Single or multiple boiling vessels in A316/316L or special alloys, full accessible
- Bundle heat exchangers removable by flange for friendly maintenance
- Condensation with plate heat exchanger or wet-bulb cooling tower.
- Vacuum circuit with pumps
- Automatic product inlet with modulating valves
- Automatic concentrate discharge with pumps from vacuum
- Antifoam circuit with foam-detector
- Automatic cleaning circuit
- Comprehensive Control System with Siemens PLC and Control Panel
FORCED CIRCULATION TECHNOLOGY. DISTILLATION THROUGHPUT 1 TO 8 m³/h

MULTIPLE EFFECT VACUUM EVAPORATORS

Main features:
• Single or multiple boiling vessels in A-316/316L or special alloys
• Maintenance-friendly external bundle heat exchangers
• Condensation with plate heat exchanger
• Vacuum circuit in with pumps
• Automatic product inlet with modulating valves and transferring pumps
• High-speed forced circulation of the influent with pumps
• Automatic concentrate discharge with pumps from vacuum.
• Antifoam circuit with foam-detector and automatic injection system.
• Cleaning circuit for the automatic cleaning of the plant with water or chemicals.
• Comprehensive Control System with Siemens PLC and Control Panel

ECO DPM SE 30-200
The vacuum evaporators of the series DPM SE are designed for the concentration of large volumes of water based solutions and high salt concentration solutions. Powered by thermal sources like hot water or steam. Single or multiple effect. Designed to meet the severe treatment conditions of disposal contractors with a number of varied hazardous wastewater.

Main applications
ECO DPM SE evaporators are particularly suitable for:
• Waste disposal companies
• Hazardous wastewater
• Leachate
• Salt water

Flow Diagram
WITH SCRAPER FOR ENCRUSTING LIQUIDS. DISTILLATION THROUGHPUT 30 to 500 L/H

VACUUM EVAPORATOR FOR SEVERE CONCENTRATION

ECO VR-WW 750-12000

The ECO VR-WW vacuum evaporators are designed for the treatment and recovery of fouling and encrusting water-based solutions.

Recommended for the treatment of high-density sludge and ZLD.

Main features:

- Single or multiple boiling vessels in A-316/316L or special alloys
- Internal scraper controlled by gear motor to clean fouling and to improve the concentration degree
- Jacketed heat exchanger not in contact with the influent
- Condensation with plate heat exchanger
- Vacuum circuit in with pump
- Automatic product inlet with modulating valves
- Automatic concentrate discharge with pumps
- Antifoam circuit with foam-detector and automatic injection system.
- Comprehensive Control System with Siemens PLC and Control Panel

Main applications

ECO VR WW specially designed for:

- glue and encrusting streams
- Printing industry
- tBrine and brackish water
- wastewater treatment printing
- Pharmaceutical & Chemical industry
- RO rejects
- ZLD
This brochure shows models, outfitting versions and configuration possibilities (standard and optional) of vacuum evaporation systems for industrial applications, manufactured and distributed by ECO-TECHNO. The content is intended for general information purpose only. The details it contains shall not be deemed a contractually binding document, since ECO-TECHNO may make constructive and outfitting modifications anytime and during the period between publication of this catalogue, the manufacturing of the equipment and the publication of an update catalogue.