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Document done on 19/07/2018
The group

CMI designs, integrates, upgrades and services equipment for energy, defence, steelmaking, the environment and other industries in general.

The group is structured around 5 sectors that assist customers throughout the entire life-cycles of their equipment to improve their economic, technical and environmental performance.

CMI's strengths are numerous: a unique combination of expertise in engineering, maintenance and management of international technical projects, a vast geographical and technological scope an ability to innovate in accordance with the concrete needs of its customers.

CMI has a turnover of more than 1.3 billion euros and 4,800 experienced employees in Africa, Brazil, China, the United States, Europe, India, Mexico, New Caledonia, Russia and the United States.

On the 5 continents, CMI ENVIRONMENT puts at your disposal its know-how and its sense of innovation to develop tailor-made global environmental solutions in 4 areas of expertise:

**Air & Gas**
- Air and fumes treatment
- Treatment of hot and cold gases
- Odor treatments
- Anti-corrosion ventilation solutions and thermoplastic accessories

**Energy Efficiency**
- Energy efficiency solutions: process, plant management...
- AFNOR training reference
- Hydroelectric power
- Energy recovery (anaerobic digestion, gasification)

**Water**
- Industrial water treatment
- Municipal water treatment
- Drinking water solutions
- Liquid waste treatment
- Water treatment products and processes (preventive or curative)

**Solid Wastes**
- The NESA solutions

High-temperature thermal conversion process for:
- Solid wastes
- Biomasse
- Activated carbon
Based on Multiple Hearth Furnaces & Shaft Kiln (VSK Technologies)
CMI ENVIRONMENT

CMI Europe Environnement

Since 25 years, CMI Europe Environnement works at cleaning up a precious resource: air! Specialized in the treatment of corrosive, harmful and odorous industrial gaseous emissions, CMI Europe Environnement designs and manufactures pollution-control equipment that comply with stringent standards and regulations.

If CMI Europe Environnement was only figures, it can be said the company numbers 150 people, has more than 1000 references in gas scrubbing in more than 40 countries worldwide. But figures say nothing about our R&D team and processes, our olfactometry laboratory, our audit and consulting services, our pilot projects, our tests and technical developments…

CMI Europe Environnement is the best technological choices for:

- Adsorption and odor removal on activated carbon
- Physico-chemical scrubbing
- Biofiltration
- Solvent recovery
- Stripping
- Thermal and catalytic oxidation
- Catalytic DeNOx

Our solutions are suitable for public authorities (composting centres, biomethanisation, waste water treatment plants, etc.) as well as industrial companies (surface treatment, chemistry, food processing, etc.).
CMI ENVIRONMENT

They rely on us

In figures

- 18,000 fans
- 1,700 activated carbon filters
- 1,600 scrubbers
- 300 biofilters
- 1,000 customers
- 45 countries
- 30 partners
Household and residual wastes treatment plant of BOURG-EN-BRESSE (FR – 01)

Client: TIRU

Flow rate: 163 000 m$^3$/h

Commissioning: 2014

Equipments:
- 2 vertical spraying scrubbers operating with sulfuric acid, including peripheral equipments
- 2 modular biofilters
- The whole ventilation network
## Residual waste treatment plant of CHAGNY (FR - 71)

<table>
<thead>
<tr>
<th>Client</th>
<th>TIRU</th>
<th>Equipment</th>
</tr>
</thead>
</table>
| Air flow | 150 000 m³/h | - Vertical spraying scrubber (103 895 m³/h) operating with sulfuric acid  
- Vertical packing scrubber (47 630 m³/h)  
- 3 rectangular biofilters, each of 300 m² (151 525 m³/h) |
| Technologies | scrubbing + biofiltration | - Air transfer ductwork  
- Tanks Equipment, reagent injection system, safety shower |
| Commissionning | 2014 | |

Ref. 14 50009
**CMI ENVIRONMENT**

**Residual household wastes treatment plant MARSEILLE (France - 13)**

<table>
<thead>
<tr>
<th>Customer</th>
<th>URBASER</th>
<th>Equipment</th>
</tr>
</thead>
</table>
| **Commissioning** | 2010 | - 1 Acid scrubber Ø4000mm  
- 3 wet dust scrubbers Ø 4000 mm  
- 2 horizontal biofilters of 1300 m² each |
| **Technologies** | Scrubbing & biofiltration | - 6 High Pressure centrifugal fans  
- 6 transfer axial fans  
- 1 piping network  
- 1 Electric control panel for the facility monitoring |
| **Flow rate** | 400 000 m³/h | |

---

**Cockerill Maintenance & Ingénierie**
Few biomethanisation references

"Agrimaine" (Biogest Energie), Charchigné (France)

Pollutants: Sulfure d'hydrogène, Ammoniac, Amines, Mercaptans, DMS + DMDS, Aldéhydes, Alcools, Aldéhydes

Technologies: Lavage de gaz & Biofiltration

Flow rate: 81000 m³/h

Commissionning: 2017

Odors units: at inlet 4000 OU/m³ / at outlet: 880 OU/m³

Efficiency of the odor control unit: 80%

Supplied equipment:
- High pressure fan VCP HP 1120
- Vertical spraying scrubber LPV 3500-2C
- Automatic regulation of the reagent solution (soda)
- Safety showers
- 1 covered biofilter with chimney BIOMOD R368-2,5M
- Ductwork
- Exhaust stack
- Control panel

Ref.: 385

THOIRY BIOENERGIE (METHAVOS), Thoiry (France)

Pollutants: Ammonia, Amines

Technologies: Gas scrubbing

Flow rate: 20 800 m³/h

Commissionning: 2017

Supplied equipment:
- Vertical spraying scrubber LPV 1900-1C
- Centrifugal fan VCP 630
- Automatic regulation of the reagent solution (sulfuric acid)

Ref.: 457
SEMECS, VARENNES (Canada)

**Business:** Methanisation of organic wastes

**Pollutants:** Ammonia, Amines

**Technologies:** Gas scrubbing, biofiltration, stripping

**Commissioning:** 2017

**Supplied equipment for the OCU:**

**Flow rate:** 40 000 m³/h

- Vertical spraying scrubber LPV 2850-3C
- High pressure Centrifugal fan VCP HP 900
- Automatic regulation of the reagent solution (sulfuric acid)
- Covered organic bio filter BIOREC GC300-2M
- Safety shower
- Ductwork

**Supplied equipment for the ammonia stripping unit:**

- **Effluent flow to process:** 24 m³/h
- **Temperature:** 50°C
- **Air flow:** 35 000 m³/h
- **Ammonia inlet charge:** 1700 mg/l
- **Material in suspension:** 500 ppm

- CO₂ Vertical spraying stripper SRV 700 4M
- NH₄⁺ vertical spraying stripper SRV 2850-3,5M
- Vertical packing scrubber LRV 2850-3M
- Acid dosing distribution
- Safety shower
- CO₂ Centrifugal fan VCPA 200
- NH₄⁺ High pressure centrifugal fan VCP HP 800
- Ductwork

**Consumption & Treatment performance**

- Efficiency: 95%  
  1700 mg/l ➔ 5 mg/l
- Sulphuric acid at 98% : ~37 l/h
- Ammonium Sulphate Purge: ~220 l/h at 400 g/l
ANDIGESTION (ATS), GLOUCESTER (England)

Business: Food waste recycling
Capacity: 34 000 T/year equivalent to waste from 185 000 households
Pollutants: Hydrogen sulfide, mercaptans, ammonia
Technologies: gas scrubbing & biofiltration
Flow rate: 5 000 m$^3$/h
Performance: 90%
inlet odor concentration = 15 000 UO/m$^3$ / Outlet < 1 500 UO/m$^3$
Commissioning: 2014

Supplied equipment
- Vertical Packing Scrubber LRV 940-2M
- Centrifugal fan VCPA 315
- Modular covered biofilter BIOREC 40-2M
- Interconnecting ductwork
### Organic Recovery Centre ANGERS (France - 49)

<table>
<thead>
<tr>
<th>Customer</th>
<th>VINCI ENVIRONNEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2011</td>
</tr>
<tr>
<td>Flow rate</td>
<td>115 000 m³/h</td>
</tr>
<tr>
<td>Capacité</td>
<td>90 000 tonnes/an</td>
</tr>
</tbody>
</table>

**Equipment**

- 4 2-step scrubbers Ø 2200 mm
- 4 horizontal biofilters of 200 m² each
- 1 Electric control panel for the facility monitoring
CMI ENVIRONMENT

Recovery unit from biowastes of Meta Bio Energie in Combrée (FR – 49)

Client: TERRRALYS

Installation: 2016
Flow: 180,000 m³/h

Equipment:
- 2 rectangular biofilters of 448 m² each
- 1 chimney
- Air transfer ductwork
- Electrical cabinet
- Full ventilation solution
  - 2 helicoid stainless steel fans
  - 5 high pressure centrifugal plastic fans
  - 14 wall helicoid plastic fans
  - 44 air transfer axial plastic fans

Ref. 00159
# Few Composting references

## Waste sorting and composting center, Saint-Barthélemy

<table>
<thead>
<tr>
<th>Customer</th>
<th>TIRU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td>2017</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>3 000 m³/h</td>
</tr>
<tr>
<td><strong>Pollutants</strong></td>
<td>Ammonia, hydrogen sulfide</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>gas scrubbing</td>
</tr>
<tr>
<td><strong>Ref.</strong></td>
<td>489</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 high pressure centrifugal fans</td>
</tr>
<tr>
<td>1 centrifugal spraying scrubber</td>
</tr>
<tr>
<td>1 vertical packing scrubber LRV</td>
</tr>
<tr>
<td>Dosing system for the scrubbing solution</td>
</tr>
<tr>
<td>Safety shower</td>
</tr>
<tr>
<td>2 storage tanks : 2500L &amp; 6000L</td>
</tr>
<tr>
<td>1 Droplet separator</td>
</tr>
<tr>
<td>1 Activated carbon filter for H₂S removal</td>
</tr>
<tr>
<td>Ductwork</td>
</tr>
<tr>
<td>1 Electrical cabinet</td>
</tr>
</tbody>
</table>

![Equipment images]
## Composting center CHATUZANGE LE GOUBET (France - 26)

<table>
<thead>
<tr>
<th>Customer</th>
<th>JAMONET</th>
<th>Equipment</th>
</tr>
</thead>
</table>
| **Installation** | 2013 | - 1 acid scrubber Ø1900 mm  
- 1 system for reagent transfer, storage and distribution  
- 1 biofilter (140 m²)  
- 2 sets of fans (process and ambiance)  
- 1 piping network  
- 1 Electric control panel for the facility monitoring |
| **Flow rate** | 19 000 m³/h | |

Ref. 13 50002
## Treatment center of residual household wastes

**SAINT BARTHÉLÉMY DE VALS (FR - 26)**

<table>
<thead>
<tr>
<th>Customer</th>
<th>SYTRAD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td>2012</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>110 000 m³/h</td>
</tr>
<tr>
<td><strong>Pollutants</strong></td>
<td>Ammonia, Hydrogen Sulfur, Volatil Organic Compounds</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Scrubbing &amp; Biofiltration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Equipment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- 1 acid centrifugal scrubber Ø1250 mm with automatic regulation system</td>
</tr>
<tr>
<td>- Safety showers</td>
</tr>
<tr>
<td>- 1 system for reagent transfer, storage and distribution</td>
</tr>
<tr>
<td>- 1 biofilter (300 m²)</td>
</tr>
<tr>
<td>- 2 sets of fans (process and ambiance)</td>
</tr>
<tr>
<td>- 1 piping network</td>
</tr>
<tr>
<td>- 1 Electric control panel for the facility monitoring</td>
</tr>
</tbody>
</table>

Ref. 12 55002
Treatment center of residual household wastes
BEAUREGARD-BARRET (France - 26)

Customer: SYTRAD
Installation: 2012
Flow rate: 50 000 m³/h

Equipment:
- 1 acid cyclonic scrubber
- 1 system for reagent transfer, storage and distribution
- 1 biofilter (300 m²)
- 1 set of fans
- 1 piping network
- 1 electric control panel for the facility monitoring

Ref. 12 55001
Recovery center from residual household wastes
ETOILE SUR RHÔNE (France - 26)

Customer | SYTRAD
--- | ---
Installation | 2012
Flow rate | 110,000 m³/h

Equipment of the new facility
- 1 Dust scrubber Ø1600 mm with automatic regulation system
- Safety shower
- 1 biofilter (400 m²)
- 2 biofilters of 220 m² each
- 1 High Pressure centrifugal fan with noise repipingion device (extraction)
- 1 centrifugal fan (transfer)
- 1 piping network

Revamping Equipment
- 1 system for reagent transfer, storage and distribution on existing scrubbers
- 1 spraying system for existing biofilters & biomass replacement
- Spare parts supply

Ref. 12 55001
## Composting center POZNAN (Poland)

<table>
<thead>
<tr>
<th>Customer</th>
<th>AK NOVA</th>
<th><strong>Equipment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Installation</strong></td>
<td>2012</td>
<td>- 4 scrubbers Ø2200 mm with hydraulic system</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>127 000 m³/h</td>
<td>- 4 High Pressure centrifugal fans</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Scrubbing</td>
<td>- 1 piping network</td>
</tr>
</tbody>
</table>

Ref. 12 60025
## Composting center FERTISERE (France - 38)

**Customer** | TERRALYS  
---|---
**Installation** | 2012  
**Flow rate** | 20 000 m³/h  
**Equipment**  
- 1 Acid scrubber  
- 1 system for reagent transfer, storage and distribution  
- 1 water sprayer type HHP560  
- 1 covered biofilter (130 m²)  
- 2 sets of fans (process and ambiance)  
- 1 piping network  
- 1 Electric control panel for the facility monitoring
Composting center LA CRAU (France - 83)

<table>
<thead>
<tr>
<th>Customer</th>
<th>CCVG</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2011</td>
<td>- 1 Acid scrubber Ø2500 mm with hydraulic system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 installation of reagent transfer, storage and automatic distribution</td>
</tr>
<tr>
<td>Flow rate</td>
<td>30 000 m³/h</td>
<td>- 1 149 m³ biofilter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 High Pressure centrifugal fan with noise repipingion device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 piping network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 electric control panel for the facility monitoring</td>
</tr>
</tbody>
</table>

Ref. 11 5002

CMR 11 5014
Biovalis: 11 5016
Compostière de Savoie: 11 6026
LELEDY Compost: 11 6013
Composting center CEVAL (FR - 30 / GARD)

<table>
<thead>
<tr>
<th>Customer</th>
<th>CEVAL</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2010</td>
<td>2 acid and oxido-basic scrubbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 3500 mm</td>
</tr>
<tr>
<td>Flow rate</td>
<td>65 000 m³/h</td>
<td>1 system for reagent transfer, storage and automatic distribution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 wet dust scrubber Ø 4000 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 set of process fans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 transfer axial fan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 piping network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Electric control panel for the facility monitoring</td>
</tr>
</tbody>
</table>
## Composting center CHAMBEZON (France - 43)

<table>
<thead>
<tr>
<th>Customer</th>
<th>LYONNAISE DES EAUX</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2010</td>
<td>- 1 scrubber Ø 1900 mm</td>
</tr>
<tr>
<td>Flow rate</td>
<td>180 000 m³/h</td>
<td>- 1 horizontal biofilter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 High Pressure centrifugal fan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 1 Electric control panel for the facility monitoring</td>
</tr>
</tbody>
</table>
# Mechanical-biological sorting facility

**SAINT CHRISTOPHE DU LIGNERON (France - 85)**

<table>
<thead>
<tr>
<th>Customer</th>
<th>VINCI ENVIRONNEMENT</th>
<th>Capacity</th>
<th>55 000 tonnes/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow rate</td>
<td>116 000 m³/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollutants</td>
<td>Hydrogen sulfur, Mercaptans, Ammonia, Amines, Aldehydes, Ketones, Dimethylsulfur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Biofiltration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 horizontal dust removal device</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 2-step scrubbers Ø 3150 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 horizontal biofilters of 400 m² each</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 piping network</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Electric control panel for the facility monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O/Ref:</td>
<td>115003</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Waste-to-energy Mandel plant, Rumbeke (Belgique)**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Eneco Energie</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2010</td>
<td>60 000 tons/year</td>
</tr>
<tr>
<td>O/ref:</td>
<td>106003</td>
<td></td>
</tr>
</tbody>
</table>

**Composting center PASSEL (France - 60)**

<table>
<thead>
<tr>
<th>Customer</th>
<th>ASTRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2009</td>
</tr>
<tr>
<td>Flow rate</td>
<td>60 000 m³/h</td>
</tr>
</tbody>
</table>

**Equipment**

- 1 scrubber Ø 3500 mm
- 1 High Pressure centrifugal fan
- 1 Electric control panel for the facility monitoring
Composting center LAVIGNY (Switzerland)

Customer: BIOVALIS  
Installation: 2008  
Flow rate: 37 300 m³/h

Equipment:
- 1 scrubber Ø 2500 mm
- 1 évaporator scrubber Ø 1600 mm
- 1 wet dust removal device
- 3 High Pressure centrifugal fans
## Composting center ENSUES LA REDONNE (France - 13)

<table>
<thead>
<tr>
<th>Customer</th>
<th>EAUX DE MARSEILLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>2007</td>
</tr>
<tr>
<td>Flow rate</td>
<td>28 000 m³/h</td>
</tr>
</tbody>
</table>

### Equipment
- 2 scrubbers Ø 1600 mm
- 2 High Pressure centrifugal fans
- 1 piping network
- 1 Electric control panel for the facility monitoring
Composting center PETIT MARS (France - 44)

Customer | VEOLIA PROPRETE
--- | ---
Installation | 2007
Flow rate | 45 000 m³/h

Equipment
- 2 acid scrubbers Ø 2850 mm
- 1 High Pressure centrifugal fan
- 12 centrifugal fans on windrows for composting
- 1 piping network
- 1 Electric control panel for the facility monitoring
Composting center LILLE (FR - 59)

Customer: LINDE

Installation: 2006
Flow rate: 300,000 m³/h

Equipment:
- 4 acid scrubbers Ø 3500 mm
- 2 biofilters of 1100 m² each
- 1 piping network
- 1 Electric control panel for the facility monitoring
Few Ammonia stripping references: Recov’Ammonia®

SUEZ EAU INDUSTRIELLE (St Microelectronics) - France / 38

Business: Printed circuits
Effluent flow to process: 530 m³/j
Temperature: 65°C
Air flow: 17 000 m³/h
Ammonia inlet charge: 500 mg/l
pH: 10
Material in suspension: 6 mg/l

Ammonia stripping (NH₄⁺)

- Vertical spraying stripper Ø 1900-3M
- Vertical spraying scrubber Ø 1900-3M
- Ventilateurs avec caisson acoustique 2 CTC800
- Réseau de gaines & isolation thermique

Consumption & Treatment performance

- Efficiency: 75%
- Sulphuric acid at 50%: ~32.5 l/h
- Ammonium sulphate purge: ~76 l/h at 400g/L

NH₃ scrubbing

- Ammonia concentration at inlet: 493 mg/m³
- Ammonia concentration at outlet: < 5 mg/m³

Commissioning: 02/2017 (Our ref. 2016/F036E00242)

Contact (2017):

SUEZ Eau Industrielle
Bâtiment Universaone
18 rue Felix Mangini
60 009 LYON - France

Baptiste Gouachon
Engineering project manager
Mob.: +33 6.38.12.40.21
baptiste.gouachon@suez.com
TEREOS - France/45

Business: Methanisation of vinasses from beet juice fermentation/distillation.

Effluent flow to process: 1 025 m³/j 
Temperature: 60°C 
Air flow: 80 000 m³/h 
Ammonia inlet charge: 2400 mg/l 
Material in suspension: 0.35%

Ammonia stripping (NH₄⁺):
- 3 m³ buffer tank to recover the effluents to be treated from evaporators to supply the stripper
- Vertical packing scrubber Ø 4000-3M garnissage VSP50
- Vertical spraying scrubber Ø 4000-3M
- Fans BB20
- Hydraulic & control systems
- Piping ducts

Consumption & Treatment performance
- Efficiency: >90% 
- Soda at 50% (increased pH) : 64 l/h
- Sulphuric acid at 95% ~160 l/h
- Ammonium sulphate purge ~726 l/h
- Ammonium sulphate concentration 40% +/-2% (pH ≥ 3)

Sulphuric acid (at 95%) scrubbing of noncondensables
- Ammonia concentration at inlet: 1 174 mg/m³
- Ammonia concentration at outlet: < 5 mg/m³

Commissioning: 08/2013 (Our ref. 13 60002)

Contact (2015):
TEREOS 
Route de Paris 
45 410 Artenay, 

Eric Moreau 
Process & Project Engineering 
Tél. : 07.61.70.65.65. 
emoreau3@tereos.com
NASKÉO ENVIRONNEMENT (Biogaz Grand Auch) - France/32

**Business:** Methanisation of organic waste for cogeneration (biogas recovery)

**Effluent flow to process:** 135 m³/j
**Temperature:** 40°C
**Air flow:** 26 000 à 39 000 m³/h
**Ammonia inlet charge:** 4700 at 7100 mg/l
**pH:** 11
**Material in suspension:** 7 000 mg/l

**Ammonia stripping (NH₄⁺)**
- Vertical packing stripper: Ø 2500- 2x2M VSP50
- Vertical spraying scrubber: Ø 2500-4M
- High pressure centrifugal fan: VCP HP 800
- Piping ducts

**Consumption & Treatment performance**
- Efficiency: > 95%
- Sulphuric acid at 95%: ~55 l/h
- Ammonium Sulphate Purge: ~314 l/h at 400 g/l

**NH₃ scrubbing**
- Ammonia concentration at inlet: 790 à 1200 mg/m³
- Ammonia concentration at outlet: <5 mg/m³

**Commissioning:** 12/2013 (Our ref. 13 60004)

Contact (2016):

NASKEO ENVIRONNEMENT
52, rue Paul Vaillant Couturier
92 240 Malakoff

Damien DELHOMME
Directeur associé - Pôle technique
Tél: +33 (0)1 57 21 02 16
Mob.: +33 (0)6 37 27 61 21
damien.delhomme@naskeo.com
ONDEO IS (SME Safran) - France/32

**Business:** Production of ammonium perchlorate (NH$_4$)$_2$SO$_4$ for aerospace propulsion

**Effluent flow to process:** 48 m$^3$/j
**Temperature:** 40°C
**Air flow:** 9 000 m$^3$/h
**Ammonia inlet charge:** 3 000 mg/l
**pH:** 10,5
**Material in suspension:** 6 mg/l

**Ammonia stripping (NH$_4^+$)**

- Vertical spraying stripper Ø 1400-3M
- Vertical spraying scrubber Ø 1400-3M
- High pressure centrifugal fan VCP HP 450
- Automatic dosing of sulphuric acid
- Pipes network

**Consumption & Treatment performance**

- Efficiency: >93 %
- Sulphuric acid at 95% : ~10.6 l/h
- Ammonium Sulphate Purge: ~47 l/h at 500 g/l

**Lavage NH$_3$**

- Ammonia concentration at inlet: n.c.
- Ammonia concentration at outlet: n.c.

**Commissioning:** 10/2012 (Our ref. 12 60035)

Contact (2014):

**SAFRAN**
Chemin de la Loge
31078 TOULOUSE CEDEX 04

**Christophe CERSOSIMO**
Design Office Manager
Tél. : +33 (0)5 57 74 90 39
Fax : +33 (0)5 57 74 94 55
Christophe.CERSOSIMO@ondeo-is.com
BIOGASYL - France/85

**Business:** Methanisation of agri-food waste for cogeneration (biogas recovery)

**Effluent flow to process:** 84 m³/j  
**Temperature:** 40°C  
**Air flow:** 20 000 m³/h  
**Ammonia inlet charge:** 3000 mg/l  
**Material in suspension:** n.c. excl. lime

**Ammonia stripping (NH₄⁺)**

- Vertical spraying stripper Ø 2200-3,5M
- Vertical spraying scrubber Ø 2200-3,5M
- Digestates pre-heater
- Automatic injection dosing
- High pressure centrifugal fan
- Pipes network & electrical cabinet

**Consumption & Treatment performance**

- Efficiency: 95%  
  3000 mg/l  
  <150 mg/l
- Sulphuric acid at 98%:  
  ~18 l/h
- Ammonium Sulphate Purge:  
  ~100 l/h at 300-400 g/l

**Commissioning:** 03/2009 (Our ref. 28 6075)

**Contact (2014):**

BIOGASYL SAS  
21, rue Johannes Gutenberg*  
85500 Les Herbiers

**Jérémie Vion**  
Operating manager  
jeremy.vion@saria.fr  
Tél. +33 (0)2 51 63 33 87  
Mob. +33 (0)6 15 65 59 39  
Fax. +33 (0)2 51 64 72 12
DE BRABANDERE - France

Business: Stripping of pig lixiviates

Effluent flow to process: 90 m³/j
Temperature: 20°C
Air flow: 30 000 m³/h
Ammonia inlet charge: 4 600 mg/l
Material in suspension: n.c.

Ammonia stripping (NH₄⁺)

- Stripeur vertical à pulvérisation Ø 2400-5C
- Vertical spraying scrubber Ø 1900-1,5M
- Vertical spraying scrubber Ø 2400-3,5M
- High pressure centrifugal fan VCP HP 630
- Gaines de ventilation

Lavage NH₃

- Ammonia concentration at inlet: n.c.
- Ammonia concentration at outlet: n.c.

Commissioning: 01/2006 (Our ref. 25 6046)
Other Stripping references (CO₂ & VOCs)

VEOLIA WATER STI (Befeza Zinc) - France / 59

Business: sodium carbonate production unit Na₂CO₃

Effluent flow to process: 1493 m³/j
Temperature: 35 to 50°C
Air flow: 1200 m³/h
CO₂ load at inlet: 109 414 mg/m³

CO₂ Stripping solution

- Cuve d’acidification en PEHD de 20 000 l
- Vertical packing scrubber Ø 1600-3M VSP50
- Vertical spraying scrubber Ø 700-3M
- Centrifugal fan VCPA 225
- Pipes network

Consumption & Treatment performance

- Efficiency: target at 50%
- Soda at 50% : ~160 l/h
- Sodium carbonate purge: ~1 200 l/h at 130g/l (pH>12)

Commissioning: 07/2012 (Our ref. 11 6074)
VEOLIA WATER (ATHY’s public wastewater treatment plant) - Ireland/Kilkenny

Effluent flow to process: 18 600 m³/j
Temperature: 12°C
Air flow: 45 000 m³/h

CO₂ stripping solution

- 3 Vertical spraying scrubbers Ø 3500-2,5M
- 3 Fans VCP 560
- Pipes network

Commissioning: 06/2012 (Our ref. 11 6070)

ANTÉA (Areva/Eurodif) - France/26

Business: nuclear

Effluent flow to process: 1440 m³/j
Temperature: 20°C
Air flow: 4000 m³/h
VOHC load at inlet: 2,5 mg/l

VOC stripping

- Vertical spraying stripper Ø 1400-3M
- Vertical spraying scrubber Ø 1400-3M
- Fan with acoustic box VI/B 560/N2
- Ventilation ducts

Performance: Efficiency: <99% 2,5 mg/l → <0,02 mg/l

Commissioning: 12/2010 (Our ref. 10 6009)

ANTEA (Atofina) - France/04

Business: Ground water pollution control piezometer

Effluent flow to process: 1440 m³/j
Temperature: 15°C
Air flow: 5 000 m³/h
VOHC load at inlet: 150 mg/l
Material in suspension: n.c.

VOHC Stripping

- Vertical packing stripper Ø 1250-4M
- High pressure centrifugal fan VCP HP 315
- Ventilation ducts
**Performance**  
Efficiency: >93 %  
150 mg/l ☻ < 10 mg/l

**Commissioning:**  
12/2002 (Our ref. 22 6103)

---

**Few references about activated carbon filtration systems**

This list is an excerpt of our experience in odor control unit treating above 5 000 cfm.

**Leixlip WTP (Dublin - Ireland)**

With a capacity of 175,000 m³ a day, the water treatment plant supplies over 30% of the drinking water requirements of the Greater Dublin Region, serving Fingal, Kildare and the northern part of Dublin City.

Design, Manufacture, Supply, Assembly and commissioning 3 odor control units:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Units 1 &amp; 2</strong></td>
<td>Air flow: 3 800 m³/h each</td>
</tr>
<tr>
<td>1</td>
<td>1 Droplet Eliminator type SGL</td>
</tr>
<tr>
<td>2</td>
<td>2 centrifugal Fans</td>
</tr>
<tr>
<td>1</td>
<td>1 Carbon Filter (TCA 2200)</td>
</tr>
<tr>
<td>1</td>
<td>Interconnecting ductwork &amp; discharge stack</td>
</tr>
</tbody>
</table>

Year: 2015

**Lee Tunnel (London - UK)**

Design and supply of an odor control unit for the Lee Tunnel in East London that runs from Abbey Mills Pumping Station down to Beckton Sewage Treatment Works.

5 identical units to treat 36 000 m³/h each (for a total of 108 000 m³/h) composed of:

- 2 ATEX Zone 1 Centrifugal Fans (duty/duty)
- 1 Droplet Eliminator type SGL
- 1 "Annul’Air®" Carbon Filter unit (TCA 3200)

Year: 2014 (14 20056)
Montluçon storm basin (Montluçon - France)

Design and supply of a ventilation system and an odor control unit to reduce site odors

Pollutants: $\text{H}_2\text{S}$ & mercaptans

Air flow: 13 500 m$^3$/h coming from the basin
925 m$^3$/h coming from the dump and screen for the upstream well

Design, manufacture, supply, assembly and commissioning of:

- 1 double-bed activated carbon filter (TCA 1250)
- 1 centrifugal fan (VCPL 200)
- Interconnecting ductwork
- 1 double-bed activated carbon filter (TCA 2400)
- 1 High pressure centrifugal fan (VCP HP 450)
- Interconnecting ductwork
- 2 air intakes cases

Year: 2011 (11 2041)

Digne les Bains WWTP (Digne les Bains - France)

Various odors points of this waste water treatment plant are treated with activated carbon technology: its sewage sludge drying greenhouses that releases between 40 000 m$^3$/h and 80 000 m$^3$/h of, the technical building with an airflow around 10 500 m$^3$/h, the storm basin generating 3 700 m$^3$/h to treat and the ventilation of sludge storage shed with 6 000 m$^3$/h.

The removed pollutants are mercaptans, $\text{H}_2\text{S}$ and $\text{NH}_3$.

Design, manufacture, supply, assembly and commissioning of

- for the sludge drying area : 4 identical lines able to process between 10 000 and 20 000 m$^3$/h each:
  - 1 “Annul’Air®” activated carbon filter (TCA 3400)
  - 1 centrifugal fan (VCP 560)
  - Interconnecting ductwork
- for the technical building
  - 1 activated carbon filter (TCA 2400)
  - 1 centrifugal fan (VCPA 450)
  - Interconnecting ductwork
- for the storm basin
  - 1 activated carbon filter (TCA 2200)
  - 1 centrifugal fan (VCPA 250)
  - Interconnecting ductwork
- for the sludge storage shed
  - 1 centrifugal fan (VCPA 400)
  - Interconnecting ductwork

Year: 2009 (29 5006)
Euro Bat Tri (Saint Quentin Fallavier - France)

Airflow: 10 000 m³/h
Pollutants: NH₃ + mercury

Design, manufacture, supply, assembly and commissioning of:

- 1 packing scrubber (LRV 1900)
- 1 activated carbon filter (TCA 3200)
- Interconnecting ductwork

Year: 2009 (29 6055)

Roumazières WWTP (Roumazières - France)

Pollutants: sulfur compounds, mercaptans, NH₃, H₂S, Amines & Ketones
Airflow: 25 000 m³/h

Design, manufacture, supply, assembly of:

- For the sludge drying area: 2 identical odor control units in parallel, each processing 12 500 m³/h composed of:
  - 1 “Annul’Air®” activated carbon filter (TCA 2850)
  - 1 extraction fan
  - Interconnecting ductwork
- For the buildings: processing of 1 410 m³/h
  - 1 activated carbon filter (TCA 1250)
  - 1 extraction fan (VCPL 225)
  - Interconnecting ductwork

Year: 2007 (27 5019)

WWTP of CHARAL’s slaughterhouse (Cholet - France)

Pollutants: H₂S, sulfur compounds (mercaptans & sulfur), nitrogen compounds (ammonia & amines), VOCs
Airflow: 8 100 m³/h

Design, manufacture, supply, assembly and commissioning of:

- 1 activated carbon filter (TCA 4000)
- 1 high pressure centrifugal fan (VCP HP 355)
- Interconnecting ductwork
- 1 H₂S and NH₃ gases detection probes
- 1 electrical cabinet

Year: 2005 (25 2039)
<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment Details</th>
<th>Technology</th>
<th>Air Flow (m³/h)</th>
<th>O/Ref</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Odor control unit with an airflow above 90 000 m³/h</strong></td>
<td></td>
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<tr>
<td><strong>ALTRIOM (BIOVALIS), Polignac (France)</strong></td>
<td>Composting center</td>
<td>Scrubbing</td>
<td>740 000</td>
<td>1360025</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Treatment of Ammonia</td>
<td></td>
<td></td>
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<tr>
<td><strong>VENTACID HUNGARY, Nagykanizsa (Hungary)</strong></td>
<td>Treatment of Hydrogen chloride</td>
<td>Scrubbing</td>
<td>167 360</td>
<td>296029</td>
<td>2009</td>
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<tr>
<td><strong>LILLE METROPOLE COMMUNAUTE URBAINÉ (OTV), Marquette Les Lille (France)</strong></td>
<td>Wastewater treatment</td>
<td>Scrubbing</td>
<td>214 000</td>
<td>296041</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Treatment of Hydrogen sulfur, Mercaptans, Ammonia, Amines</td>
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</tr>
<tr>
<td><strong>SEINE GRESILLONS (STEREAU), Triel-sur-Seine (France)</strong></td>
<td>Wastewater treatment</td>
<td>Scrubbing</td>
<td>300 000</td>
<td>296041</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Treatment of Aldehydes, Ketones, Amines, Ammonia, Volatil Organic Compounds and Hydrogen sulfur</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>URBASER ENVIRONNEMENT, Fos-sur-Mer (France)</strong></td>
<td>Household wastes treatment</td>
<td>Scrubbing</td>
<td>400 000</td>
<td>285001</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td>Treatment of Chlorine, mineral nitrogen, Ammonia, Air</td>
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<tr>
<td><strong>NUH CIMENTO SANAYI A.S. (ANDRITZ), Kocaeli (Turquie)</strong></td>
<td>Household wastes treatment</td>
<td>Scrubbing</td>
<td>92 000</td>
<td>286018</td>
<td>2008</td>
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<tr>
<td></td>
<td>Treatment of Hydrogen sulfur, Ammonia, Methanethiol, Volatil Organic Compounds</td>
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<tr>
<td><strong>COMPOSTING PLATEFORM (SEDE ARAS), Cernay (France)</strong></td>
<td>Composting center</td>
<td>Scrubbing and Biofiltration</td>
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<tr>
<td></td>
<td>Treatment of Ammonia, Methylamine, Trimethylamine, Hydrogen sulfur, Mercaptans, Dust</td>
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<tr>
<td><strong>TIRU, Issy-les-Moulineaux (France)</strong></td>
<td>Treatment of Hydrogen sulfur, Mercaptans, Ammonia, Amines, Alcohols, Aldehydes/Ketones, Oxides Residue</td>
<td>Scrubbing</td>
<td>200 000</td>
<td>256024</td>
<td>2005</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>

Cockerill Maintenance & Ingénierie
Communauté Urbaine de Lille (LINDE), Lomme (France)

Wastewater treatment
Treatment of Hydrogen sulfur, sulfur, Ammonia, amines, organic compounds
Technology: Scrubbing and Biofiltration
Air flow: 300,000 m³/h
O/Ref: 236058
Year: 2003

GRESILLONS (STEREAU), Triel-sur-Seine (France)

Wastewater treatment
Treatment of Hydrogen sulfur, Mercaptans, Sulfur, Ammonia, Amines, Aldehydes, Ketones
Technology: Scrubbing
Air flow: 198,000 m³/h
O/Ref: 236058
Year: 2003
### CMI’s Odor control units in North America

<table>
<thead>
<tr>
<th>Location</th>
<th>Company</th>
<th>Technology</th>
<th>Air flow</th>
<th>O/Ref</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEMECS, VARENNES (Canada)</strong></td>
<td></td>
<td></td>
<td>35 000 m³/h</td>
<td>E.00353</td>
<td>2017</td>
</tr>
<tr>
<td><strong>SEMECS, VARENNES (Canada)</strong></td>
<td></td>
<td>Scrubbing</td>
<td></td>
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</tr>
<tr>
<td><strong>SOPREMA (Toronto), Ontario, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
<td>35 000 m³/h</td>
<td>E.00170</td>
<td>2016</td>
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<tr>
<td><strong>SOPREMA (Toronto), Ontario, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
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</tr>
<tr>
<td><strong>RAEBL (Sainte Catherine), Québec, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
<td>100 000 m³/h</td>
<td>1560010</td>
<td>2015</td>
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<tr>
<td><strong>RAEBL (Sainte Catherine), Québec, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
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<td></td>
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<tr>
<td><strong>OLYMEL (Drummonville), Québec, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
<td>3 200 m³/h</td>
<td>E.00337</td>
<td>2017</td>
</tr>
<tr>
<td><strong>OLYMEL (Drummonville), Québec, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OLYMEL (Saint Henri), Québec, Canada</strong></td>
<td></td>
<td>Adsorption on activated carbon</td>
<td>3 200 m³/h</td>
<td>1520015</td>
<td>2015</td>
</tr>
<tr>
<td><strong>OLYMEL (Saint Henri), Québec, Canada</strong></td>
<td></td>
<td>Adsorption on activated carbon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RAEBL (Sainte Catherine), Québec, Canada</strong></td>
<td></td>
<td>Scrubbing</td>
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</tr>
<tr>
<td><strong>OLYMEL (Saint Hyacinthe), Québec, Canada</strong></td>
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<td>Adsorption on activated carbon</td>
<td>1 400 m³/h</td>
<td>1520016</td>
<td>2015</td>
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RAEVR (Mont Saint Hilaire), Québec, Canada

- Biomethanisation unit
- Technology: Scrubbing
- Air flow: 21,300 m³/h
- O/Ref: 1360038
- Year: 2013

AXOR (Saint Damase), Québec, Canada

- Waste Water Treatment plant of the slaughterhouse
- Technology: Adsorption on activated carbon
- Air flow: 1,700 m³/h
- O/Ref: 1225002
- Year: 2012

DUCHENE (Saint Eustache), Québec, Canada

- Water Pumping Station
- Technology: Adsorption on activated carbon
- Air flow: 5,700 m³/h
- O/Ref: 112121
- Year: 2011
Few Biotrickling references (total >100 references)

Wastewater treatment center of POZNAN (Poland)

**Client:** WUPRINZ

**Flow rate:** 48 000 m³/h

**Pollutants:** Mercaptans, H₂S, NH₃

**Solution:** Biotrickling filtration

**Commissioning:** 2014

**Equipment:**
- 4 units, each of them of 12 000 m³/h composed of
  - 2 bio-trickling filters in parallel BIOMOD 7,8-4M, each filter designed for 6000 m³/h
  - 2 droplet eliminators
  - 1 centrifugal propylene fan (inverter control)
- 2 activated double bed carbon filters, each filter designed for 6000 m³/h
- Interconnecting ductwork between our equipment and discharge stack
- 1 control panel
FOCUS AQUA / MACAU Peninsula sewage treatment plant

Air flow: 35 000 m³/h
Pollutants: Ammonia, Mercaptans, H₂S, NH₃
Solution: Biotrickling filter BIOREC 67.5-3M + activated carbon filter TCA
Year: 2014

Design, manufacture and supply of:

- 2 high pressure centrifugal fans (VCP HP 800)
- 2 silencers and acoustic enclosures
- 1 radial demister (DR 1120)
- 1 Biotrickling filter (BIOREC)
- 2 Annul’Air® Carbon Filter unit
- H₂S monitoring

Ref. 14 50008

RESPONSE ENGEENIERING / LETTERKENNY Wastewater Treatment Plant, Ireland

Air flow: 23 400 m³/h
Pollutants: H₂S
Solution: 2 Biotrickling filters BIOMOD-3700-4M
Year: 2012
**AECOM / PORTRANE Waste Water Treatment Plant, Ireland**

- **Air flow:** 22 000 m³/h
- **Pollutants:** H₂S
- **Solution:** 5 Biotrickling filters BIOMOD-2800-4M & 4 x BIOMOD-2300-4M
- **Year:** 2011

**ATS / BRACKNELL Wastewater Treatment Plant, England**

- **Air flow:** 45 200 m³/h
- **Solution:** 1 Biotrickling filter BIOMOD-2800-4M + 2 TCA « Annul'Air » 3200
- **Year:** 2011

**EPS / WATEFORD Wastewater Treatment Plant, Ireland**

- **Air flow:** 19 000 m³/h
- **Pollutants:** H₂S 19 ppm
- **Solution:** 2 Biotrickling filters BIOMOD 2800-4.0
- **Year:** 2008

**EARTH TECH / Sludge treatment of PORTLAOISE Wastewater Treatment Plant, Ireland**

- **Air flow:** 10 000 m³/h
- **Pollutants:** NH₃, Amines, Dimethylsulfide, Mercaptans, Acetone, Organic carbon
- **Solution:** 2 Biotrickling filters BIOMOD 2500-4.0
  - 3 Vertical packed scrubbers 1400-3M
  - 1 Activated carbon tower TCA 5000
- **Year:** 2008

**ATS / BECKTON Wastewater Treatment Plant, England**

- **Air flow:** 38 947 m³/h
- **Pollutants:** H₂S : 50 ppm mean, 270 ppm max
- **Solution:** 4 Biotrickling filters BIOREC 15-1,7M
- **Year:** 2008
CMI ENVIRONMENT

ATS / Wastewater Treatment Plant, England

Air flow: 29 088 m$^3$/h
Pollutants: Odeurs
Solution: 4 Biotrickling filters BIOMOD 2600-2.8M
Year: 2006

TERNOIS / ST SULPICE SUR RISLE Wastewater Treatment Plant, France (61)

Air flow: 20 000 m$^3$/h
Pollutants: H$_2$S 5 mg/m$^3$ - NH$_3$ 3mg/m$^3$ - R-SH 2mg/m$^3$
Solution: 1 Biotrickling filter BIOREC 4,4
Year: 2002