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*Document done on 19/07/2018*

## CMI group and CMI Europe Environnement company

### 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 and 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.

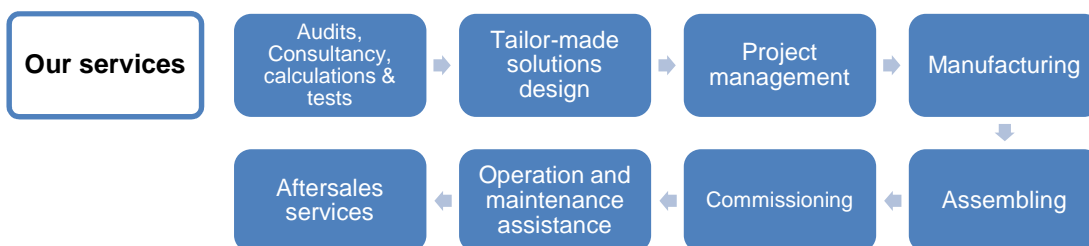
If CMi Europe Environnement was only figures, it can be said the company numbers 150 people, has more than 1000 references in gas scrubbing in more than 40 countries worldwide. But figures say nothing about our R&D team and processes, our olfactometry laboratory, our audit and consulting services, our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

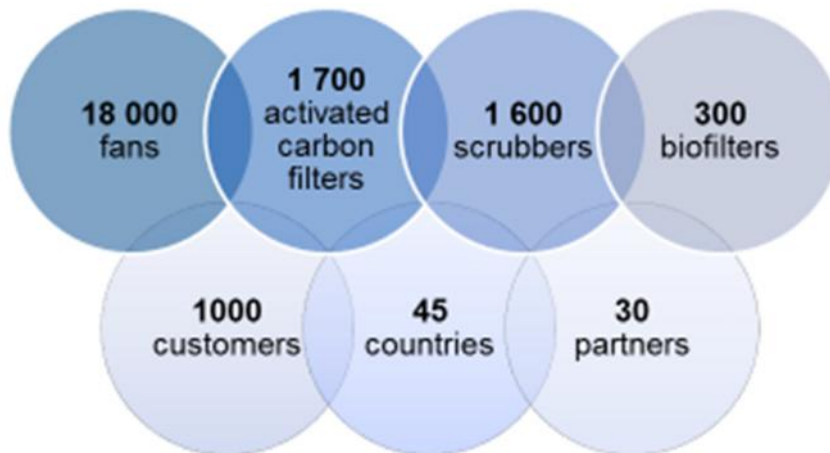


## CMI ENVIRONMENT

They rely on us



### In figures



**Few methanisation & composting references**

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**Household and residual wastes treatment plant of BOURG-EN-BRESSE (FR – 01)**

<b>Client</b>	TIRU	<b>Equipments</b>
<b>Flow rate</b>	163 000 m <sup>3</sup> /h	- 2 vertical spraying scrubbers operating with sulfuric acid, including peripheral equipments
<b>Commissioning</b>	2014	- 2 modular biofilters - The whole ventilation network



## CMI ENVIRONMENT

### Residual waste treatment plant of CHAGNY (FR – 71)

Client	TIRU	Equipment
Air flow	150 000 m <sup>3</sup> /h	- Vertical spraying scrubber (103 895 m <sup>3</sup> /h) operating with sulfuric acid
Technologies	scrubbing + biofiltration	- Vertical packing scrubber (47 630 m <sup>3</sup> /h) - 3 rectangular biofilters, each of 300 m <sup>2</sup> (151 525 m <sup>3</sup> /h)
Commissioning	2014	- Air transfer ductwork - Tanks Equipment, reagent injection system, safety shower



Ref. 14 50009





## CMI ENVIRONMENT

### Residual household wastes treatment plant MARSEILLE (France – 13)

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



## Few biomethanisation references

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### "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 m<sup>3</sup>/h

**Commissioning:** 2017

**Odors units:** at inlet 4000 OU/m<sup>3</sup> / at outlet: 880 OU/m<sup>3</sup>  
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 m<sup>3</sup>/h

**Commissioning:** 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 m<sup>3</sup>/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 m<sup>3</sup>/h  
**Temperature:** 50°C  
**Air flow:** 35 000 m<sup>3</sup>/h  
**Ammonia inlet charge:** 1700 mg/l  
**Material in suspension:** 500 ppm

- ) CO<sub>2</sub> Vertical spraying stripper SRV 700 4M
- ) NH<sub>4</sub><sup>+</sup> vertical spraying stripper SRV 2850-3,5M
- ) Vertical packing scrubber LRV 2850-3M
- ) Acid dosing distribution
- ) Safety shower
- ) CO<sub>2</sub> Centrifugal fan VCPA 200
- ) NH<sub>4</sub><sup>+</sup> 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



## CMI ENVIRONMENT

### ANDIGESTION (ATS), GLOUCESTER (England)

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

#### Supplied equipment

)	Vertical Packing Scrubber	LRV 940-2M
)	Centrifugal fan	VCPA 315
)	Modular covered biofilter	BIOREC 40-2M
)	Interconnecting ductwork	

# CMI ENVIRONMENT

## Organic Recovery Centre ANGERS (France – 49)

<b>Customer</b>	VINCI ENVIRONNEMENT	<b>Equipment</b>
<b>Installation</b>	2011	- 4 2-step scrubbers Ø 2200 mm
<b>Flow rate</b>	115 000 m <sup>3</sup> /h	- 4 horizontal biofilters of 200 m <sup>2</sup> each
<b>Capacité</b>	90 000 tonnes/an	- 1 Electric control panel for the facility monitoring



## CMI ENVIRONMENT

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

<b>Client</b>	TERRRALYS	<b>Equipment</b>
<b>Installation</b>	2016	- 2 rectangular biofilters of 448 m <sup>2</sup> each
<b>Flow</b>	180 000 m <sup>3</sup> /h	- 1 chimney
		- Air transfer ductwork
		- Electrical cabinet
		- Full ventilation solution
		o 2 helicoid stainless steel fans
		o 5 high pressure centrifugal plastic fans
		o 14 wall helicoid plastic fans
		o 44 air transfer axial plastic fans

Ref. 00159





CMI ENVIRONMENT

## Few Composting references

### Waste sorting and composting center, Saint-Barthélemy

Customer	TIRU	Equipment
<b>Installation</b>	2017	- 4 high pressure centrifugal fans - 1 centrifugal spraying scrubber
<b>Flow rate</b>	3 000 m <sup>3</sup> /h	- 1 vertical packing scrubber LRV - Dosing system for the scrubbing solution
<b>Pollutants</b>	Ammonia, hydrogen sulfide	- Safety shower - 2 storage tanks : 2500L & 6000L - 1 Droplet separator
<b>Technology</b>	gas scrubbing	- 1 Activated carbon filter for H <sub>2</sub> S removal - Ductwork - 1 Electrical cabinet
Ref. : 489		



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 Ventacid™  
 Amcec™  
 Dalteau™  
 Aquaged®  
 Solu:top®  
 Cedi™  
 Estac®  
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 Proserpol™  
 Neylor® Environnement™  
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Cockerill Maintenance & Ingénierie

www.cmigroupe.com

## Composting center CHATUZANGE LE GOUBET (France – 26)

<b>Customer</b>	JAMONET	<b>Equipment</b>
<b>Installation</b>	2013	- 1 acid scrubber Ø1900 mm
<b>Flow rate</b>	19 000 m <sup>3</sup> /h	- 1 system for reagent transfer, storage and distribution
		- 1 biofilter (140 m <sup>2</sup> )
		- 2 sets of fans (process and ambiance)
		- 1 piping network
		- 1 Electric control panel for the facility monitoring



Ref. 13 50002



**Treatment center of residual household wastes  
SAINT BARTHÉLÉMY DE VALS (FR – 26)**

<b>Customer</b>	SYTRAD	<b>Equipment</b>
<b>Installation</b>	2012	- 1 acid centrifugal scrubber Ø1250 mm with automatic regulation system
<b>Flow rate</b>	110 000 m <sup>3</sup> /h	- Safety showers
<b>Pollutants</b>	Ammonia, Hydrogen Sulfur, Volatil Organic Compounds	- 1 system for reagent transfer, storage and distribution
<b>Technology:</b>	Scrubbing & Biofiltration	- 1 biofilter (300 m <sup>2</sup> )
		- 2 sets of fans (process and ambiance)
		- 1 piping network
		- 1 Electric control panel for the facility monitoring
		Ref. 12 55002



**Treatment center of residual household wastes  
BEAUREGARD-BARRET (France – 26)**

<b>Customer</b>	SYTRAD	<b>Equipment</b>
<b>Installation</b>	2012	- 1 acid cyclonic scrubber - 1 system for reagent transfer, storage and distribution
<b>Flow rate</b>	50 000 m <sup>3</sup> /h	- 1 biofilter (300 m <sup>2</sup> ) - 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)**

<b>Customer</b>	SYTRAD	<b>Equipment of the new facility</b>
<b>Installation</b>	2012	- 1 Dust scrubber Ø1600 mm with automatic regulation system
<b>Flow rate</b>	110 000 m <sup>3</sup> /h	- Safety shower - 1 biofilter (400 m <sup>2</sup> ) - 2 biofilters of 220 m <sup>2</sup> each - 1 High Pressure centrifugal fan with noise repiping 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)

<b>Customer</b>	AK NOVA	<b>Equipment</b>
<b>Installation</b>	2012	- 4 scrubbers Ø2200 mm with hydraulic system - 4 High Pressure centrifugal fans
<b>Flow rate</b>	127 000 m <sup>3</sup> /h	- 1 piping network
<b>Technology:</b>	Scrubbing	

Ref. 12 60025



**Composting center FERTISERE (France – 38)**

**Customer** TERRALYS

**Installation** 2012

**Flow rate** 20 000 m<sup>3</sup>/h

**Equipment**

- 1 Acid scrubber
- 1 system for reagent transfer, storage and distribution
- 1 water sprayer type HHP560
- 1 covered biofilter (130 m<sup>2</sup>)
- 2 sets of fans (process and ambiance)
- 1 piping network
- 1 Electric control panel for the facility monitoring



## Composting center LA CRAU (France – 83)

<b>Customer</b>	CCVG	<b>Equipment</b>
<b>Installation</b>	2011	- 1 Acid scrubber Ø2500 mm with hydraulic system
<b>Flow rate</b>	30 000 m <sup>3</sup> /h	- 1 installation of reagent transfer, storage and automatic distribution
		- 1 149 m <sup>2</sup> biofilter
		- 1 High Pressure centrifugal fan with noise repipingion device
Ref. 11 5002		- 1 piping network
		- 1 electric control panel for the facility monitoring



**Composting center CEVAL (FR – 30 / GARD)**

<b>Customer</b>	CEVAL	<b>Equipment</b>
<b>Installation</b>	2010	- 2 acid and oxido-basic scrubbers Ø 3500 mm
<b>Flow rate</b>	65 000 m <sup>3</sup> /h	- 1 system for reagent transfer, storage and automatic distribution - 1 wet dust scrubber Ø 4000 mm - 1 set of process fans - 1 transfer axial fan - 1 piping network - 1 Electric control panel for the facility monitoring



**Composting center CHAMBEZON (France – 43)**

<b>Customer</b>	LYONNAISE DES EAUX	<b>Equipment</b>
<b>Installation</b>	2010	- 1 scrubber Ø 1900 mm
<b>Flow rate</b>	180 000 m <sup>3</sup> /h	- 1 horizontal biofilter
		- 1 High Pressure centrifugal fan
		- 1 Electric control panel for the facility monitoring





**Mechanical-biological sorting facility  
SAINT CHRISTOPHE DU LIGNERON (France – 85)**

<b>Customer</b>	VINCI ENVIRONNEMENT	<b>Capacity</b>	55 000 tonnes/year
<b>Installation</b>	2011	<b>Equipment</b>	
<b>Flow rate</b>	116 000 m <sup>3</sup> /h	-	1 horizontal dust removal device
<b>Pollutants</b>	Hydrogen sulfur, Mercaptans, Ammonia, Amines, Aldehydes, Ketones, Dimethylsulfur	-	2 2-step scrubbers Ø 3150 mm
		-	2 horizontal biofilters of 400 m <sup>2</sup> each
		-	1 piping network
		-	1 Electric control panel for the facility monitoring
<b>Technology:</b>	Biofiltration	O/Ref:	115003



**Waste-to-energy Mandel plant, Rumbek (Belgique)**

<b>Customer</b>	<b>Eneco Energie</b>	<b>Capacity</b>	60 000 tons/year
<b>Installation</b>	2010	<b>O/ref:</b>	106003

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

<b>Customer</b>	<b>ASTRADE</b>	<b>Equipment</b>	
<b>Installation</b>	2009	- 1 scrubber Ø 3500 mm	
<b>Flow rate</b>	60 000 m <sup>3</sup> /h	- 1 High Pressure centrifugal fan	
		- 1 Electric control panel for the facility monitoring	



**Composting center LAVIGNY (Switzerland)**

<b>Customer</b>	BIOVALIS	<b>Equipment</b>
<b>Installation</b>	2008	- 1 scrubber Ø 2500 mm
<b>Flow rate</b>	37 300 m <sup>3</sup> /h	- 1 évaporator scrubber Ø 1600 mm
		- 1 wet dust removal device
		- 3 High Pressure centrifugal fans



**Composting center ENSUES LA REDONNE (France – 13)**

<b>Customer</b>	EAUX DE MARSEILLE	<b>Equipment</b>
<b>Installation</b>	2007	- 2 scrubbers Ø 1600 mm
<b>Flow rate</b>	28 000 m <sup>3</sup> /h	- 2 High Pressure centrifugal fans
		- 1 piping network
		- 1 Electric control panel for the facility monitoring



## Composting center PETIT MARS (France – 44)

<b>Customer</b>	VEOLIA PROPRETE	<b>Equipment</b>
<b>Installation</b>	2007	- 2 acid scrubbers Ø 2850 mm
<b>Flow rate</b>	45 000 m <sup>3</sup> /h	- 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)**

<b>Customer</b>	LINDE	<b>Equipment</b>
<b>Installation</b>	2006	- 4 acid scrubbers Ø 3500 mm
<b>Flow rate</b>	300 000 m <sup>3</sup> /h	- 2 biofilters of 1100 m <sup>2</sup> 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

<b>Business:</b>	Printed circuits
<b>Effluent flow to process:</b>	530 m <sup>3</sup> /j
<b>Temperature:</b>	65°C
<b>Air flow:</b>	17 000 m <sup>3</sup> /h
<b>Ammonia inlet charge:</b>	500 mg/l
<b>pH :</b>	10
<b>Material in suspension:</b>	6 mg/l

**Ammonia stripping (NH<sub>4</sub><sup>+</sup>)**

- 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% 500 mg/l ➔ <123 mg/l
- Sulphuric acid at 50% : ~32,5 l/h
- Ammonium sulphate purge ~76 l/h at 400g/L

**NH<sub>3</sub> scrubbing**

- Ammonia concentration at inlet: 493 mg/m<sup>3</sup>
- Ammonia concentration at outlet: < 5 mg/m<sup>3</sup>

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



Contact (2017) :

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## TEREOS – France/45

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

**Effluent flow to process:** 1 025 m<sup>3</sup>/j  
**Temperature:** 60°C  
**Air flow:** 80 000 m<sup>3</sup>/h  
**Ammonia inlet charge:** 2400 mg/l  
**pH :** 10,5 at 11  
**Material in suspension:** 0.35%

### Ammonia stripping (NH<sub>4</sub><sup>+</sup>) :

- 3 m<sup>3</sup> 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% 2400 mg/l ➔ < 200 mg/l
- 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/m<sup>3</sup>
- Ammonia concentration at outlet: < 5 mg/m<sup>3</sup>

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



Contact (2015) :

TEREOS  
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45 410 Artenay,

Eric Moreau  
Process & Project Engineering  
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[emoreau3@tereos.com](mailto:emoreau3@tereos.com)



## NASKÉO ENVIRONNEMENT (Biogaz Grand Auch) – France/32

<b>Business:</b>	Methanisation of organic waste for cogeneration (biogas recovery)
<b>Effluent flow to process:</b>	135 m <sup>3</sup> /j
<b>Temperature:</b>	40°C
<b>Air flow:</b>	26 000 à 39 000 m <sup>3</sup> /h
<b>Ammonia inlet charge:</b>	4700 at 7100 mg/l
<b>pH :</b>	11
<b>Material in suspension:</b>	7 000 mg/l

### Ammonia stripping (NH<sub>4</sub><sup>+</sup>)

- |                                 |                    |
|---------------------------------|--------------------|
| ▪ 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%        | 4700 at 7100 mg/l ➔ < 200 mg/l |
| ▪ Sulphuric acid at 95% :  | ~55 l/h                        |
| ▪ Ammonium Sulphate Purge: | ~314 l/h at 400 g/l            |

### NH<sub>3</sub> scrubbing

- |                                    |                              |
|------------------------------------|------------------------------|
| ▪ Ammonia concentration at inlet:  | 790 à 1200 mg/m <sup>3</sup> |
| ▪ Ammonia concentration at outlet: | <5 mg/m <sup>3</sup>         |

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



Contact (2016) :

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## ONDEO IS (SME Safran) – France/32

<b>Business:</b>	Production of ammonium perchlorate $(\text{NH}_4)_2\text{SO}_4$ for aerospace propulsion
<b>Effluent flow to process:</b>	48 m <sup>3</sup> /j
<b>Temperature:</b>	40°C
<b>Air flow:</b>	9 000 m <sup>3</sup> /h
<b>Ammonia inlet charge:</b>	3 000 mg/l
<b>pH:</b>	10,5
<b>Material in suspension:</b>	6 mg/l

### Ammonia stripping ( $\text{NH}_4^+$ )

- 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 % 3 000 mg/l → < 200 mg/l at pH < 10
- Sulphuric acid at 95% : ~10,6 l/h
- Ammonium Sulphate Purge: ~47 l/h at 500 g/l

### Lavage $\text{NH}_3$

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

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



Contact (2014) :

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## **BIOGASYL – France/85**

<b>Business:</b>	Methanisation of agri-food waste for cogeneration (biogas recovery)
<b>Effluent flow to process:</b>	84 m <sup>3</sup> /j
<b>Temperature:</b>	40°C
<b>Air flow:</b>	20 000 m <sup>3</sup> /h
<b>Ammonia inlet charge:</b>	3000 mg/l
<b>Material in suspension:</b>	n.c. excl. lime

### **Ammonia stripping (NH<sub>4</sub><sup>+</sup>)**

- |                                      |             |
|--------------------------------------|-------------|
| ▪ Vertical spraying stripper         | Ø 2200-3,5M |
| ▪ Vertical spraying scrubber         | Ø 2200-3,5M |
| ▪ Digestates pre-heater              |             |
| ▪ Automatic injection dosing         |             |
| ▪ High pressure centrifugal fan      | VCP HP 560  |
| ▪ 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) :**

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## DE BRABANDERE – France

**Business:** Stripping of pig lixiviates

**Effluent flow to process:** 90 m<sup>3</sup>/j  
**Temperature:** 20°C  
**Air flow:** 30 000 m<sup>3</sup>/h  
**Ammonia inlet charge:** 4 600 mg/l  
**Material in suspension:** n.c.

### Ammonia stripping (NH<sub>4</sub><sup>+</sup>)

- 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 NH<sub>3</sub>

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

**Commissioning:** 01/2006 (Our ref. 25 6046)

## Other Stripping references (CO<sub>2</sub> & VOCs)

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### VEOLIA WATER STI (Befeza Zinc) – France / 59

**Business:** sodium carbonate production unit Na<sub>2</sub>CO<sub>3</sub>

**Effluent flow to process:** 1493 m<sup>3</sup>/j  
**Temperature:** 35 to 50°C  
**Air flow:** 1200 m<sup>3</sup>/h  
**CO<sub>2</sub> load at inlet:** 109 414 mg/m<sup>3</sup>

#### CO<sub>2</sub> 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 200l/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 m<sup>3</sup>/j  
Temperature: 12°C  
Air flow: 45 000 m<sup>3</sup>/h

### CO<sub>2</sub> 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 m<sup>3</sup>/j  
Temperature: 20°C  
Air flow: 4000 m<sup>3</sup>/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 m<sup>3</sup>/j  
Temperature: 15°C  
Air flow: 5 000 m<sup>3</sup>/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

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This lists 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 m<sup>3</sup> 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 3odor control units:

Units 1 & 2	Unit 3
Air flow : <b>3 800 m<sup>3</sup>/h each</b>	Air flow : <b>13 800 m<sup>3</sup>/h</b>
) 1 Droplet Eliminator type SGL	) 1 Droplet Eliminator type SGL
) 2 centrifugal Fans	) 2 centrifugal Fans
) 1 Carbon Filter (TCA 2200)	) 2 Acoustic Enclosures
) Interconnecting ductwork & discharge stack	) 1 Double Bed Carbon Filter (TCA 2800 DB)
	) Interconnecting ductwork & discharge stack

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 m<sup>3</sup>/h each (for a total of 108 000 m<sup>3</sup>/h) composed of:

- ) 2 ATEX Zone 1 Centrifugal Fans (duty/duty)
- ) 1 Droplet Eliminator type SGL
- ) 1 “Annul’Air<sup>®</sup>” 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: H<sub>2</sub>S & mercaptans

Air flow: 13 500 m<sup>3</sup>/h coming from the basin  
925 m<sup>3</sup>/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<sup>3</sup>/h and 80 000 m<sup>3</sup>/h of, the technical building with an airflow around 10 500 m<sup>3</sup>/h, the storm basin generating 3 700 m<sup>3</sup>/h to treat and the ventilation of sludge storage shed with 6 000 m<sup>3</sup>/h.

The removed pollutants are mercaptans, H<sub>2</sub>S and NH<sub>3</sub>.

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<sup>3</sup>/h each:
  - o 1 "Annul'Air<sup>®</sup>" activated carbon filter (TCA 3400)
  - o 1 centrifugal fan (VCP 560)
  - o Interconnecting ductwork
- ) for the technical building
  - o 1 activated carbon filter (TCA 2400)
  - o 1 centrifugal fan (VCPA 450)
  - o Interconnecting ductwork
- ) for the storm basin
  - o 1 activated carbon filter (TCA 2200)
  - o 1 centrifugal fan (VCPA 250)
  - o Interconnecting ductwork
- ) for the sludge storage shed
  - o 1 centrifugal fan (VCPA 400)
  - o Interconnecting ductwork

Year: 2009 (29 5006)



## **Euro Bat Tri (Saint Quentin Fallavier – France)**

Airflow: 10 000 m<sup>3</sup>/h  
Pollutants: NH<sub>3</sub> + 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, NH<sub>3</sub>, H<sub>2</sub>S, Amines & Ketones  
Airflow: 25 000 m<sup>3</sup>/h

Design, manufacture, supply, assembly of:

- ) For the sludge drying area: 2 identical odor control units in parallel, each processing 12 500 m<sup>3</sup>/h composed of:
  - o 1 “Annul’Air®” activated carbon filter (TCA 2850)
  - o 1 extraction fan
  - o Interconnecting ductwork
- ) For the buildings: processing of 1 410 m<sup>3</sup>/h
  - o 1 activated carbon filter (TCA 1250)
  - o 1 extraction fan (VCPL 225)
  - o Interconnecting ductwork

Year: 2007 (27 5019)

## **WWTP of CHARAL’s slaughterhouse (Cholet – France)**

Pollutants: H<sub>2</sub>S, sulfur compounds (mercaptans & sulfur), nitrogen compounds (ammonia & amines), VOCs

Airflow: 8 100 m<sup>3</sup>/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 H<sub>2</sub>S and NH<sub>3</sub> gases detection probes
- ) 1 electrical cabinet

Year: 2005 (25 2039)

**Odor control unit with an airflow above 90 000 m<sup>3</sup>/h**

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**ALTRIOM (BIOVALIS),  
Polignac (France)**

Composting center  
Treatment of Ammonia  
Technology: Scrubbing  
Air flow: 740 000 m<sup>3</sup>/h  
O/Ref: 1360025  
Year: 2013

**VENTACID HUNGARY,  
Nagykanizsa (Hungary)**

Treatment of Hydrogen chlorine  
Technology: Scrubbing  
Air flow: 167 360 m<sup>3</sup>/h  
O/Ref: 296029  
Year: 2009

**LILLE METROPOLE  
COMMUNAUTE URBAINE  
(OTV),  
Marquette Les Lille (France)**

Wastewater treatment  
Treatment of Hydrogen sulfur,  
Mercaptans, Ammonia, Amines  
Technology: Scrubbing  
Air flow: 214 000 m<sup>3</sup>/h  
O/Ref: 296041  
Year: 2009

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

Wastewater treatment  
Treatment of Aldehydes, Ketones,  
Amines, Ammonia, Volatil Organic  
Compounds and Hydrogen sulfur  
Technology: Scrubbing  
Air flow: 300 000 m<sup>3</sup>/h  
O/Ref: 296041  
Year: 2009

**URBASER  
ENVIRONNEMENT,  
Fos-sur-Mer (France)**

Household wastes treatment  
Treatment of Chlorine, mineral nitrogen,  
Ammonia, Air  
Technology: Scrubbing and Biofiltration  
Air flow: 400 000 m<sup>3</sup>/h  
O/Ref: 285001  
Year: 2008

**NUH CIMENTO SANAYI A.S.  
(ANDRITZ), Kocaeli  
(Turquie)**

Household wastes treatment  
Treatment of Hydrogen sulfur, Ammonia,  
Methanethiol, Volatil Organic Compounds  
Technology: Scrubbing  
Air flow: 92 000 m<sup>3</sup>/h  
O/Ref: 286018  
Year: 2008

**COMPOSTING PLATFORM  
(SEDE ARAS), Cernay  
(France)**

Composting center  
Treatment of Ammonia, Methylamine,  
Trimethylamine, Hydrogen sulfur,  
Mercaptans, Dust  
Technology: Scrubbing and Biofiltration  
Air flow: 200 000 m<sup>3</sup>/h  
O/Ref: 255013  
Year: 2005

**TIRU, Issy-les-Moulineaux  
(France)**

Treatment of Hydrogen sulfur,  
Mercaptans, Ammonia, Amines, Alcohols,  
Aldehydes/Ketones, Oxides Residue  
Technology: Scrubbing  
Air flow: 200 000 m<sup>3</sup>/h  
O/Ref: 256024  
Year: 2005

**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 m<sup>3</sup>/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 m<sup>3</sup>/h  
O/Ref: 236058  
Year: 2003

## **CMI's Odor control units in North America**

### **SEMECS, VARENNES (Canada)**

#### **SOPREMA (Toronto), Ontario, Canada**

Asphalt shingle production plant  
Technology: Scrubbing  
Air flow: 35 000 m3/h  
O/Ref: E.00353  
Year: 2017

#### **OLYMEL (Drummonville), Québec, Canada**

Wastewater Treatment Plant  
Technology: Adsorption on activated carbon  
Air flow: 3 200 m3/h  
O/Ref: E.00337  
Year: 2017

#### **SEMECS (Varenes), Québec, Canada**

Biosolid wastes management plant  
Technology: Scrubbing + Biofiltration + Stripping  
Air flow: 40 000 m3/h  
O/Ref: E.00267  
Year: 2016

#### **SOPREMA (Wadsworth), Ohio, USA**

Asphalt shingle production plant  
Technology: Scrubbing  
Air flow: 35 000 m3/h  
O/Ref: E.00170  
Year: 2016

### **RAEBL (Sainte Catherine), Québec, Canada**

Wastewater Treatment Plant  
Technology: Scrubbing  
Air flow: 100 000 m3/h  
O/Ref: 1560010  
Year: 2015

#### **OLYMEL (Saint Henri), Québec, Canada**

Water Pumping Station  
Technology: Adsorption on activated carbon  
Air flow: 3 200 m3/h  
O/Ref: 1520015  
Year: 2015

#### **OLYMEL (Saint Hyacinthe), Québec, Canada**

Water Pumping Station  
Technology: Adsorption on activated carbon  
Air flow: 1 400 m3/h  
O/Ref: 1520016  
Year: 2015

#### **FILTRUM CONSTRUCTION (Saint Nicolas), Québec, Canada**

Sewage sludge treatment  
Technology: Adsorption on activated carbon  
Air flow: 4 000 m3/h  
O/Ref: 1520073  
Year: 2015

**RAEVR (Mont Saint Hilaire),  
Québec, Canada**

Biomethanisation unit  
Technology: Scrubbing  
Air flow: 21 300 m<sup>3</sup>/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 m <sup>3</sup> /h O/Ref: 1225002 Year: 2012
--

**DUCHENE (Saint Eustache),  
Québec, Canada**

Water Pumping Station Technology: Adsorption on activated carbon Air flow: 5 700 m <sup>3</sup> /h O/Ref: 112121 Year: 2011
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**CMI ENVIRONMENT**

## Few Biotrickling references (total >100 references)

### Wastewater treatment center of POZNAN (Poland)

Client	WUPRINZ	Equipment
<b>Flow rate</b>	48 000 m <sup>3</sup> /h	4 units, each of them of 12 000 m <sup>3</sup> /h composed of
<b>Pollutants:</b>	Mercaptans, H <sub>2</sub> S, NH <sub>3</sub>	- 2 bio-trickling filters in parallel BIOMOD 7,8-4M, each filter designed for 6000 m <sup>3</sup> /h
<b>Solution:</b>	Biotrickling filtration	- 2 droplet eliminators
<b>Commissioning</b>	2014	- 1 centrifugal propylene fan (inverter control)
		- 2 activated double bed carbon filters, each filter designed for 6000 m <sup>3</sup> /h
		- Interconnecting ductwork between our equipment and discharge stack
		- 1 control panel



▲ After insulation

Before insulation ▼



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## CMi ENVIRONMENT

### FOCUS AQUA / MACAU Peninsula sewage treatment plant

Air flow: 35 000 m<sup>3</sup>/h  
Pollutants: Ammonia, Mercaptans, H<sub>2</sub>S, NH<sub>3</sub>  
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<sup>®</sup> Carbon Filter unit
- ) H<sub>2</sub>S monitoring

Ref. 14 50008



### RESPONSE ENGINEERING / LETTERKENNY Wastewater Treatment Plant, Ireland

Air flow: 23 400 m<sup>3</sup>/h  
Pollutants: H<sub>2</sub>S  
Solution: 2 Biotrickling filters BIOMOD-3700-4M  
Year: 2012



## CMI ENVIRONMENT

### AECOM / PORTRANE Waste Water Treatment Plant, Ireland

Air flow: 22 000 m<sup>3</sup>/h  
Pollutants: H<sub>2</sub>S  
Solution: 5 Biotrickling filters BIOMOD-2800-4M & 4 x BIOMOD-2300-4M  
Year: 2011



### ATS / BRACKNELL Wastewater Treatment Plant, England

Air flow: 45 200 m<sup>3</sup>/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 m<sup>3</sup>/h  
Pollutants: H<sub>2</sub>S 19ppm  
Solution: 2 Biotrickling filters BIOMOD 2800-4.0  
Year: 2008

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

Air flow: 10 000 m<sup>3</sup>/h  
Pollutants: NH<sub>3</sub>, 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 m<sup>3</sup>/h  
Pollutants: H<sub>2</sub>S : 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<sup>3</sup>/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<sup>3</sup>/h  
Pollutants: H<sub>2</sub>S 5 mg/m<sup>3</sup> - NH<sub>3</sub> 3mg/m<sup>3</sup> - R-SH 2mg/m<sup>3</sup>  
Solution: 1 Biotrickling filter BIOREC 4,4  
Year: 2002