

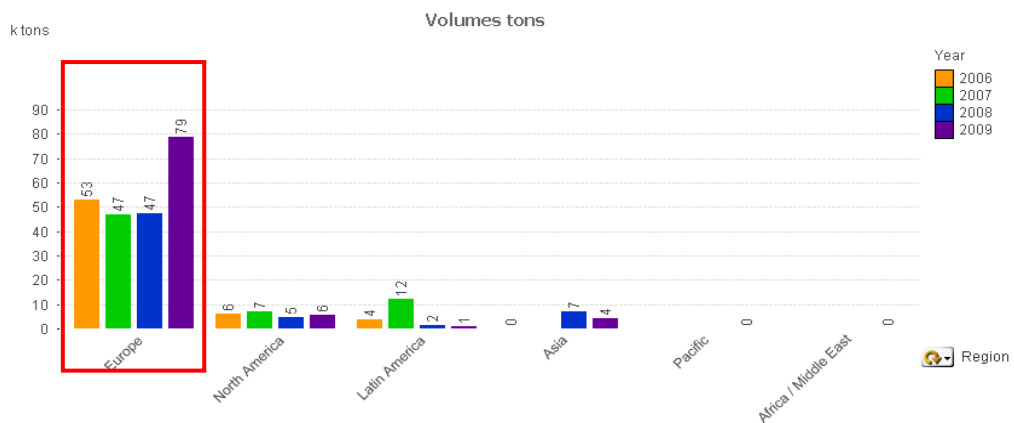
# ***GEOCYCLE...*** *Pre-processing and Co-processing of Sewage Sludge's*

Jean-Pierre Degré

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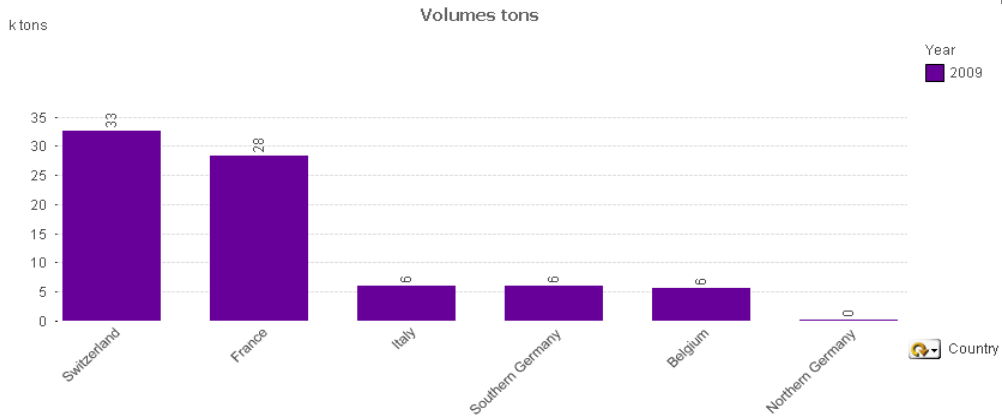
*The mayor part of sewage sludge co-processing in Holcim takes place in Europe*



**Europe makes up for more than 85 % of total sewage sludge use in Holcim 2009**



## Main sewage sludge users in Europe are Switzerland, France, Italy and Germany



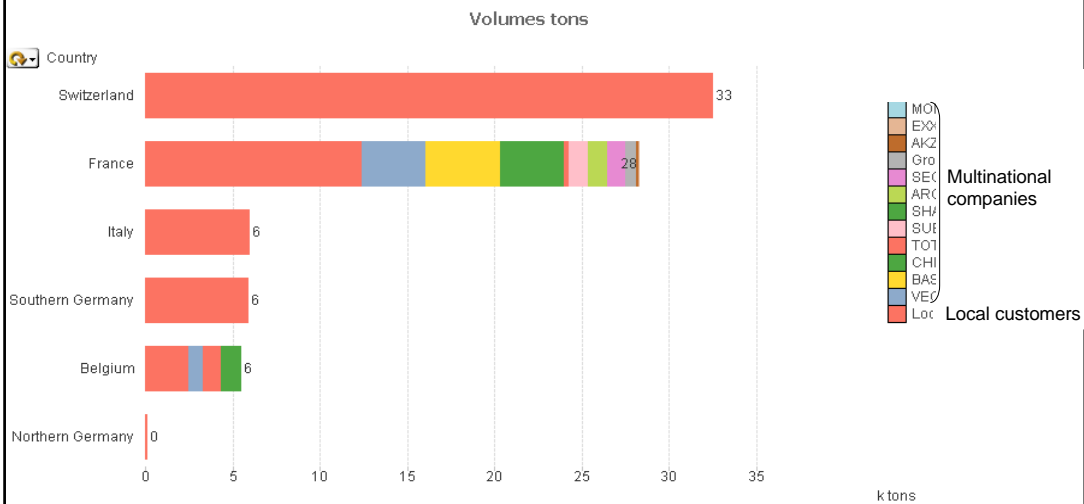
- Experience with sewage sludge exists also in Spain and Eastern Europe for 2006-2008
- Sludges in France are mainly contaminated industrial sewage sludges

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## The majority of sewage sludge is coming from local customers



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*Example of composition and calorific value of dried sewage sludge for selected Holcim cement plants (1)*

(2)

	Net calorific value (as fired)	Sulfur content (as fired)	Chlorine content (as fired)	H2O as fired	Volatile matter (as fired)	Ash content (as fired)	% of Total Thermal Energy
	[MJ/t, MJ/1000 Nm3]	[%]	[%]	[%]	[%]	[%]	[%]
Plant 1	11'554			8.11		44.12	5.25
Plant 2	9'700					44.4	3.87
Plant 3	10'300	1.06	0.08	7.91	47.68	45.19	5.02
Plant 4	8'000	0.68	0.04	5.85	48.42	48.5	4.15

**Up to 5% of thermal energy is substituted by sewage sludge**

(1) Holcim Annual Technical Report

(2) Phosphorus content 8-9% P2O5 on dry sludge as fired (source: laboratory data plant 3)

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*Example: The B.E.M.T.I. Installation  
Sludge's pre-processing in Obourg - Belgium*

- Acceptable moisture: up to 55 %
- Residual humidity: < 2 %
- Particle size at the entrance: < 50 mm
- Limits
  - Evaporation capacity 17 - 21 t water/h
  - Grinding capacity
- Guarantee production data's

Sludge's 38% H2O

Sludge's 55 % H2O

47 wet tons/h

35 wet tons/h

30 dried tons/h

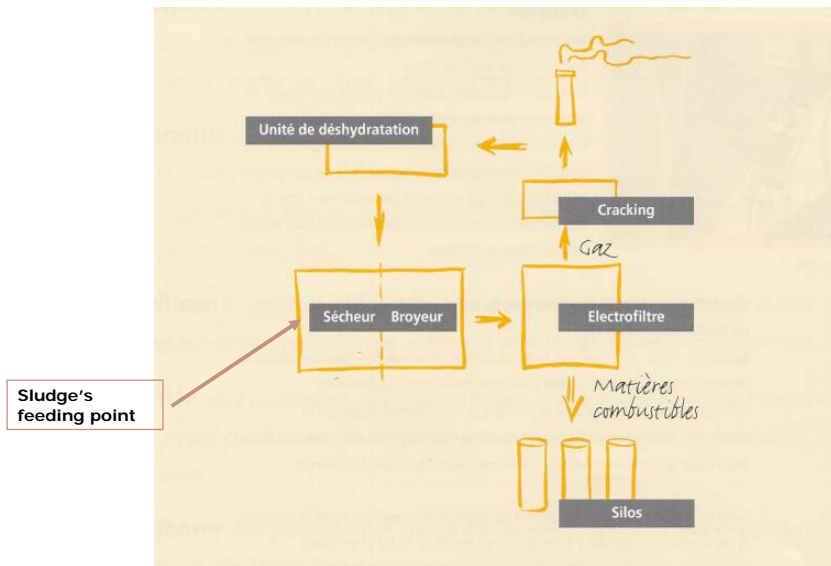
16 dried tons/h

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## Bemti – simplified plan

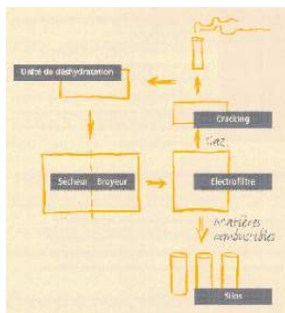


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## Simplified process



The wet sludges are incorporated into the dryer room, which has a high temperature thanks to the hot gases produced by a heat generator.

After drying, the biggest particles go through the grinding room before being taken through an electrofilter, which separates the finest particles and the air stream.

The dried matter is stored into different silos to be used as alternative fuel in our kilns. The gases are sent into a thermal oxidizer to be free of any odor or V.O.C. before dumping it into the atmosphere.

A part of the gas is dehydrated and recycled in the hot gas generator to bring the oxygen concentration under the explosive limit.

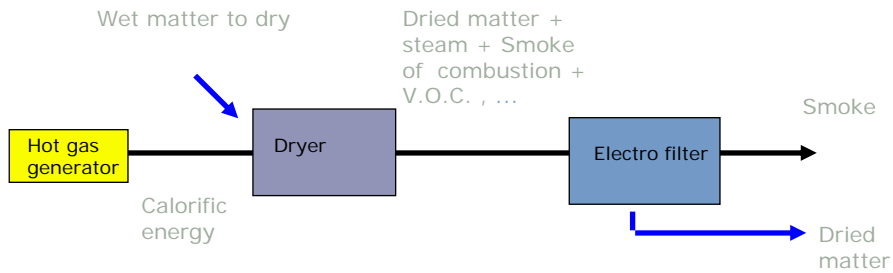
The unit contains several systems to recover energy.

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## Drying process



### Remarks :

Dried matter = alternative fuels for kilns

V.O.C. = Volatile Organic Compounds (With high risk of nauseating odor)

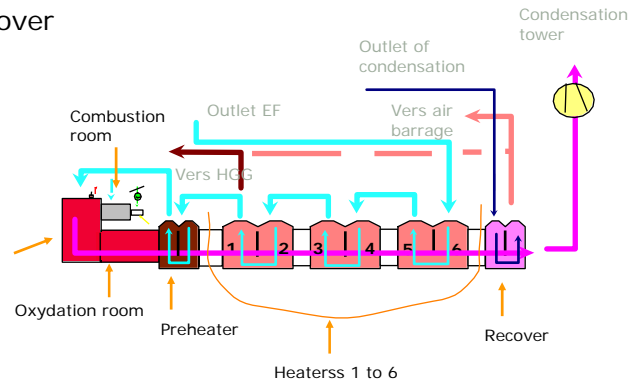
## Thermal Oxidizer

- Goal:
  - Destruction of the nauseating odor component from the gas, coming from the drying of the alternative fuel, at the stack.
- Means:
  - By thermal destruction of the V.O.C. at a high temperature (850 °C during 2 sec.)

➔ Energy recovery

## Thermal Oxidizer - T.O. - Composition

- 1 combustion room (burner with natural gas)
- 1 oxidation room (850°C - 1.5 up to 2 sec)
- 2 Casing for the separation of the effluents
- 2 lines with tubular exchange (energy recovery)
- 1 secondary recover



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## T.O. - overview



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