

Monitoring and Treatment of Mercury air emissions

COP 2 - Knowledge Lab - Geneva, November 19th

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TO SUPPORT INDUSTRY THROUGH SUSTAINABLE RISK MANAGEMENT OF WASTE

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Our three activities



WATER

Veolia treats and monitors **water quality** at all stages of the cycle, from extraction to discharge into the natural environment. We innovate to preserve the resource and promote water recycling and reuse for cities and industry.

100

million people supplied with drinking water

61

million inhabitants connected to wastewater systems

4,052

water production plants managed

2,928

wastewater treatment plants managed



WASTE

Veolia specializes in **waste management**, regardless of whether it is liquid or solid, non-hazardous or special. Our expertise covers the entire waste lifecycle, from collection to recycling and final recovery in the form of materials or energy.

40

million people provided with collection services on behalf of municipalities

45

million metric tons of waste treated

764,477

business customers

591

waste-processing facilities operated



ENERGY

An expert in **energy services**, Veolia supports the economic growth of its municipal and industrial customers while reducing their ecological footprint. Energy efficiency, efficient management of heating and cooling networks, production of green energy - unique expertise for a more sustainable world.

44

million MWh produced

37,339

thermal installations managed

2,086

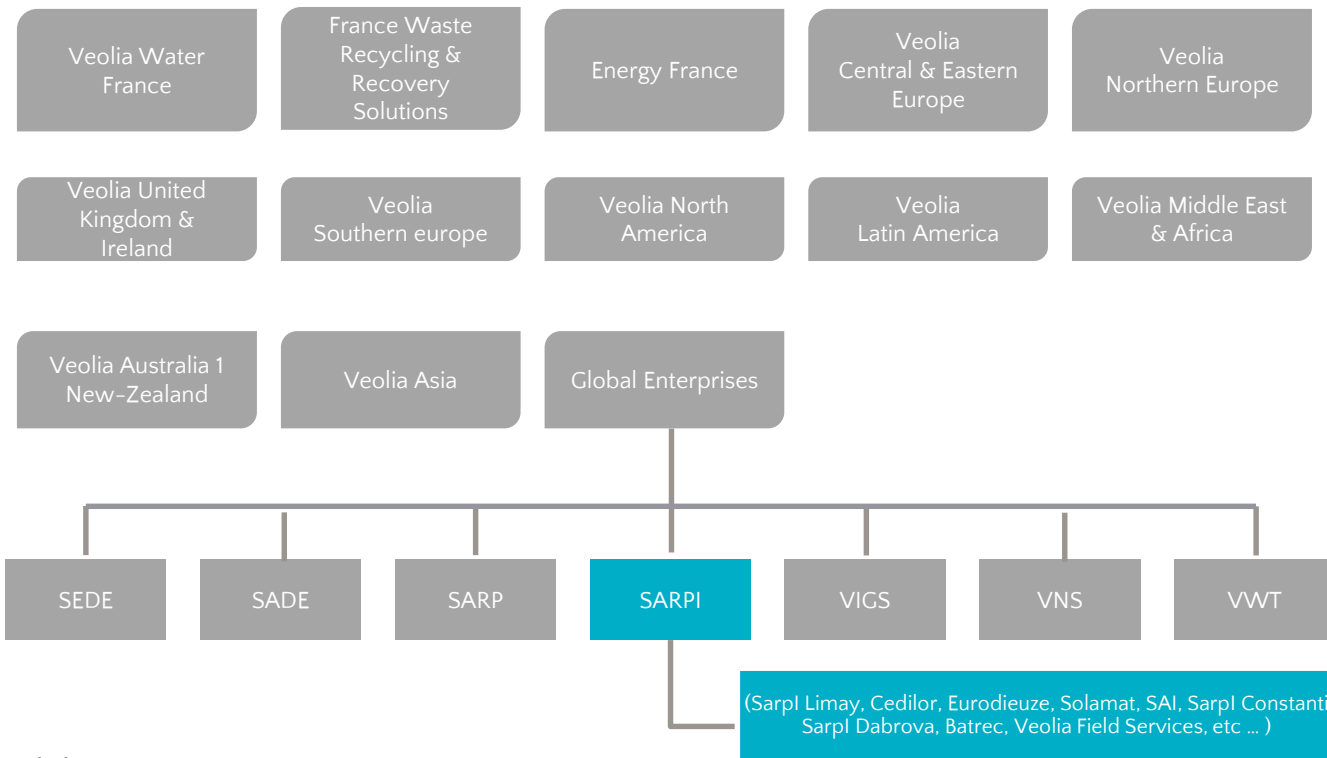
industrial sites managed

551

heating and cooling networks managed

SARPI within the group VEOLIA

Our business activities are now structured around a country-based organization, with company business units (BU) working according to a single organizational model.



SARPI, the hazardous waste treatment expert

FIGURES

- **3,8 million tons** of waste treated every year
- **+ 10 000** industrial customers and local authority
- **580 millions €** of turnover
- **+ 75 sites** in Europe
- **2 800 collaborators** through Europe
- **43 years** of activity

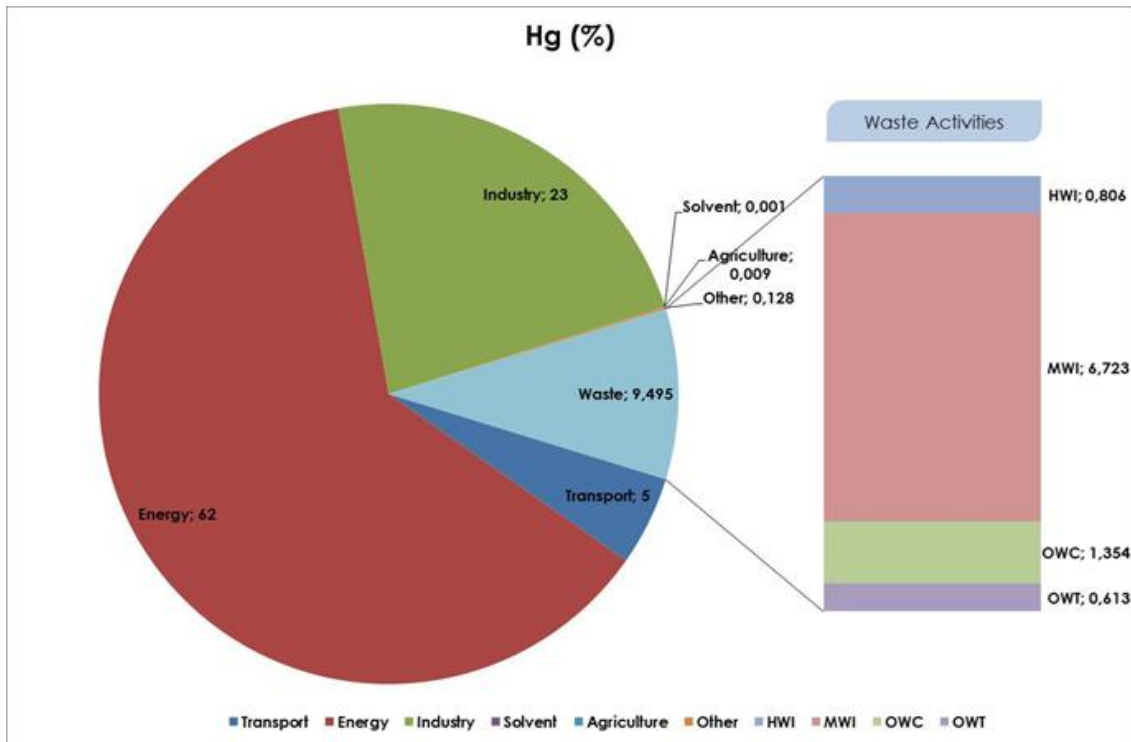
ACTIVITIES

GLOBAL MANAGEMENT OF HAZARDOUS WASTE

- On site pre-collection and collection of hazardous waste
- Grouping and Sorting of hazardous waste on dedicated platforms
- Recycling and other material recovery
- Energy recovery (incineration with electricity production and steam delivery)
- Physico-chemical treatment of waste
- Landfilling of non-recoverable hazardous waste
- Soiled industrial lands remediation
- Dedicated treatment of special hazardous waste:
 - POP waste
 - ODS
 - Mercury
 - All unwanted chemicals

Hg air emissions in Hazardous Waste Incinerators 10 years for a global understanding

Contribution of the Waste Incineration sector to the total emissions to air (2012)



Countries taken into account covered 69% of the EU inhabitants

Waste Incineration Sector Contribution is about 7,5 %

How to reduce the contribution of incineration?



Better monitoring (EU target, continuous)



Adapted and dedicated treatment in order to reach lower levels (EU target, 5-20 $\mu\text{g}/\text{Nm}^3$)

Continuous Monitoring

Not so easy...

Monitoring equipments tested



**Mercury Freedom
Thermo Fisher
Scientific**



**Mercem 300Z
Sick**



**HM 1400 TRX
Durag**



**AR 600
Opsis**

Comparison of the different equipments

Supplier	Model	Technology	Speciation	Capex (€ HT)	Opex Preventive curative (€ HT/an)	Advantages	Weaknesses
Durag	HM 1400 TRX	Atomic Absorption Spectrometry	<ul style="list-style-type: none"> Hg0 Hg2+ Hgt 	~ 85 000	~ 6 000	Maintenance easy	short lifespan of the convertor
Thermo Fischer Scientific	Mercury Freedom	Atomic fluorescence Spectrometry	<ul style="list-style-type: none"> Hg0 Hg2+ Hgt 	~ 105 000	~ 15 000	<ul style="list-style-type: none"> Convertor upstream Dilution system Calibration system integrated 	Complex technology
Opsis	AR 600	UV spectrometry	<ul style="list-style-type: none"> Hgt 	~ 85 000	~ 6 000	Maintenance easy	<ul style="list-style-type: none"> No speciation Size
Sick	Mercem 300Z	Atomic Absorption Spectrometry	<ul style="list-style-type: none"> Hgt 	~ 80 000	~ 9 000	Maintenance easy	No speciation

Equipements recommended internally

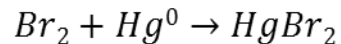
New eq.: ENV(SA) and Gasmet close to Thermo

Dedicated treatment

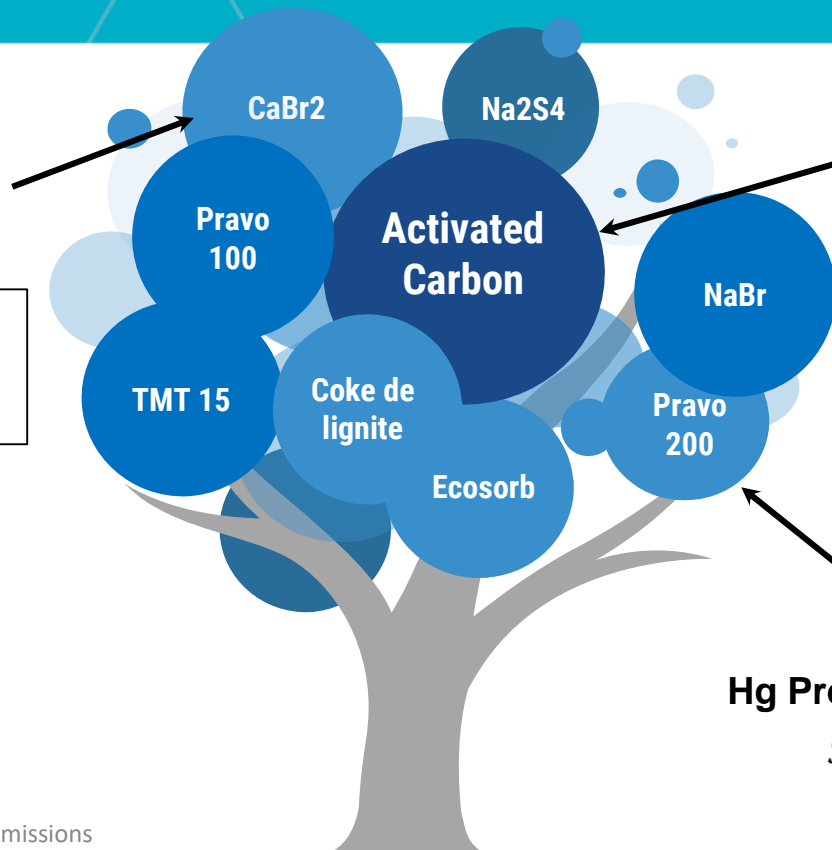
A combination of reagents

Different solutions tested in Partnership with Pr Voosteen

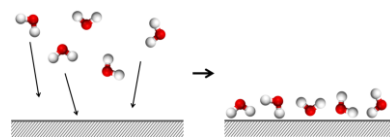
Hg Oxidation



The oxidised form of Hg is better adsorbed on activated carbon

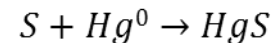


Hg Adsorption



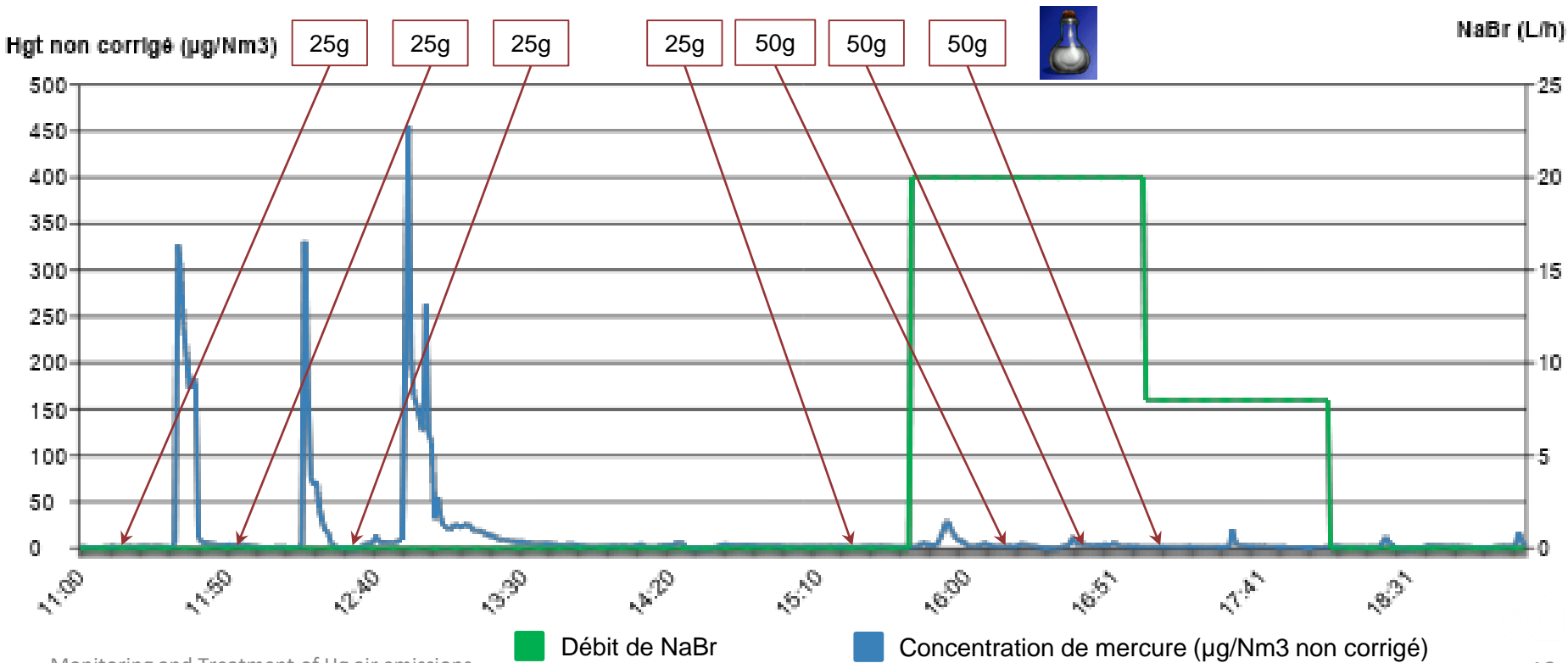
Activated carbon remains the best reagent

Hg Precipitation



Trials

Exemple de campagne d'essais de traitement à Sedibex (2017)



Costs?

Very low compared to the benefit for health and the environment!

Monitoring & Treatment in dedicated HWI

Depends on the monitoring equipments and the reagents chosen

0,2 to 0,31 €/t

with a wet flue gas cleaning system

(approx. double with a dry flue gas cleaning system)

The 14 lines for hazardous waste incineration of SARPI in Europe are fully equipped (monitoring and treatment)

Challenges...

Risks of re-emission of mercury

- Avoid recirculation in the scrubbers
- Emission from SCR during regeneration if placed at the end of the FGC system

Thank you for your attention