Monitoring and Treatment of Mercury air emissions
COP 2 - Knowledge Lab - Geneva, November 19th

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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
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

21/09/2018
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 µg/Nm³)
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

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Model</th>
<th>Technology</th>
<th>Speciation</th>
<th>Capex (€ HT)</th>
<th>Opex Preventive curative (€ HT/an)</th>
<th>Advantages</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durag</td>
<td>HM 1400 TRX</td>
<td>Atomic Absorption Spectrometry</td>
<td>• Hg0 • Hg2+ • Hgt</td>
<td>~ 85 000</td>
<td>~ 6 000</td>
<td>Maintenance easy</td>
<td>short lifespan of the convertor</td>
</tr>
<tr>
<td>Thermo Fischer Scientific</td>
<td>Mercury Freedom</td>
<td>Atomic fluorescence Spectrometry</td>
<td>• Hg0 • Hg2+ • Hgt</td>
<td>~ 105 000</td>
<td>~ 15 000</td>
<td>• Convertor upstream • Dilution system • Calibration system integrated</td>
<td>Complex technology</td>
</tr>
<tr>
<td>Opsi</td>
<td>AR 600</td>
<td>UV spectrometry</td>
<td>• Hgt</td>
<td>~ 85 000</td>
<td>~ 6 000</td>
<td>Maintenance easy</td>
<td>• No speciation • Size</td>
</tr>
<tr>
<td>Sick</td>
<td>Mercem 300Z</td>
<td>Atomic Absorption Spectrometry</td>
<td>• Hgt</td>
<td>~ 80 000</td>
<td>~ 9 000</td>
<td>Maintenance easy</td>
<td>No speciation</td>
</tr>
</tbody>
</table>

**Equipements recommended internally**

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

A combination of reagents
Monitoring and Treatment of Hg air emissions

Different solutions tested in Partnership with Pr Voosteen

Hg Oxidation

\[ Br_2 + Hg^0 \rightarrow HgBr_2 \]

The oxidised form of Hg is better adsorbed on activated carbon

Hg Adsorption

Activated carbon remains the best reagent

Hg Precipitation

\[ S + Hg^0 \rightarrow HgS \]
Trials

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

Débit de NaBr
Concentration de mercure (µg/Nm3 non corrigé)

25g  25g  25g  25g  50g  50g  50g
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

\[ 0.2 \text{ to } 0.31 \text{ €/t} \]

*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)*
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