

**Thermal Decontamination and Recycling of Spent Hg Guards, and stabilisation of resultant mercury:**

**Insights from Batrec Catalyst Recycling Plan**

**ICMGP 2024**

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**SARPI**  **VEOLIA**



**Wimmis**



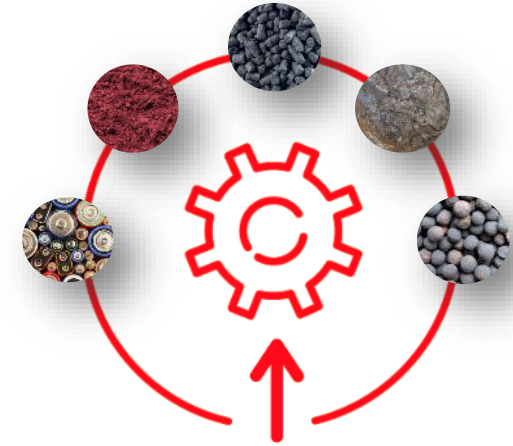
**1991**

FUNDATION



ISO 9001  
ISO 14001  
OSHAS 18001

CERTIFICATIONS



*Liquid Mercury Stabilisation*  
*Activated Carbon reactivation*  
*Mercury wastes treatment*  
*Mercury adsorbents recycling*  
*Battery recycling*

**5 CORE SPECIALITIES**



**Wimmis**





**Wimmis**



# What is the deal with mercury waste?

- Liquid elemental mercury
- Absorbents with mercury ( $\text{HgO}$ ,  $\text{HgCl}_2$ ,  $\text{HgS}$ ...)
- Sludges with mercury (Organic, inorganic, pH 1-12)
- Soils/debris contaminated ( $\text{Hg}$ ,  $\text{HgO}$ ,  $\text{Hg}_2\text{Cl}_2$ ....)
- Products containing mercury compounds or elemental mercury

In short:

**Hg Waste comes in  
many complex forms**



Dense liquid metal element

Gives off toxic vapour

Compounds can be extremely toxic

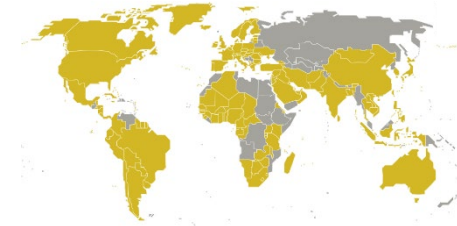
Bioaccumulates in nature



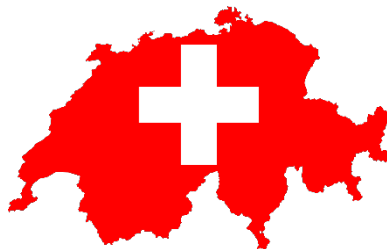
MINAMATA  
CONVENTION  
ON MERCURY

UN  
environment  
programme

Protects health and environment from Hg  
Reduction, phase out of Hg use  
Implements controls on Hg emissions



Control of Transboundary Movement of Haz Wastes & Disposal  
Allows import to OECD countries  
Specific guidelines for Hg Wastes – **conversion & stabilisation**



EU, Switzerland and other countries may have specific regulations on Hg export or waste treatment

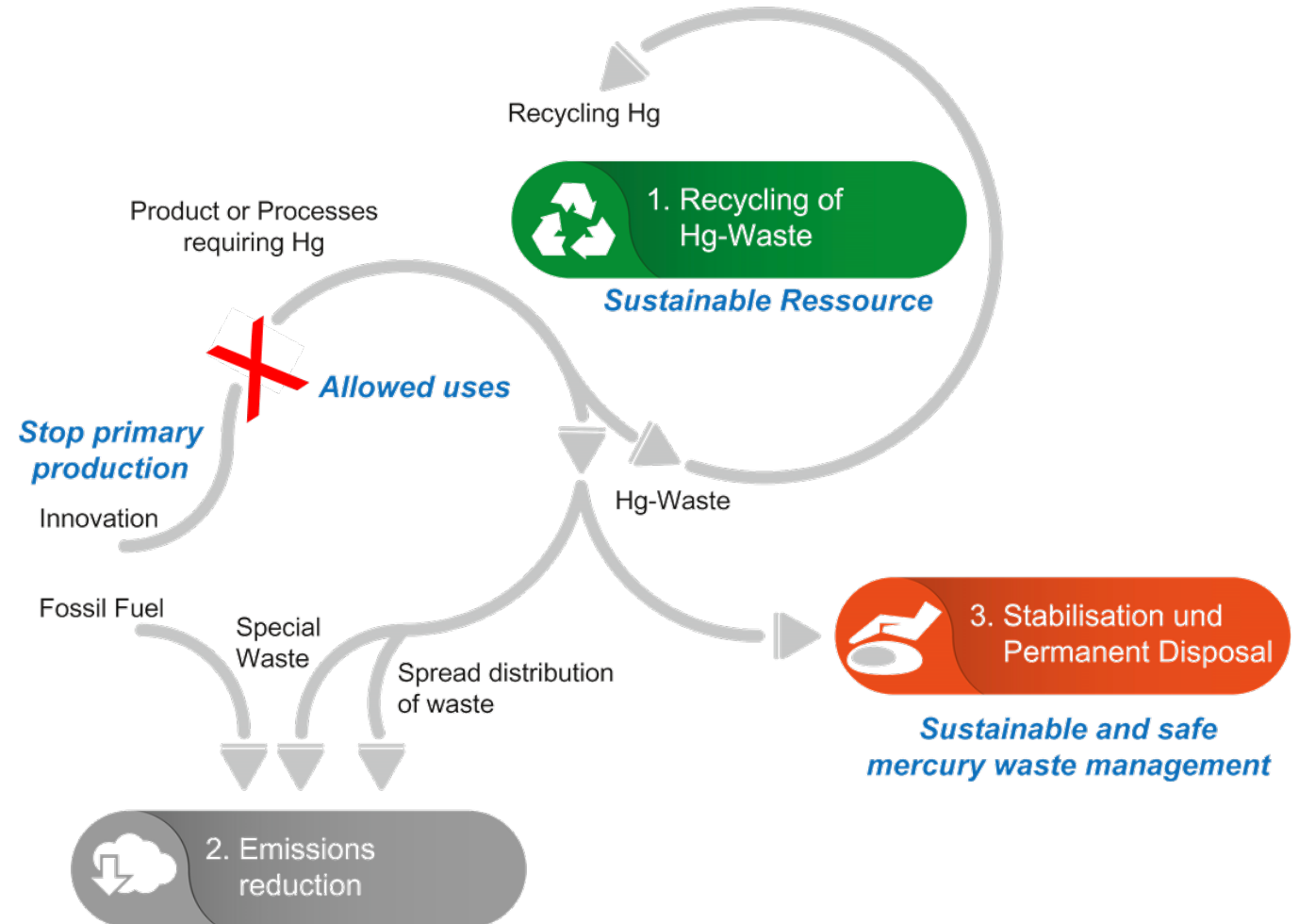
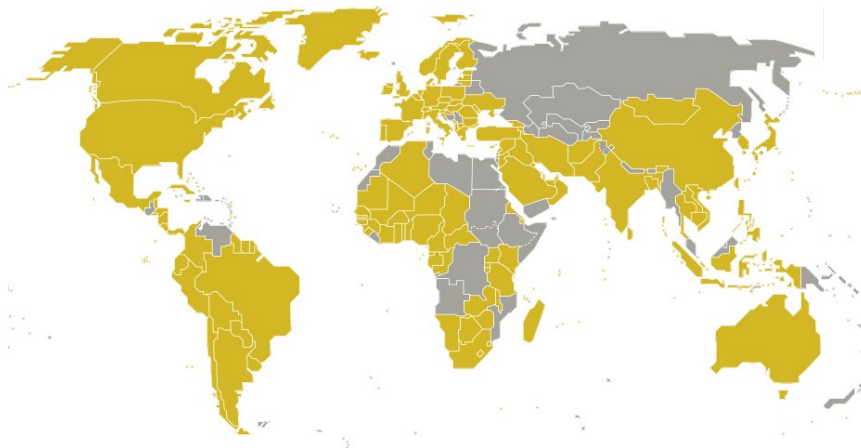
# Why Stabilise Mercury? - Global Context



The **MINAMATA CONVENTION** is an international **treaty** developed with the backing of the United Nations Environment Program to **protect human health and the environment from the harmful effects of mercury**.

147 countries agreed on:

- the **reduction and phase out of mercury use** in a number of products and processes.
- implementing **control measures on environmental emissions**.



# Mercury Waste Treatment – Batrecs Capabilities

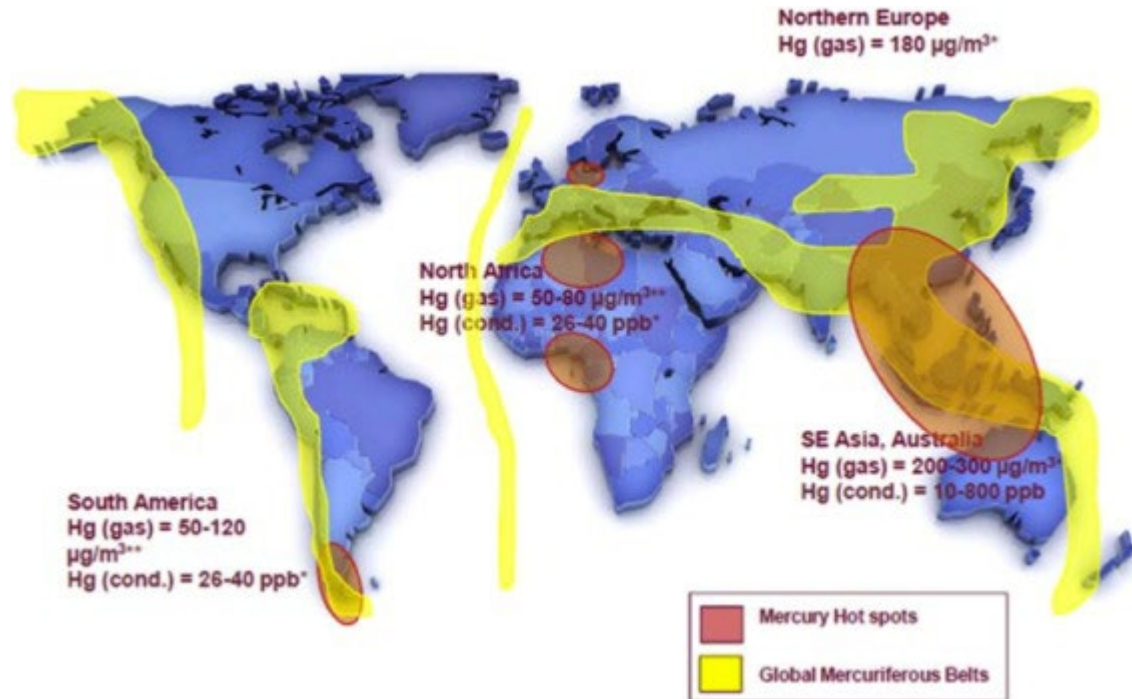


# Batrecs advantage – versatility, expertise and focus



# Hg in natural Gas : What are mercury guards?

Hg is present in oil and gas fields globally



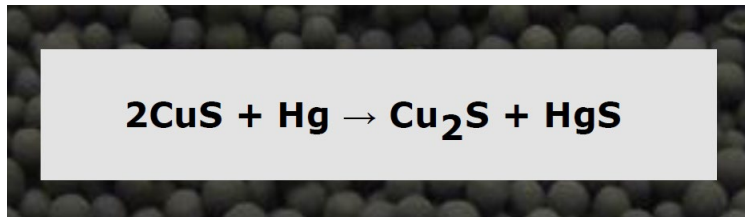
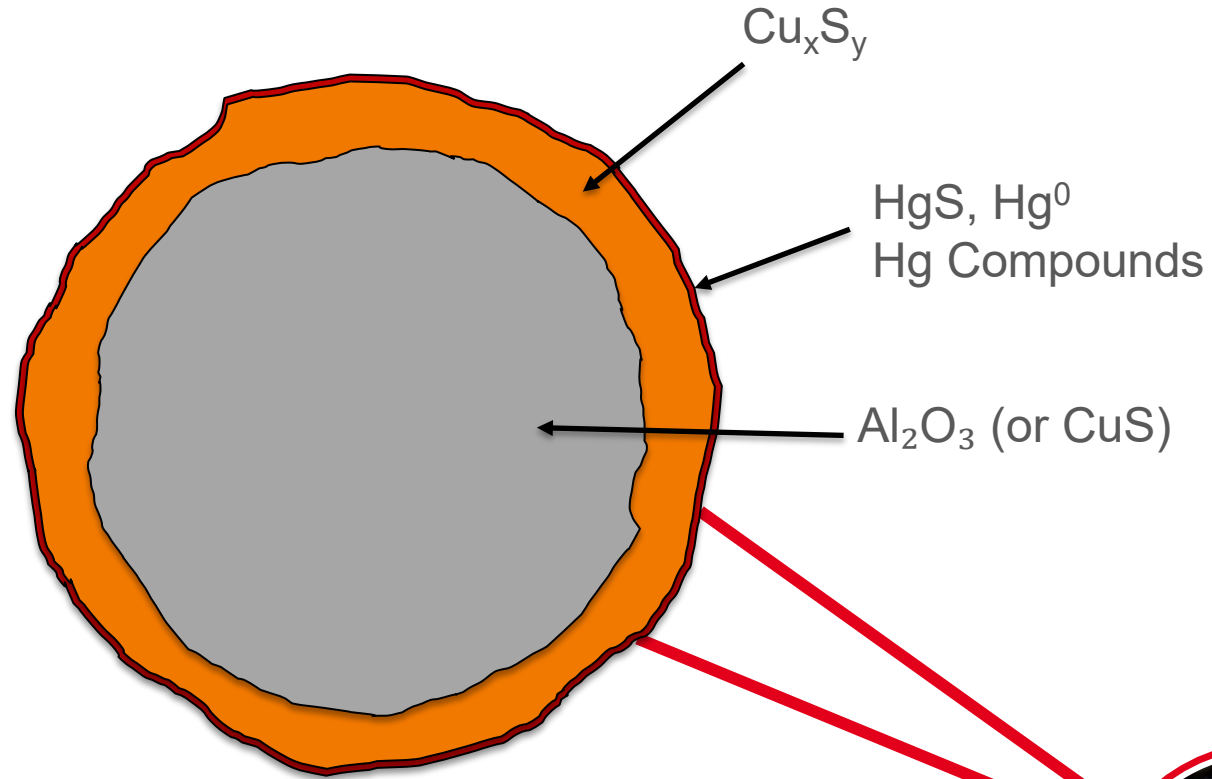
Hg found in natural gas, in scale, process equipment and storage tank sludges.

Hg removed from natural gas by MRU

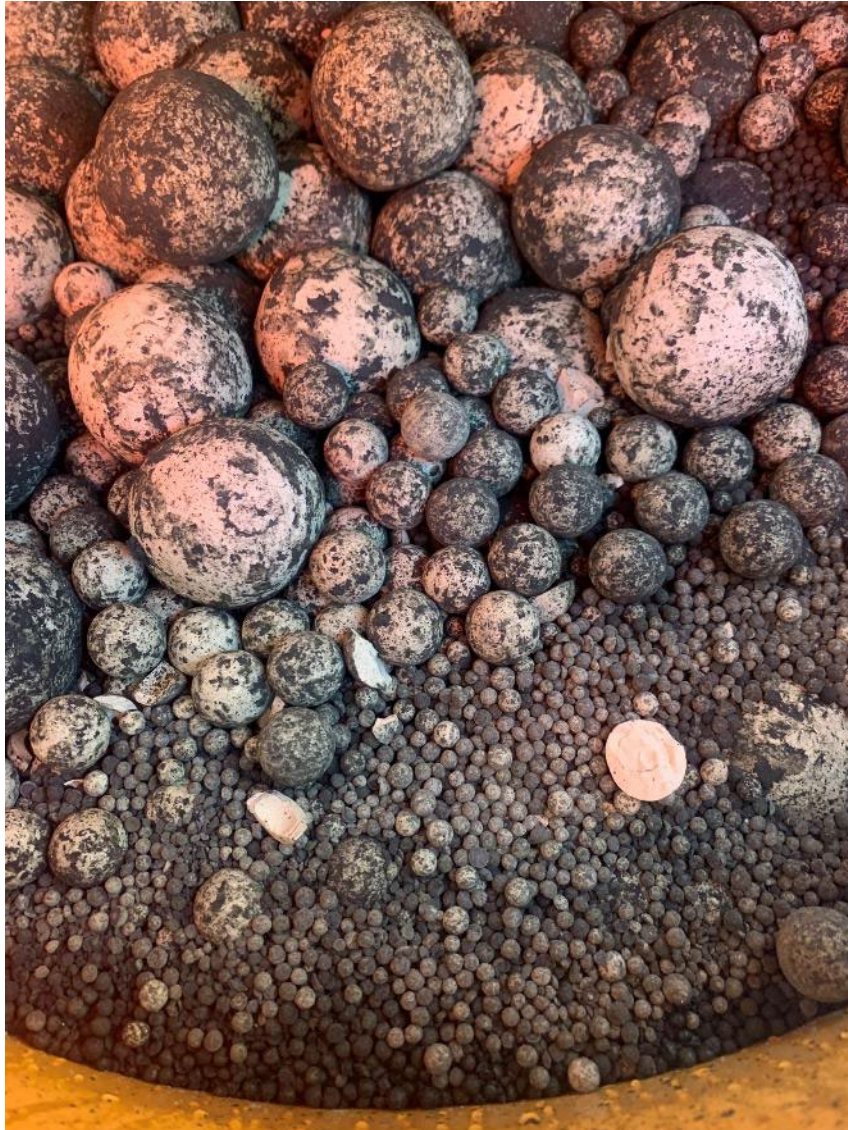


MRU = Mercury Recovery Unit  
(gas filter containing Hg Guards)

# Spent Hg Guards: an example



# Spent Hg Guards



# Spent Hg Guards – Typical analysis

N° Analysis	Al	S	Cu	Zn	As	Br	Hg	Pb
	%	%	%	%	%	%	%	%
1	42.87	5.76	9.35	0.17	0.011	0.006	9.22	0.029
2	60.48	4.00	9.31	0.12	0.008	0.005	5.86	0.019
3	38.02	4.73	8.43	0.13	0.008	0.034	6.04	0.022
4	1.60	27.76	44.74	0.41	0.0004	0.0002	0.13	0.012
5	27.46	9.26	16.13	0.11	0.0019	0.0078	1.98	0.009
6	7.41	19.84	24.51	12.40	0.2026	0.0094	2.85	0.009
7	18.26	14.49	20.46	5.98	0.0020	0.0093	1.96	0.008
8	18.64	12.36	18.70	4.74	0.0022	0.0087	2.34	0.009

# Hg Guard treatment – Who do we work with?

## Mercury Guard Suppliers



## Service Companies



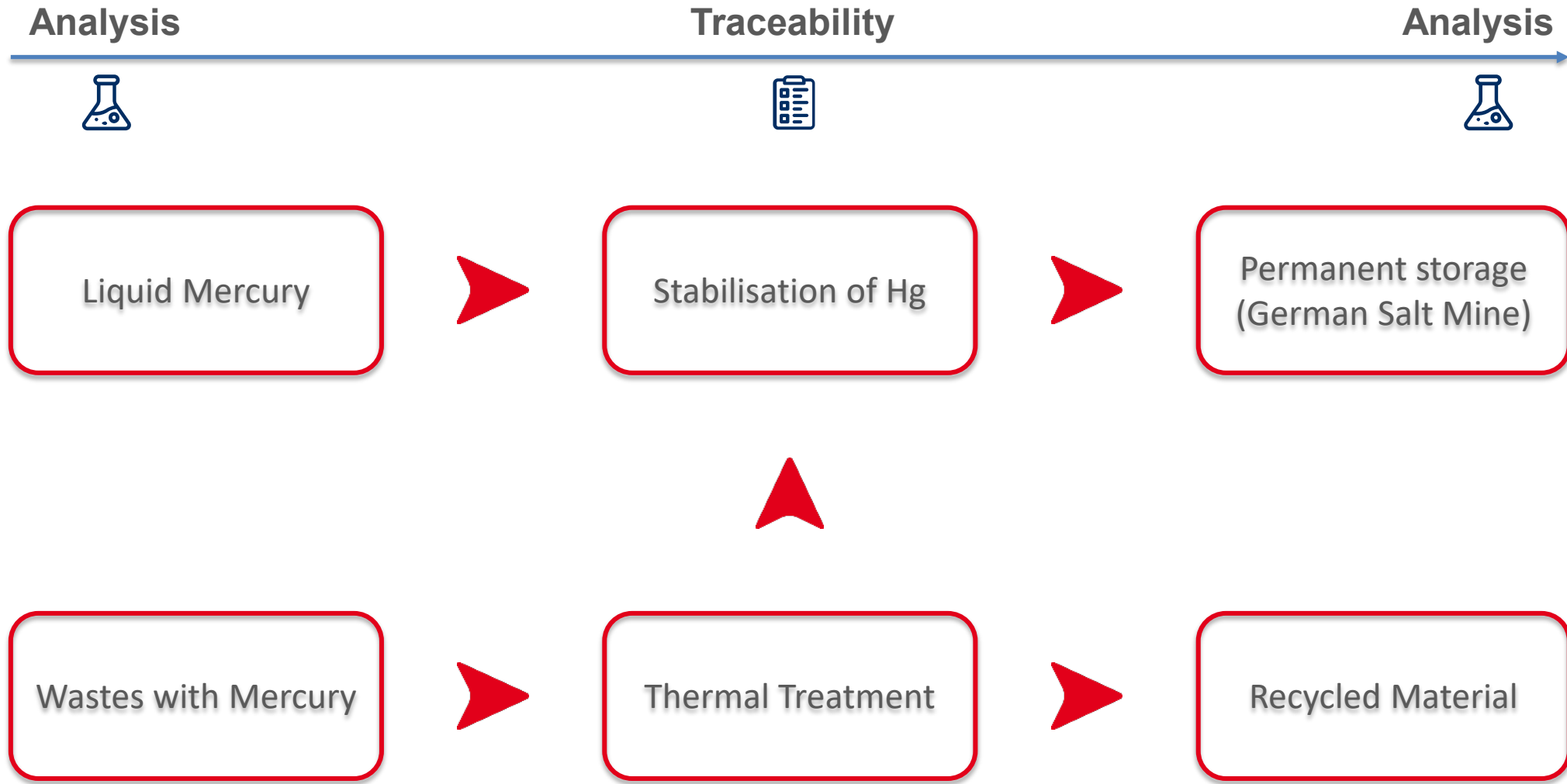
## Energy Companies and Petrochemical Operators



# What do our customers want?



# We treat mercury waste



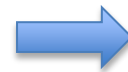
# Spent Hg Guards – Typical analysis

Typical Hg Guards contain copper (normally as  $\text{Cu}_x\text{S}_y$ )

- 10 – 40% copper by weight
- LME price for copper high at USD 9,400 (18<sup>th</sup> June 2024)
- Copper cannot be recovered due to Hg presence
- Batrec will remove Hg to allow copper recovery

Rebate for copper ranges:

**USD 150 –2400** per tonne  
of spent Hg Guards\*



\*Depends on copper content, LME and other variable factors. Rebate cannot be guaranteed

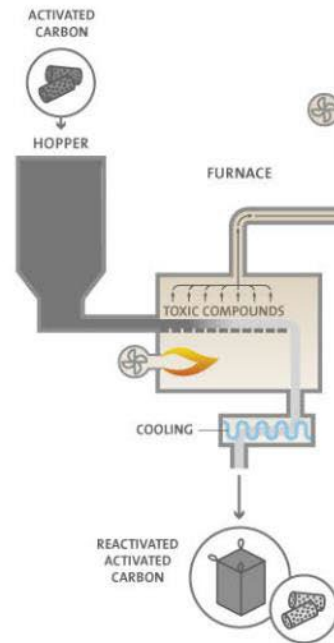
# Treatment of Hg Guards in the CRP at Batrec



**1**

## THERMAL TREATMENT

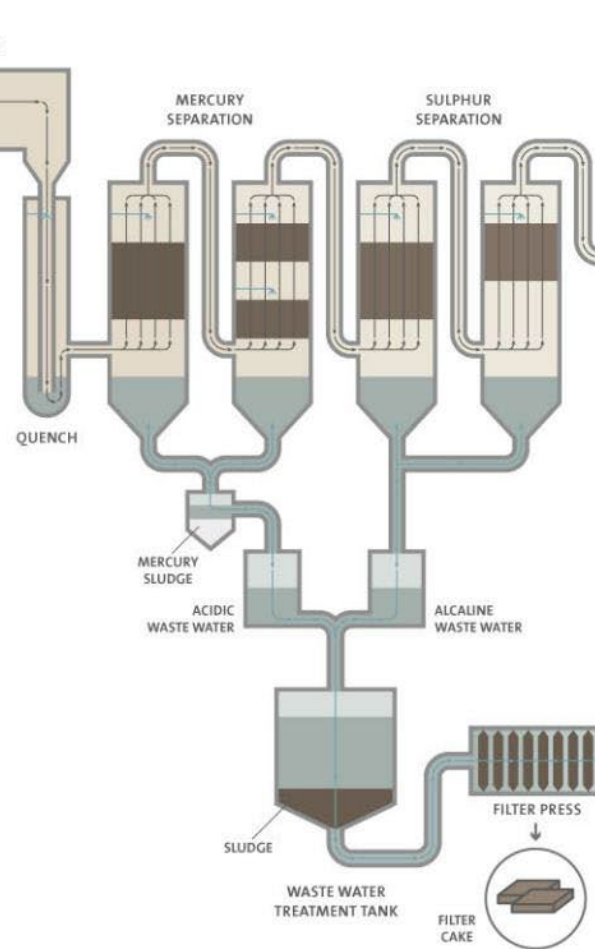
- o desorption of the pollutants at 750 – 850°C
- o destruction of the organic pollutants in the post-combustion chamber



**2**

## WASTE GAS WET CLEANING

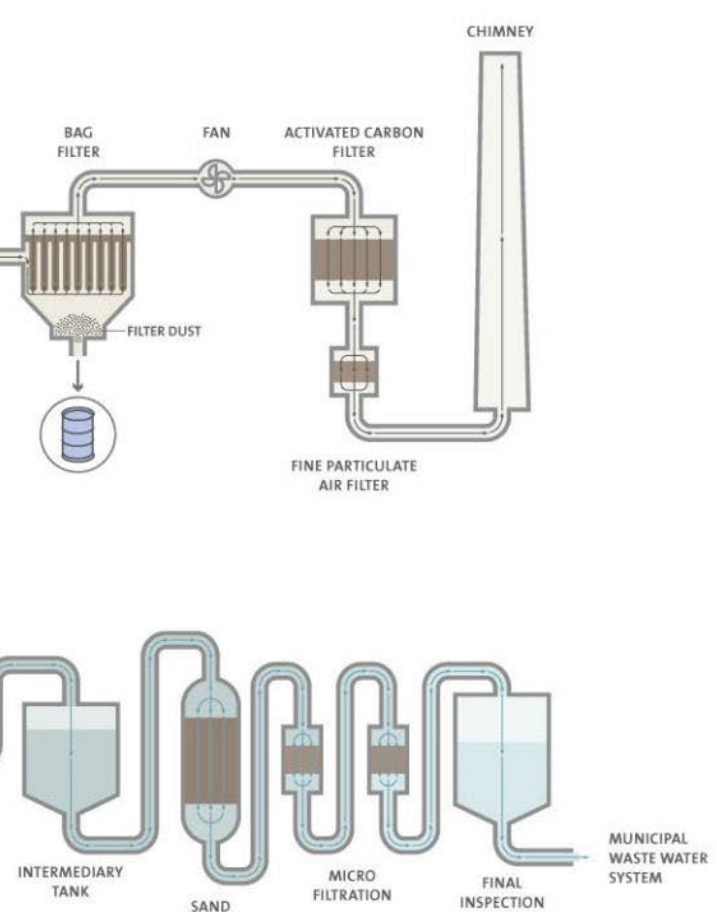
- o condensation of Mercury
- o removal of Sulfur



**3**

## WASTE GAS DRY CLEANING

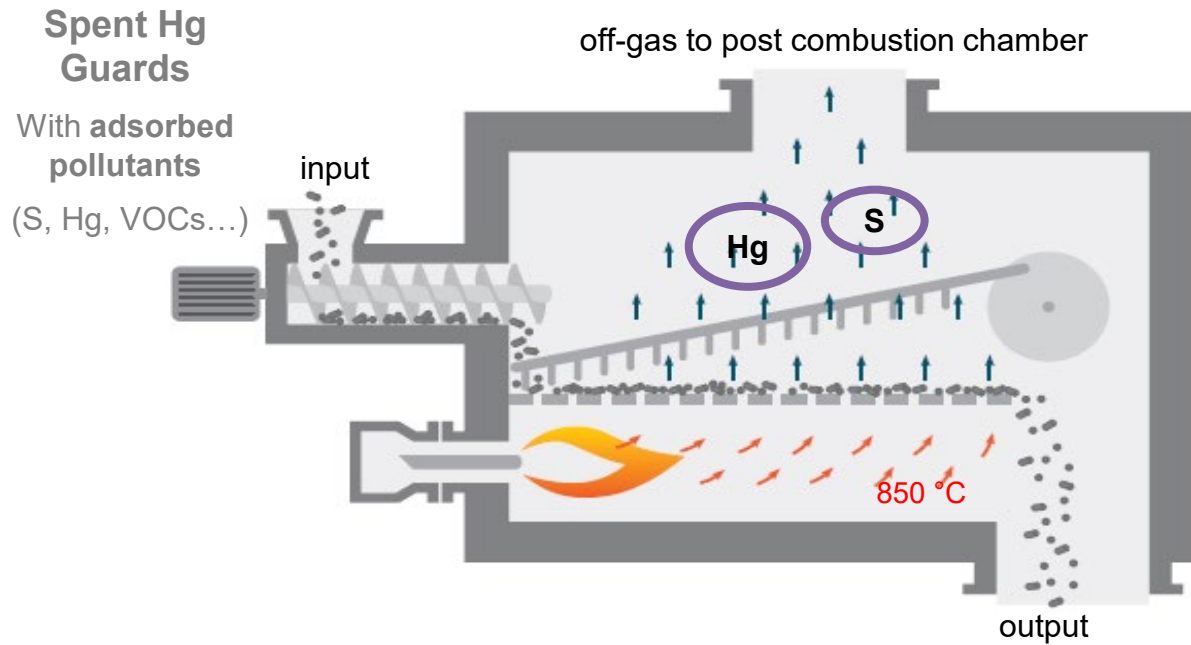
- o removal of trace level Mercury
- o removal of other pollutants and fine dust
- o removal HEPA Filter



## WASTE WATER TREATMENT

# Treatment Process

## Decontamination Furnace



### Treated Hg Guards

Oxidised and all VOCs removed,  
No longer self heating.  
Hg <20ppm



- ❑ Mercury (Hg) without limit
- ❑ Sulphur (S) up to 20%
- ❑ VOCs

# Treatment Process

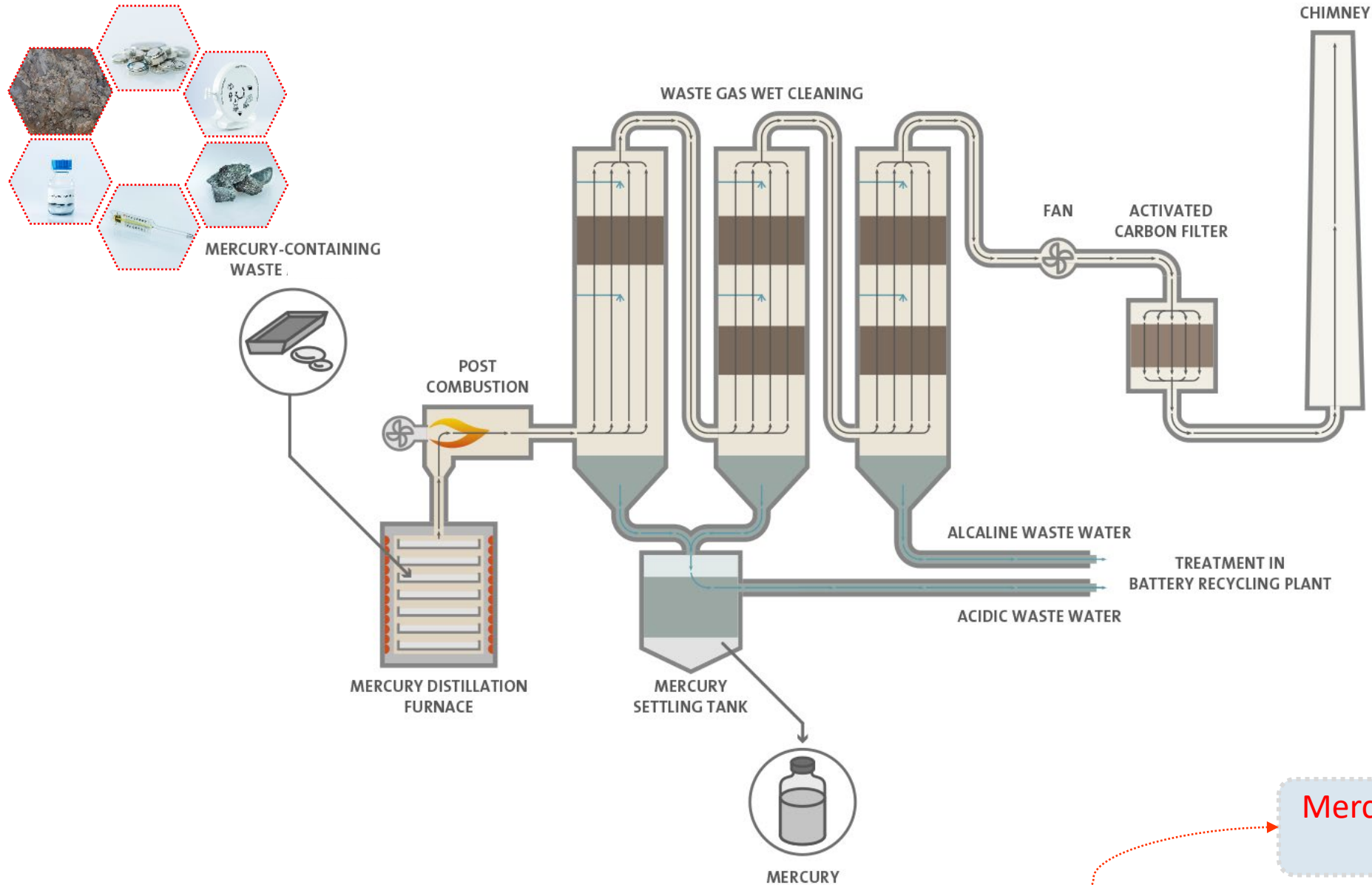
## Decontamination Furnace



# Mercury Operations



# Mercury Distillation – Process

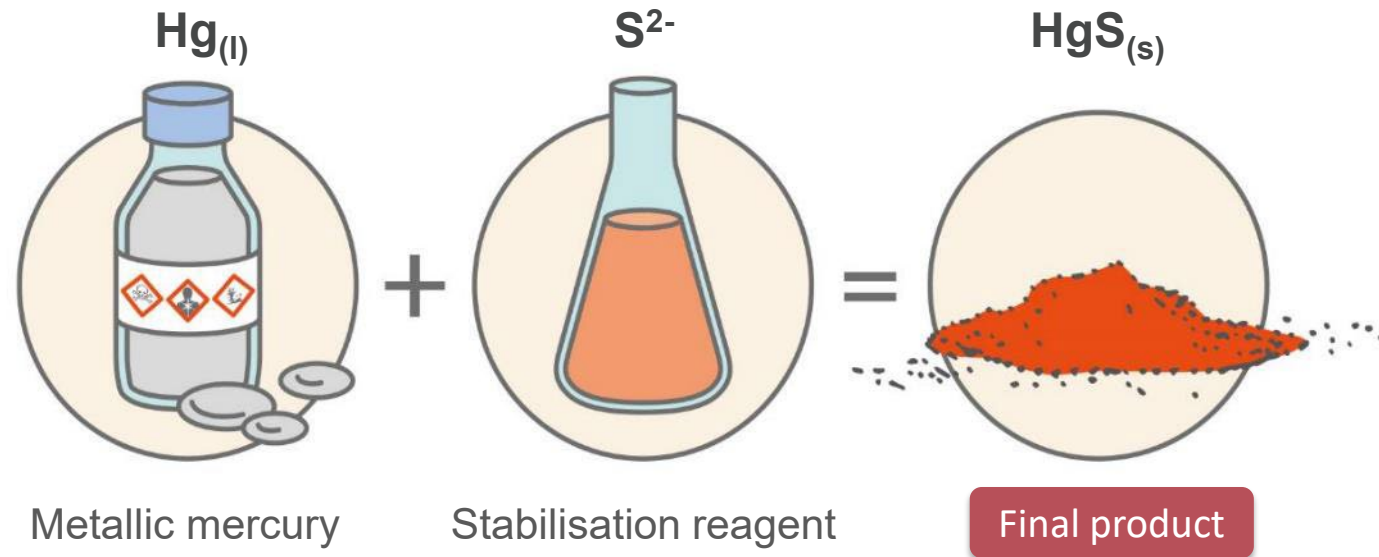




## BATREC's approach

Transform highly toxic Hg into non-toxic HgS

Controlled reaction at ambient temperature and pressure → low risk, high conversion and consistent product



HgS is **least toxic**  
Hg compound

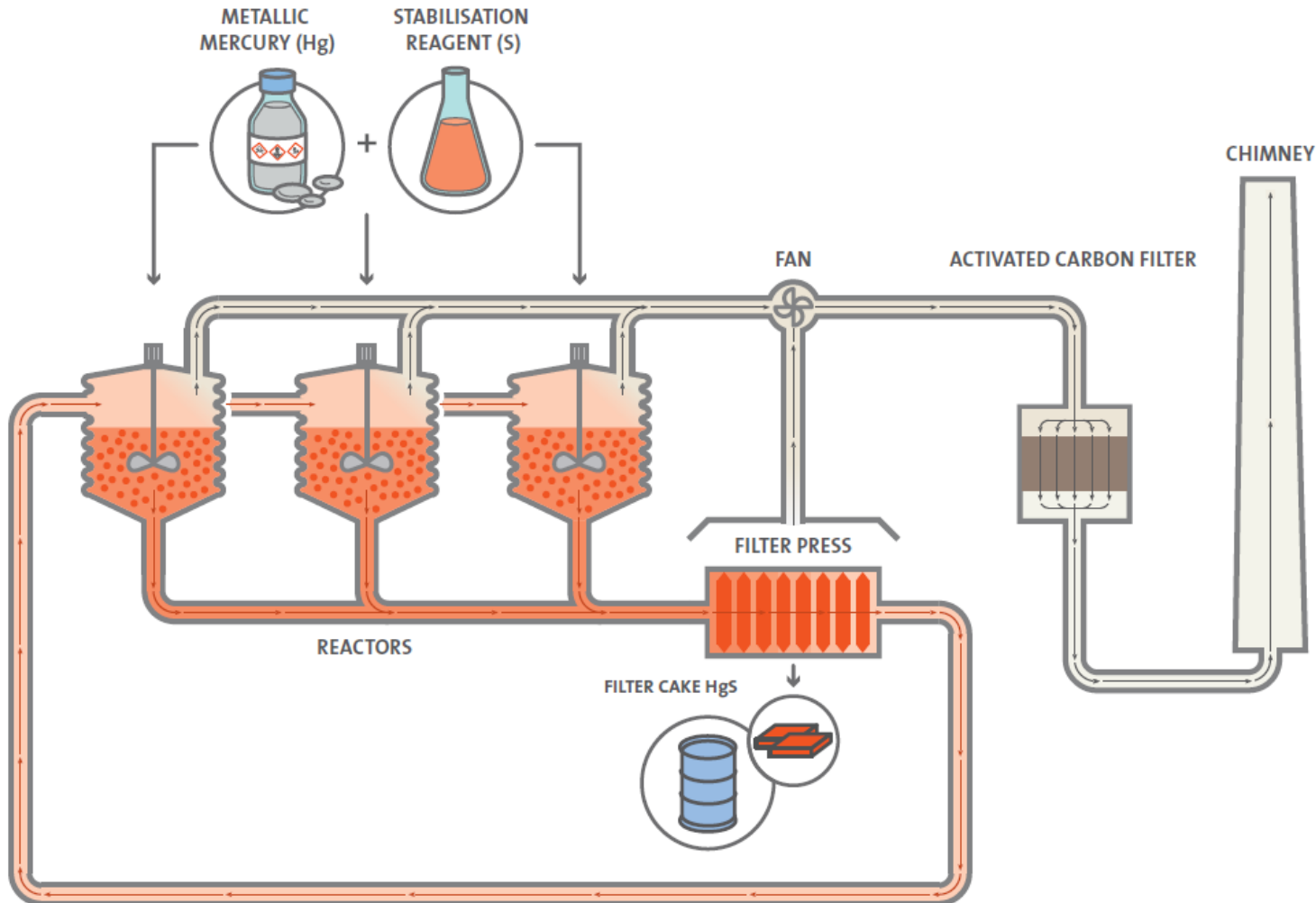
HgS is the **most stable** Hg  
compound

HgS is the **most insoluble** Hg  
compound

HgS is the natural  
mineral form  
[cinnabar] of Hg

# Mercury Stabilisation – Process

Capacity: 1.200 t/year



## Process characteristics

- ✓ batch process
- ✓ wet process at low temperatures in a closed circuit limits the risk of Hg emissions
- ✓ no gaseous Hg in the process
- ✓ stabilisation solution is regenerated  
→ all effluents re-used
- ✓ simple reactants

## mass balance

1'000 kg of Hg turns into **1'190 - 1'250 kg of HgS**

## HgS composition

- Hg 80 – 84 %  
HgS 92.8 – 97.4 %
- H<sub>2</sub>O 1.0 – 5.0 %
- S 0.7 – 3.0 %
- Na 0.4 – 1.8 %
- metallic Hg < 100 ppm



Thank you for your attention

Batrecs 'Ask'?

If you hear about mercury waste,  
lets discuss.

