



# Hilde Govaerts

CAMPINE (BE)

## The **Antimony** value chain

LIFE PlasPLUS



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# The **Antimony** value chain



Hilde Goovaerts - Campine  
1<sup>st</sup> dedicated Lifeplasplus event  
01 02 2022



## **Campine specialty chemicals**

12,000 mt  $\text{Sb}_2\text{O}_3$

6,500 mt Masterbatches  
(Mastertek ®)

## **Campine metals recycling**

60.000 tons recycled Pb

1.500 tons recycled Sn, Sb, Ag, Au



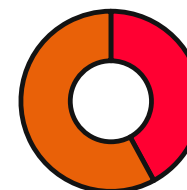
# Key Figures Campine



In business since  
1912



Largest global  
player in antimony  
outside China



Turnover 2020  
161,9 M Euro

■ Specialty Chemicals



**195**  
employees



ISO9001 /  
ISO14001 /  
ISO 45001  
SEVESO company



Active member of  
International Antimony  
Association (i2a)  
And ILA International  
Lead Association

# The **use** of antimony and antimony trioxide



## Some history

The oldest use of Sb is as make up during biblical times, in ancient the Middle East, Egypt, and South Asia. Cleopatra was probably Sb's first big fan!



More info on twitter / linked in: [Antimony\\_i2a](#)



# Some history

## DID YOU KNOW?



Antimony was a popular remedy in the 19th century for the chronically constipated. Ingested as a small metal ball, it became known as the everlasting pill and would be collected and reused, sometimes passed down through generations.





# Current uses of antimony



**Best hardener for lead metal  
essential in many applications**

**Radiation protection or lead  
acid batteries**



**Best synergist for  
flame retardants:**

**3x less flame retardant  
needed to have same effect**







# Antimony is an excellent synergist for FR applications

Flame retardant in PVC for cables, foils and tents





# Current uses of antimony



Most performant polymerization catalyst for PET and PE production



Excellent fining agent or degasser for the production of optical glass, screens, fluorescent light bulbs, night vision goggles

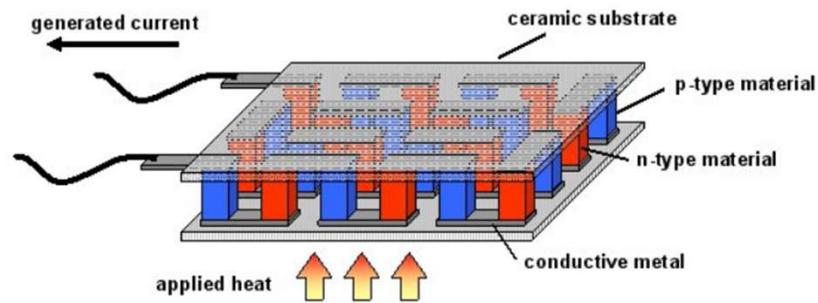


Dense white, yellow and red-orange coloring in complex specialty pigments





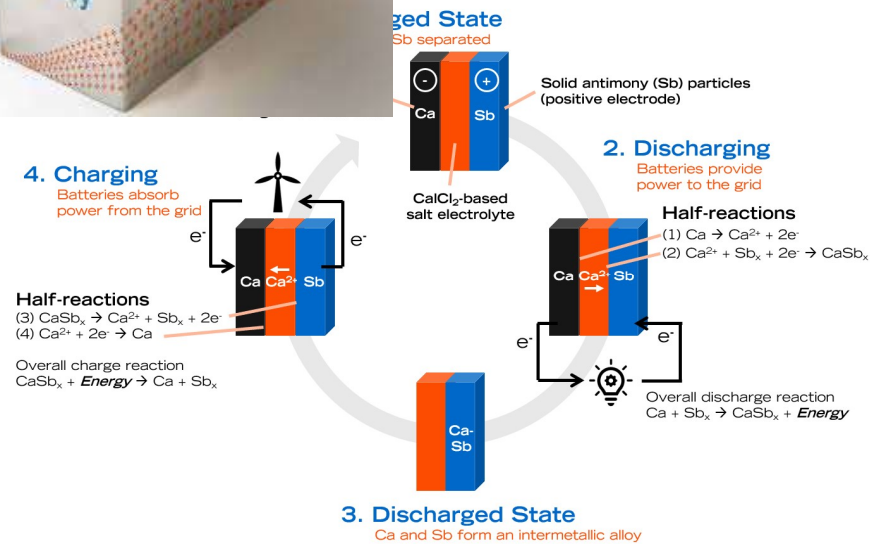
# New uses



Thermo-electric generator



Liquid metal battery  
For long time storage



# Use of flame retardants in plastics



# Increased use of plastics in our daily life

Over 2,5 millions of fires each year in Europe

Time between start of fire and a non-surviving situation

- Reduced last 30 years: from 17 to 3 min
- Average response time fire fighters = 8 min

Every 3 hours somewhere, someone dies in a fire

Introduction of new risks (EV, chargers, 5G, solar panels,...)

**Flame retardants save lives & material**





# Gas phase flame retardants

Scavenging reactive free radicals

Inhibiting flame propagation

Reduce heat

Examples

- Halogenated FR
- Red Phosphor
- Phosphates / Phosphinates

**Synergists** are not effective by themselves but will significantly **improve the effectiveness** of a primary Flame Retardant, or will improve subsidiary fire risks such as smoke reduction, afterglow, smouldering, ...

- Sb<sub>2</sub>O<sub>3</sub>, Borates, Stannates, Silicon compounds, Nanoclays

Release of halogen radicals ( $X^* = Cl^*, Br^*$ ) from the flame retardant (R-X)



Formation of hydrogen halide (HX)



Neutralization of radicals (rich energy)





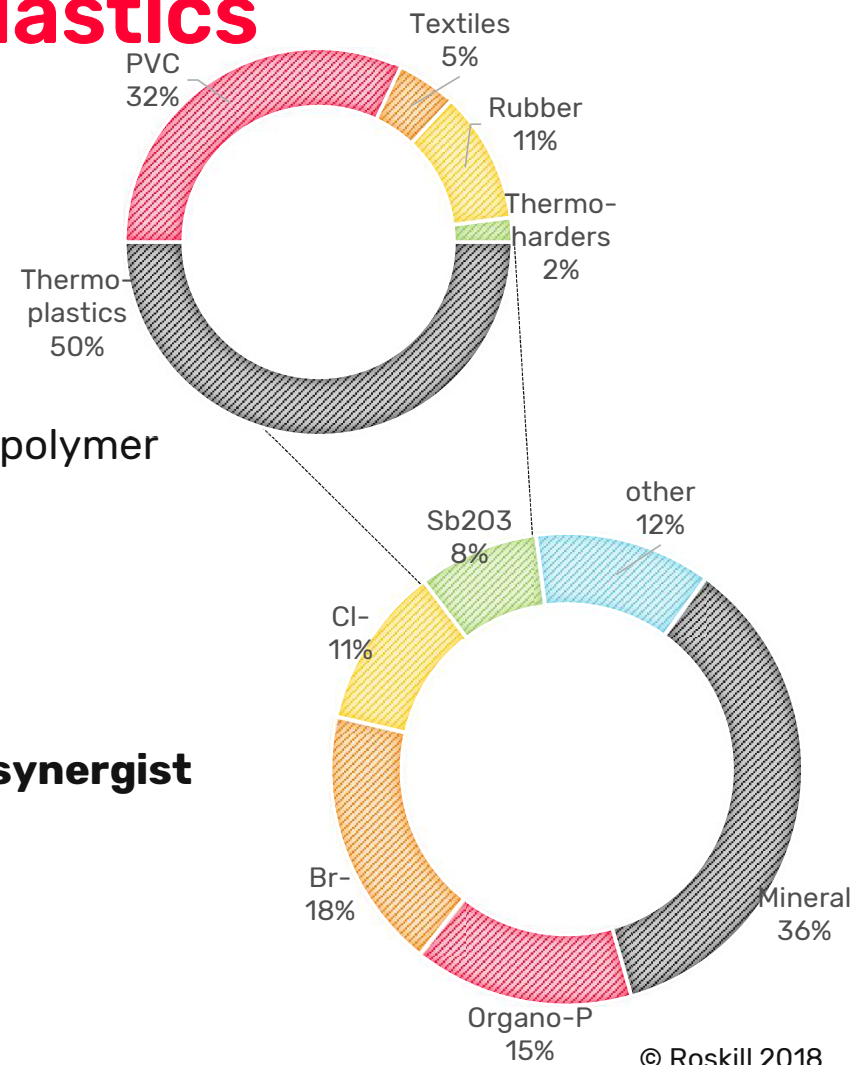
# Use of Flame Retardants in Plastics

Conventional flame retardant formulations are based on halogenated substances.

- effective in low doses / good thermal stability
- minimal impact on the physical properties of the polymer
- have a good price / performance ratio.

Flame retardancy of halogens can be boosted by the use of different synergists

- **Sb<sub>2</sub>O<sub>3</sub>/ATO** is by far the **most frequently used synergist**



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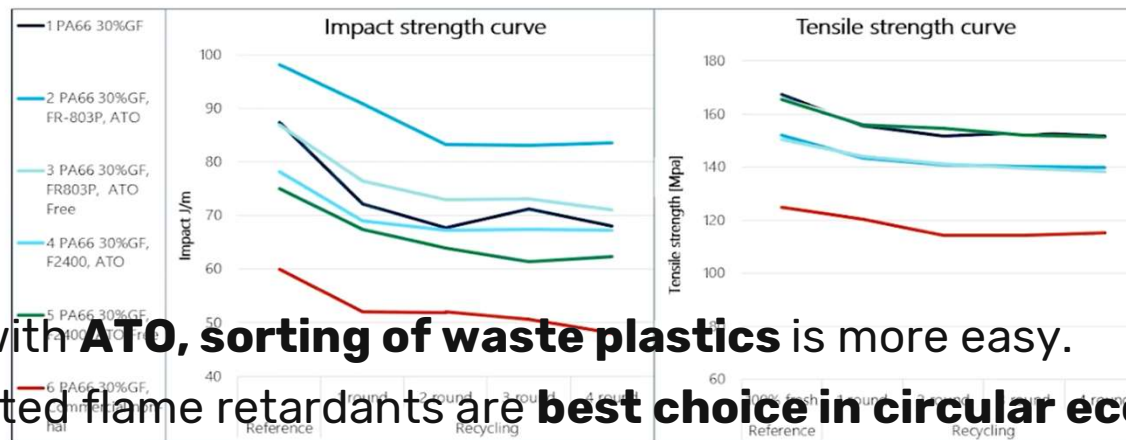




# Use of Flame Retardants in Plastics

Brominated flame retardants **keep their performance after mechanical recycling very well**

### Mechanical Recycling of PA 6.6 compounds



Source: ICL

In combination with **ATO**, **sorting of waste plastics** is more easy.  
Current Brominated flame retardants are **best choice in circular economy**  
Product tracing must help us to bring POP'BFR's into the traject of



LIFE PlasPLUS OR

PL<sup>♻️</sup>ST2bCLE<sup>♻️</sup>NED





**Sb supply chain**



# Demand Metallurgical consumption

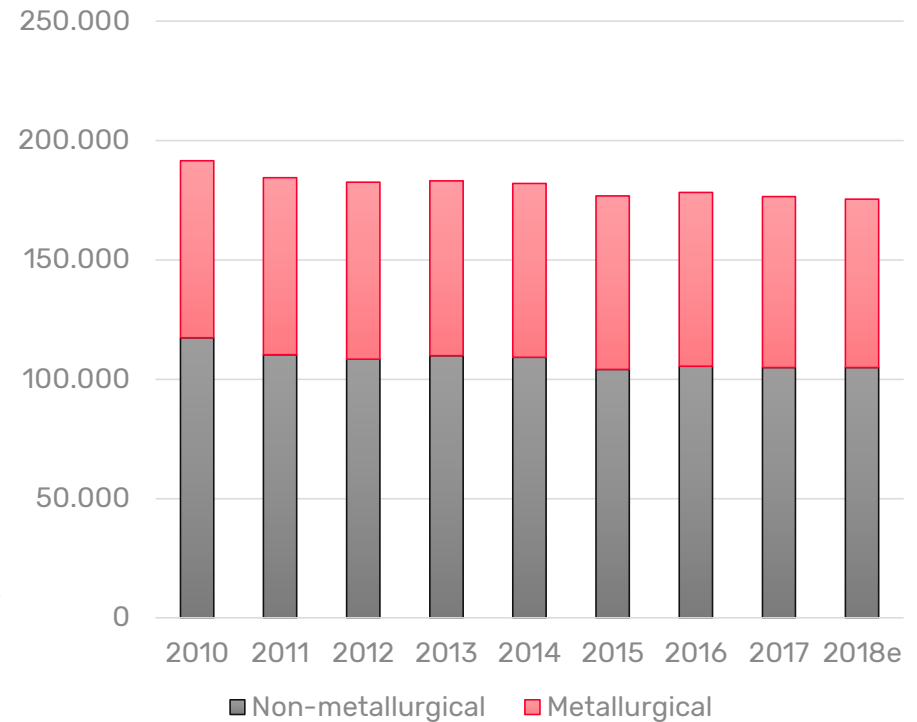


- 60 kTon / year in batteries,
- 10 kton/year 'others'

Full recycling of antimony as alloy.

Decreasing consumption due to the use of CaAl lead

Campine is the first European supplier to recycle PbSb into pure  $Sb_2O_3$



Source: Roskill

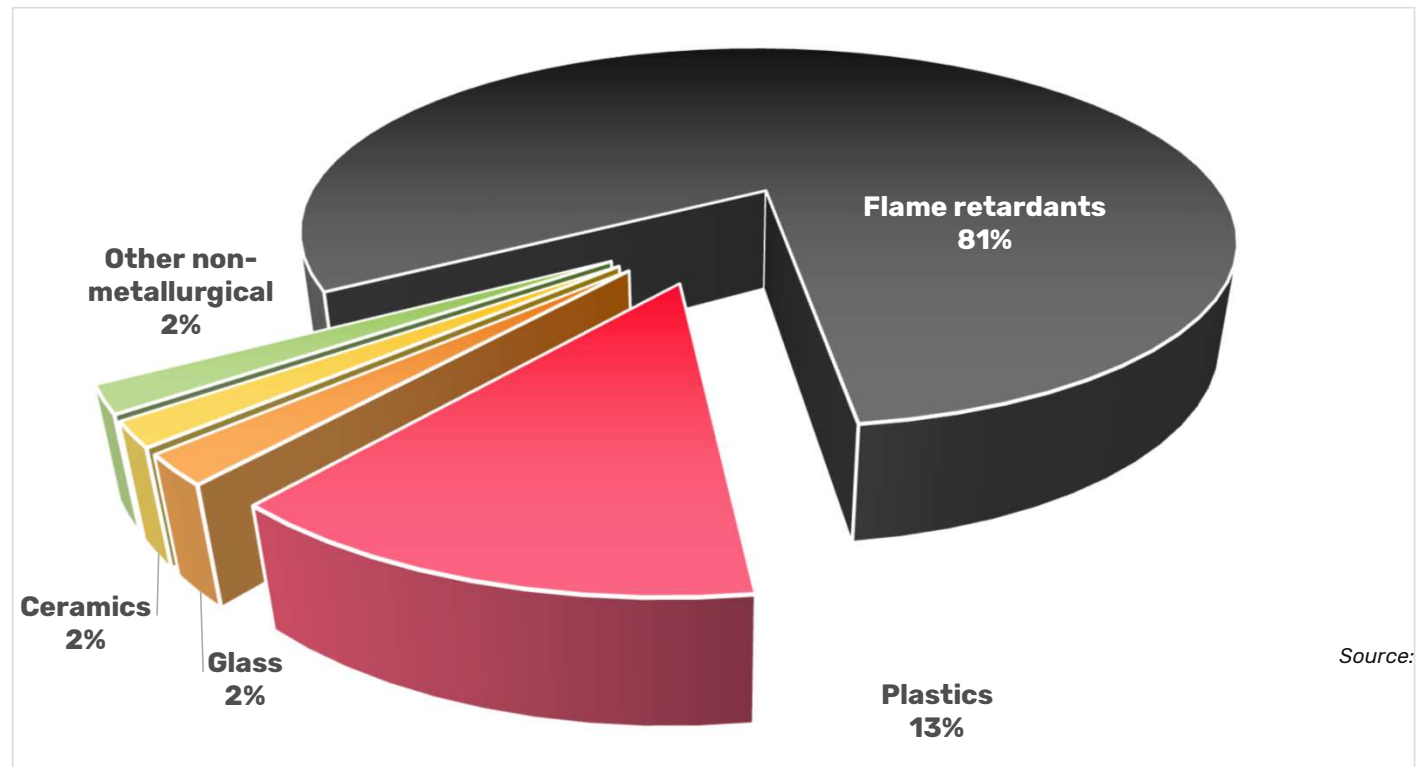


# Demand

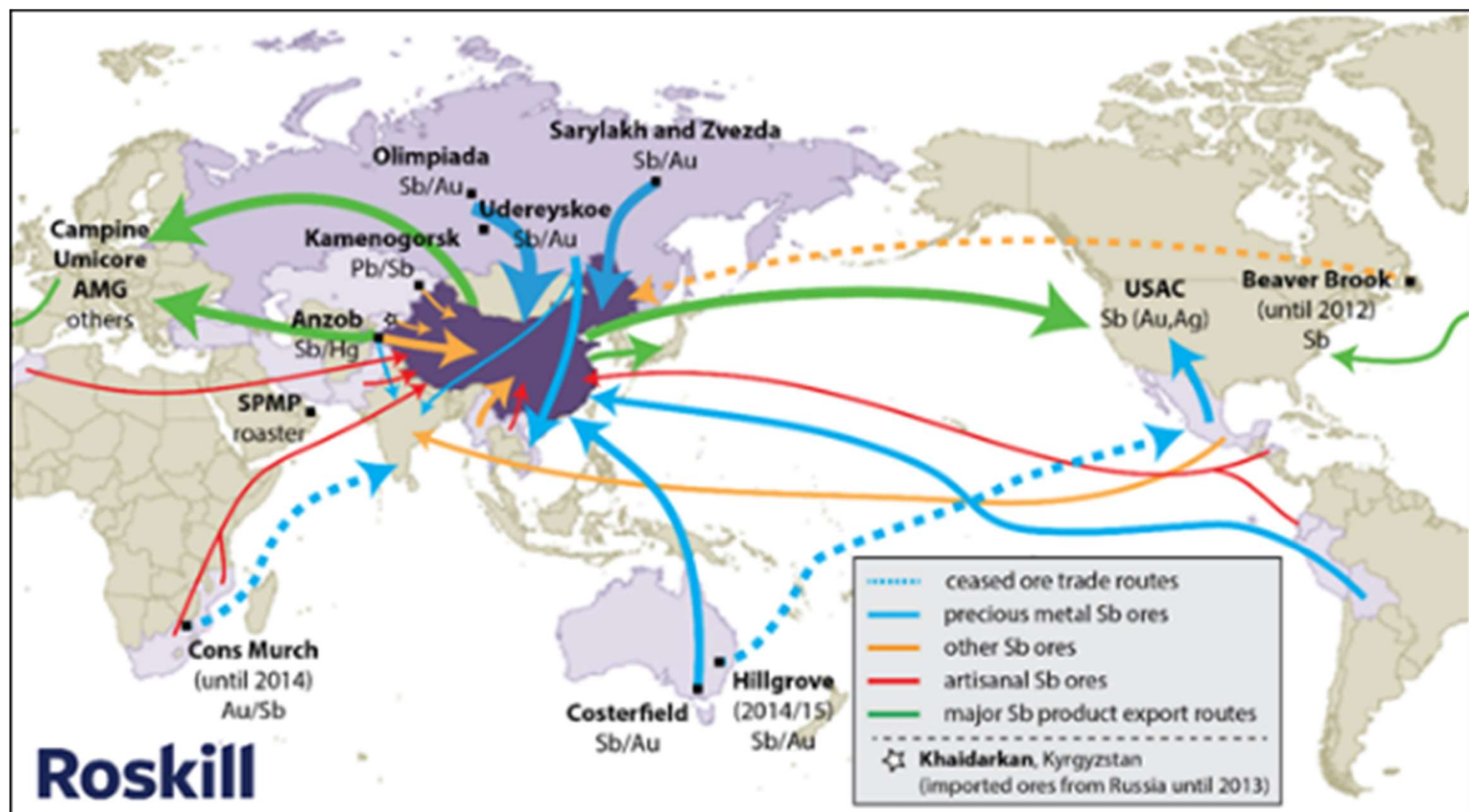
## Non metallurgical consumption



Consumption of antimony in non-metallurgical applications (t contained Sb)



Source: Roskill





# Recycling of ATO in FR applications

## **Will decrease the supply risk of Europe**

EU/USA are 100% dependent upon imports, with 80-90% of all EU/USA imports of Antimony metal coming from China.

## **Will increase the recycling rate of antimony**

– E.O.L recycling rate for Sb is estimated at 28%

## **Will increase the volume of recycled plastics**

Both  LIFE PlasPLUS and

PLST2bCLENED

Will enable to recycle ATO