Bottom Ash

How much gold is actually in it?

CEWEP WtE Congress, Bilbao, September 20th, 2018

N.V. HVC

a public waste company

- **Owned by 46 municipalities and 6 water boards**
- **Operates two WtE plants**
- **Produces 235 kton bottom ash, annually**
- **Committed to Dutch Green Deal bottom ash**

- **Partner in a joint venture, called** wASH vof POWERED BY HVC & BOSKALIS **with Boskalis Environmental which operates wet treatment of bottom ash at HVC site in Alkmaar**

Green Deal:
Implementation by

- **Produce a clean (washed) aggregate**
- **Apply it in the traditional bottom ash market**
- **Aggregate as alternative for (sea) sand**
- **Neutralize the additional operating cost by:**
  - **Maximize the metal recovery (both physically as well as financially)**

Green Deal:
Implementation by

wASH vof
POWERED BY HVC & BOSKALIS

HVC

Green Deal:
Implementation by

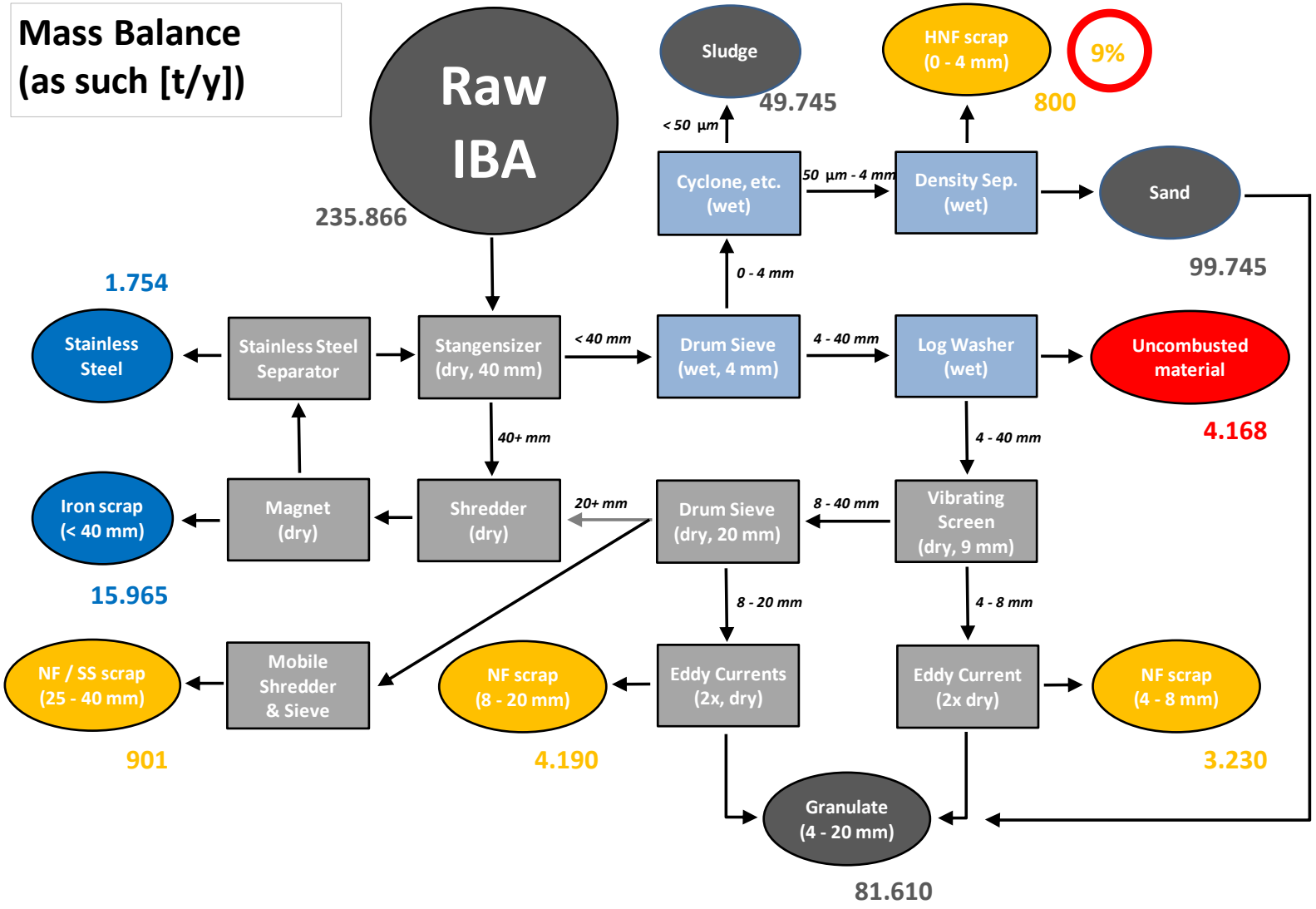
- **Dry sieving prior to parallel Eddy Currents replaced by wet sieving:**
- **(Metal) particles ‘rinsed’:**
  - **free of ash ballast**
  - **sludge and sand (< 4 mm) removed**
  - **particles less ‘sticky’**
- **Higher working efficiency existing Eddy Currents**
- **Yield raw classic NF metal concentrate increased**

Bottom Ash Treatment
from Dry to Wet….

	Dry	*Wet*
Raw Bottom Ash Input	100,0%	100,0%
Output Bottom Ash	89,4%	77,2%
Sludge Landfilled (dry basis)		9,4%
Uncombusted Material	0,8%	1,5%
Iron Scrap	**6,3%**	**6,7%**
Bulky (iron) Scrap	**0,4%**	**0,4%**
NF concentrate from Granulate	**2,6%**	**3,3%**
Stainless & 25+ NF concentrate	**0,5%**	**1,1%**
HNF from Sand		**0,3%**
Overall Yield Metals	**9,8%**	**11,85%**

Overall Mass Balance

Mass Balance (as such [t/y])



Maximize Financial yield

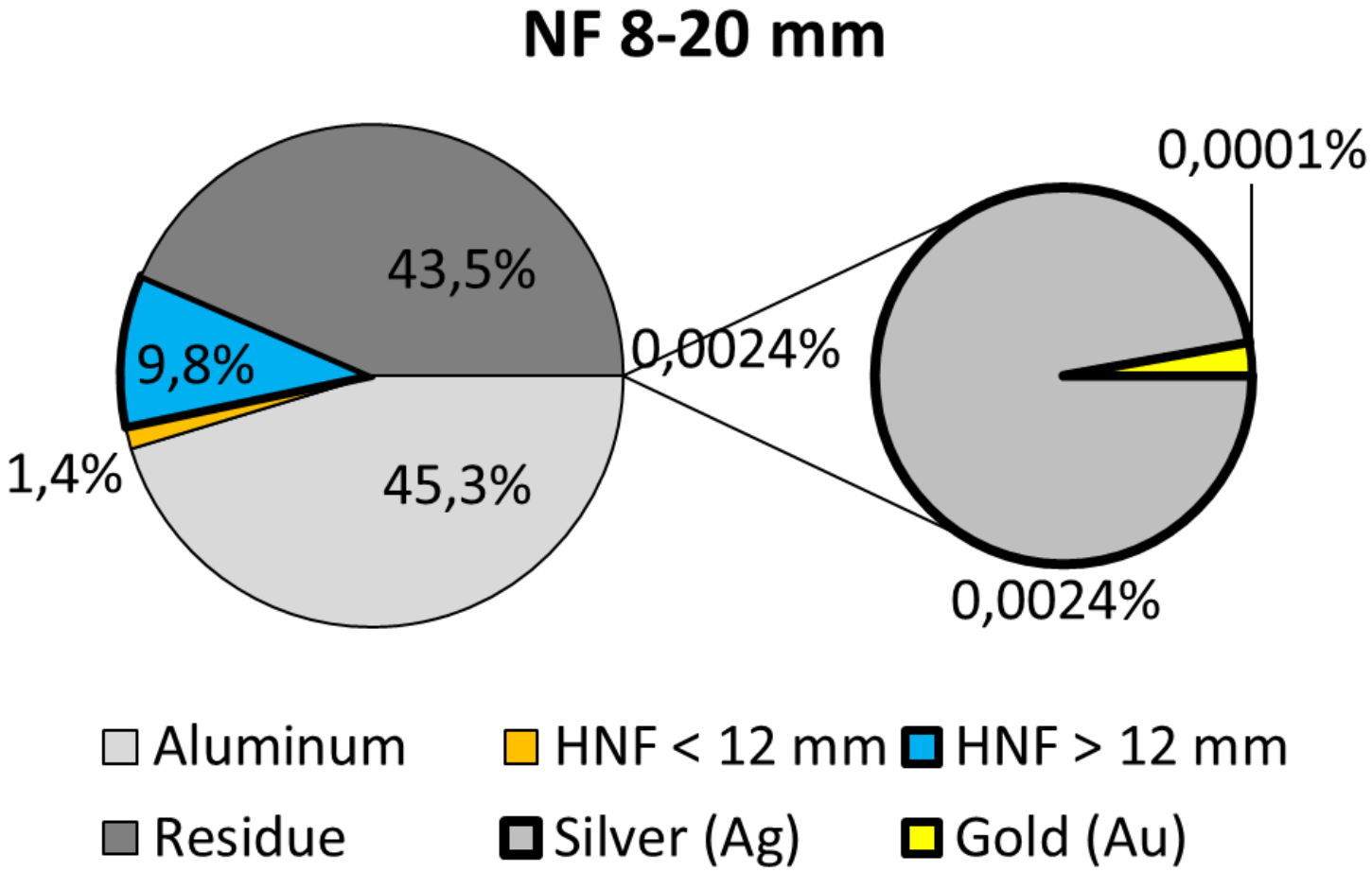
- Sell NF concentrate to various sink-float companies
- Compare reported levels of LNF and HNF concentrate
- Request an analysis of PM in HNF concentrate
- Redirect fine fraction of HNF conc. to smelters
- Let smelter report results directly to yourself
- Sell fine HNF conc. to various smelter companies
- Compare reported levels HNF and PM
- Learn the impact of PM on HNF concentrate value……

NF concentrate (8 – 20 mm)

(to sink-float operator)

NF concentrate (8 – 20 mm)

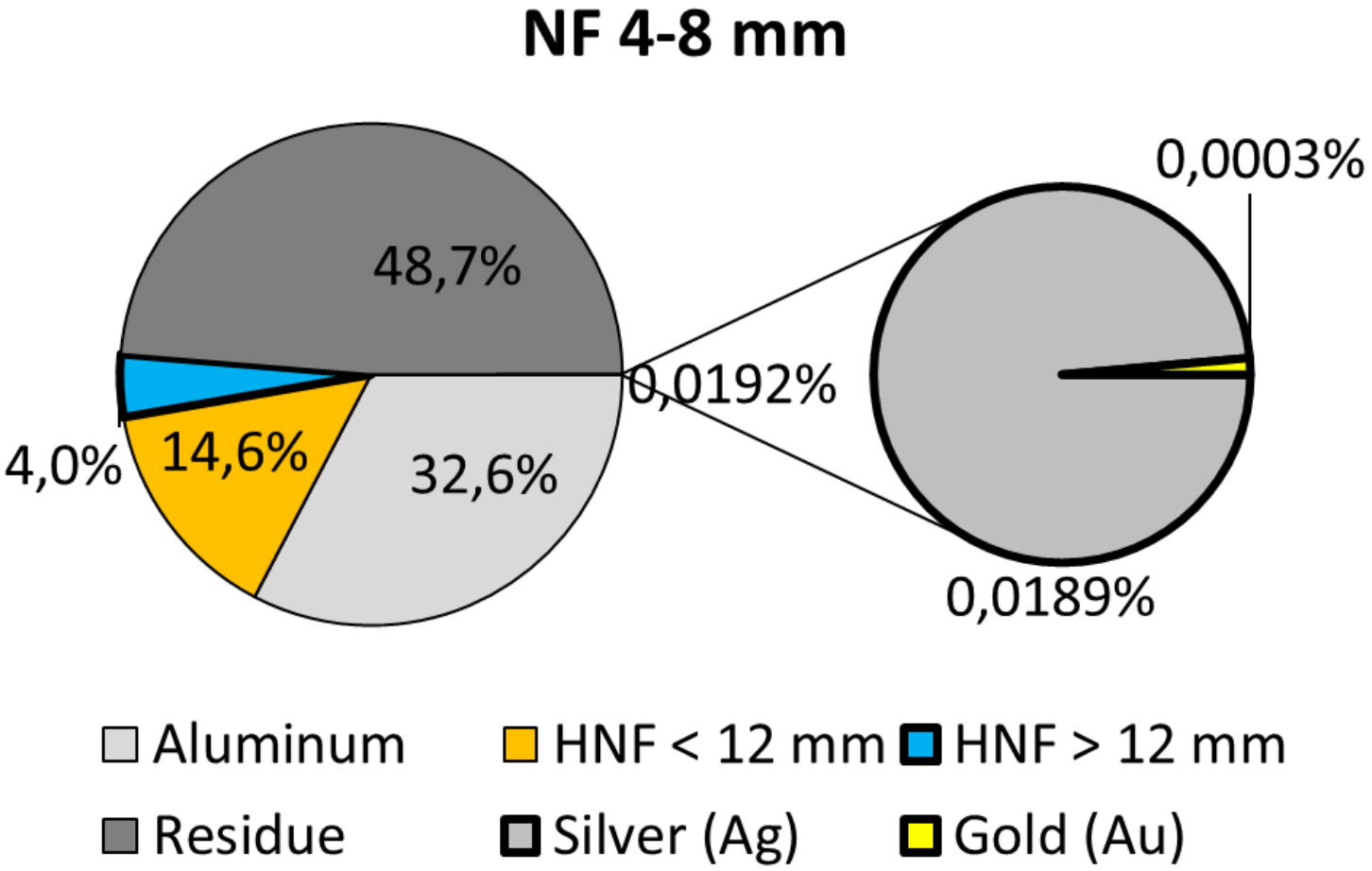
(as reported by sink-float operators)



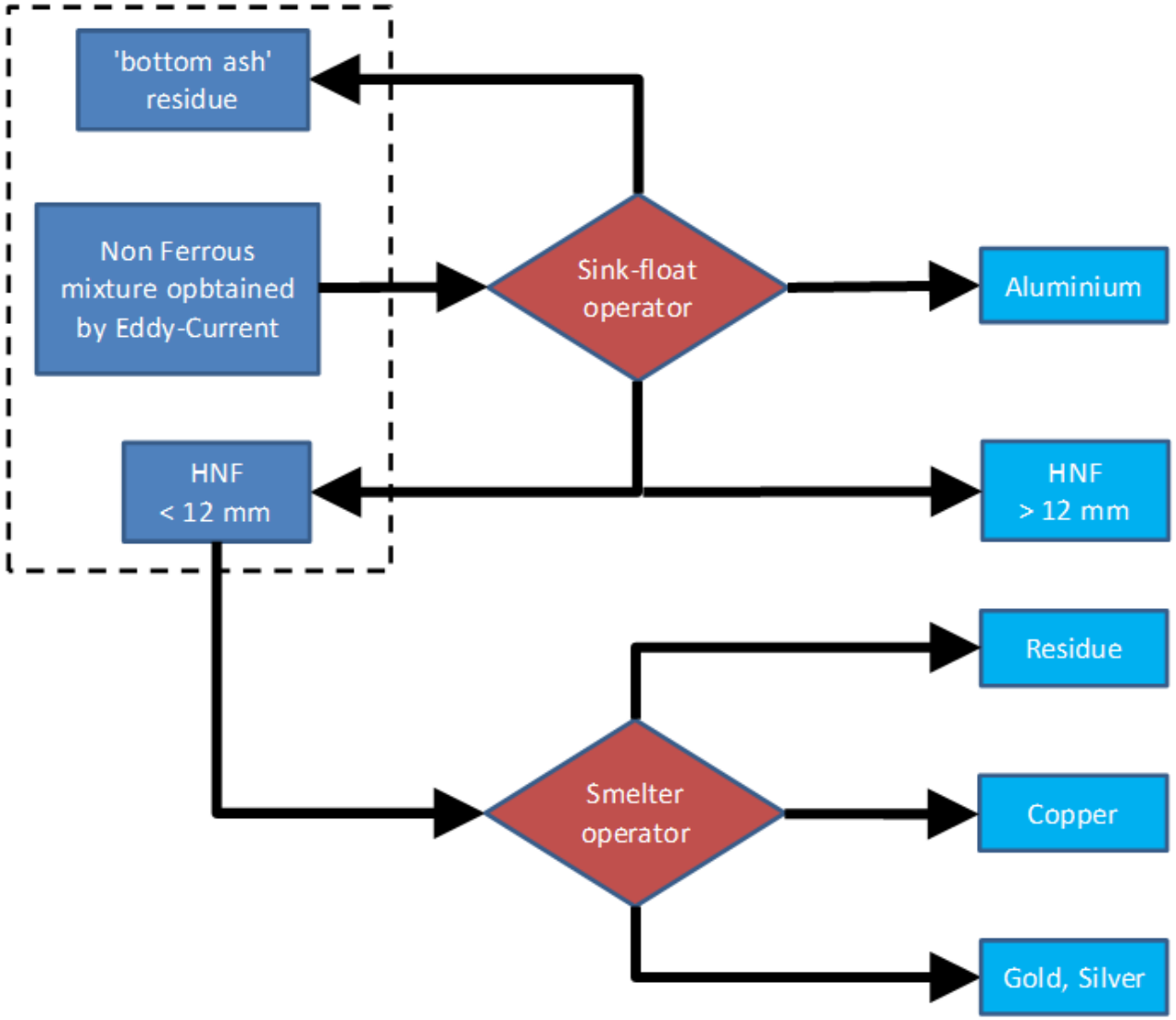
NF concentrate (4 – 8 mm)

(to sink-float operator)

NF concentrate (4 – 8 mm)
(as reported by sink-float operators)

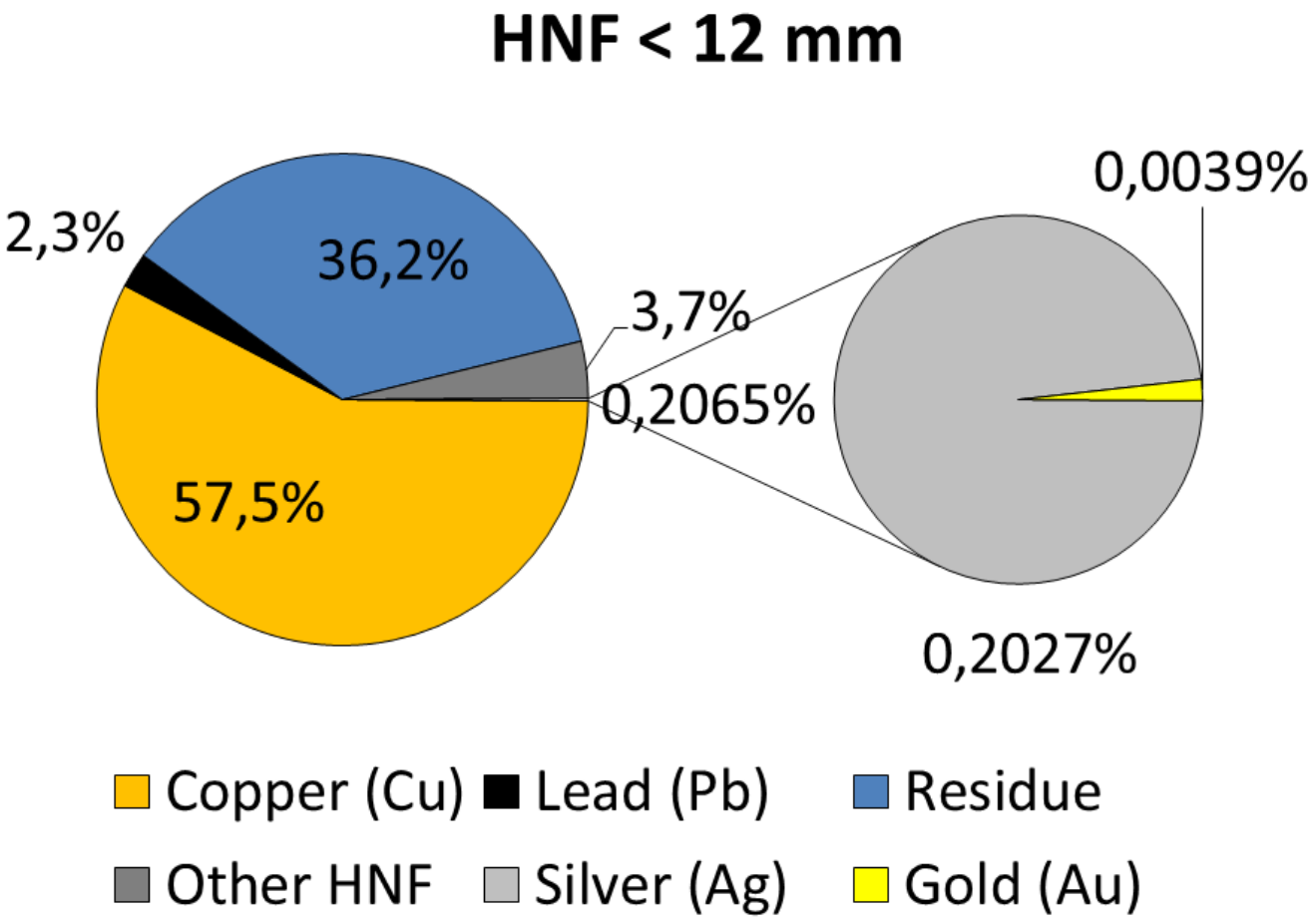


HNF (<12 mm), sink-float (1)



HNF (<12 mm), sink-float (2)

as reported by smelters directly

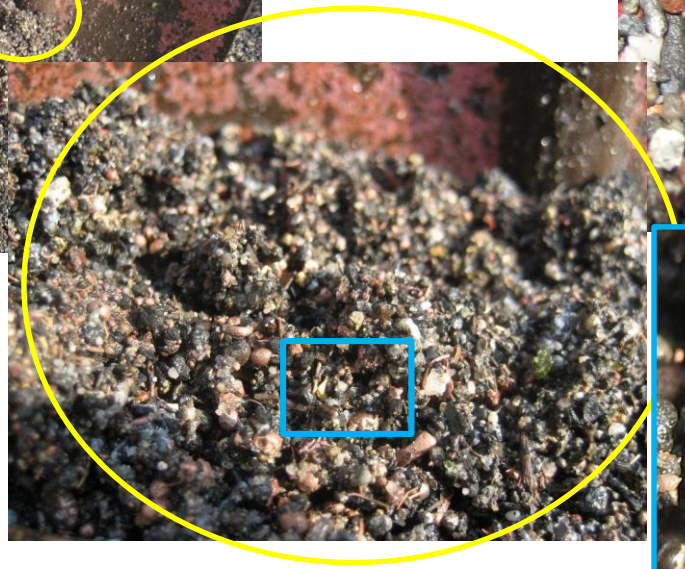


Wet Density Separation (1)

Fines (< 4 mm) are separated into:

- **Sludge (< 63 µm), to be landfilled**
- **Sand (> 63 µm and < 4 mm)**
- **Mining sand based on density separation**
- **HNF concentrate recovered**
- **LNF concentrate not recovered**

Wet Density Separation (2)



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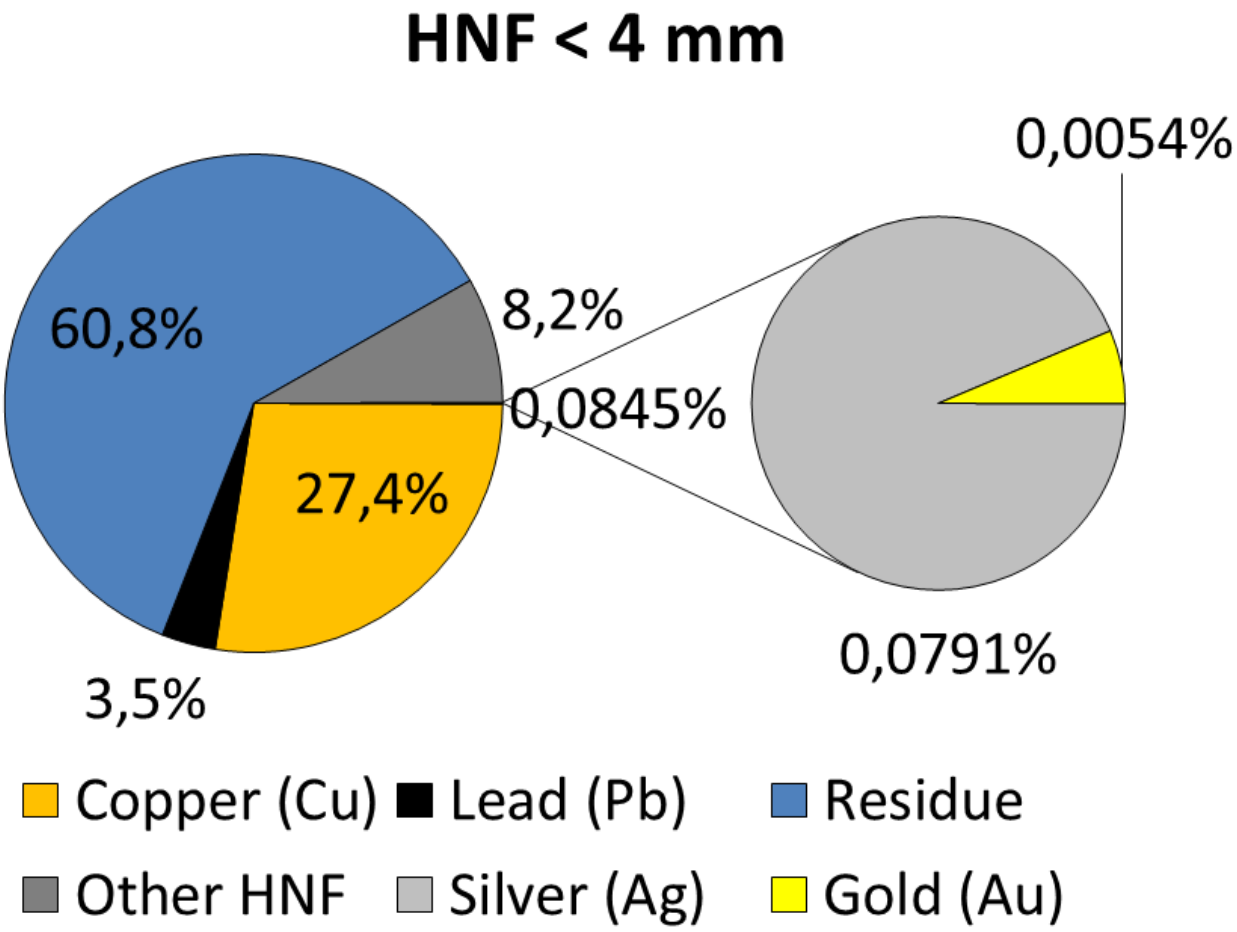
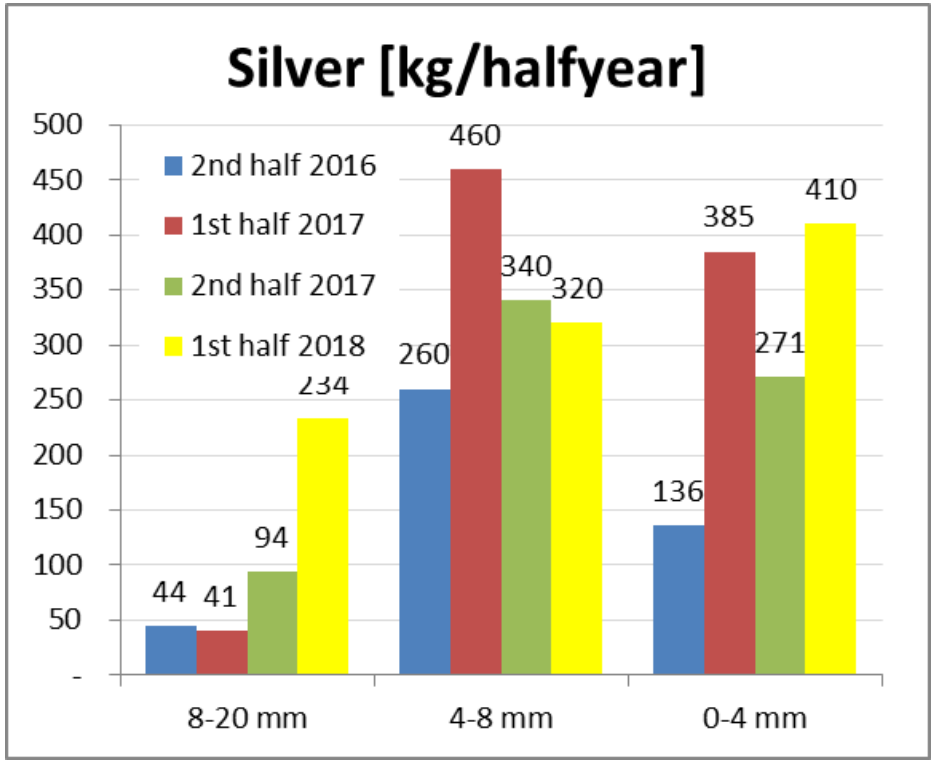
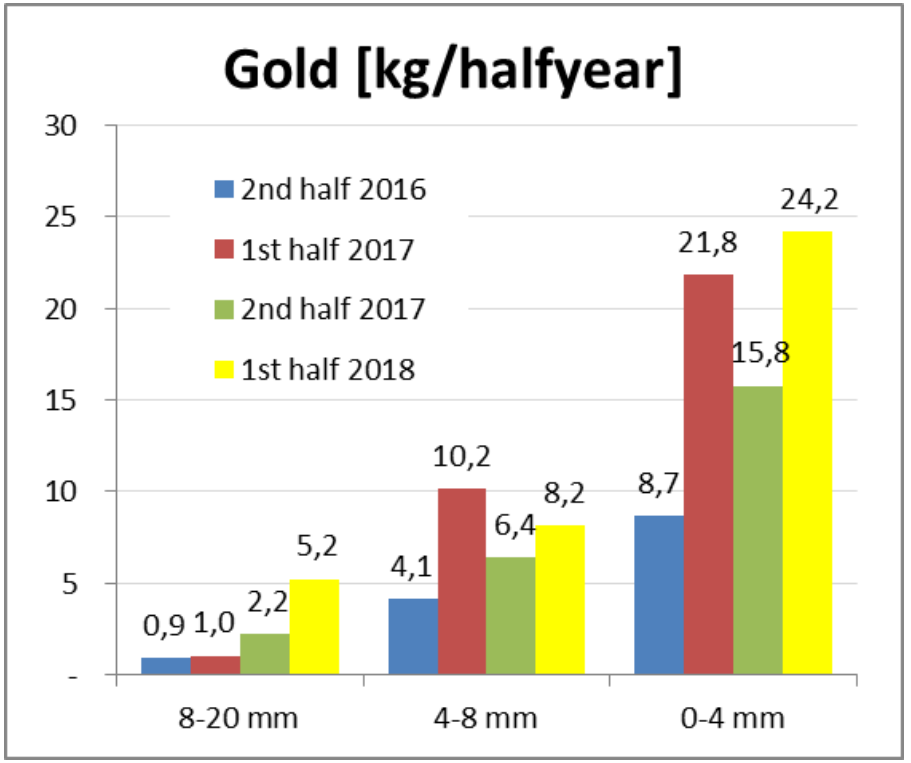
Wet Density Separation (3)

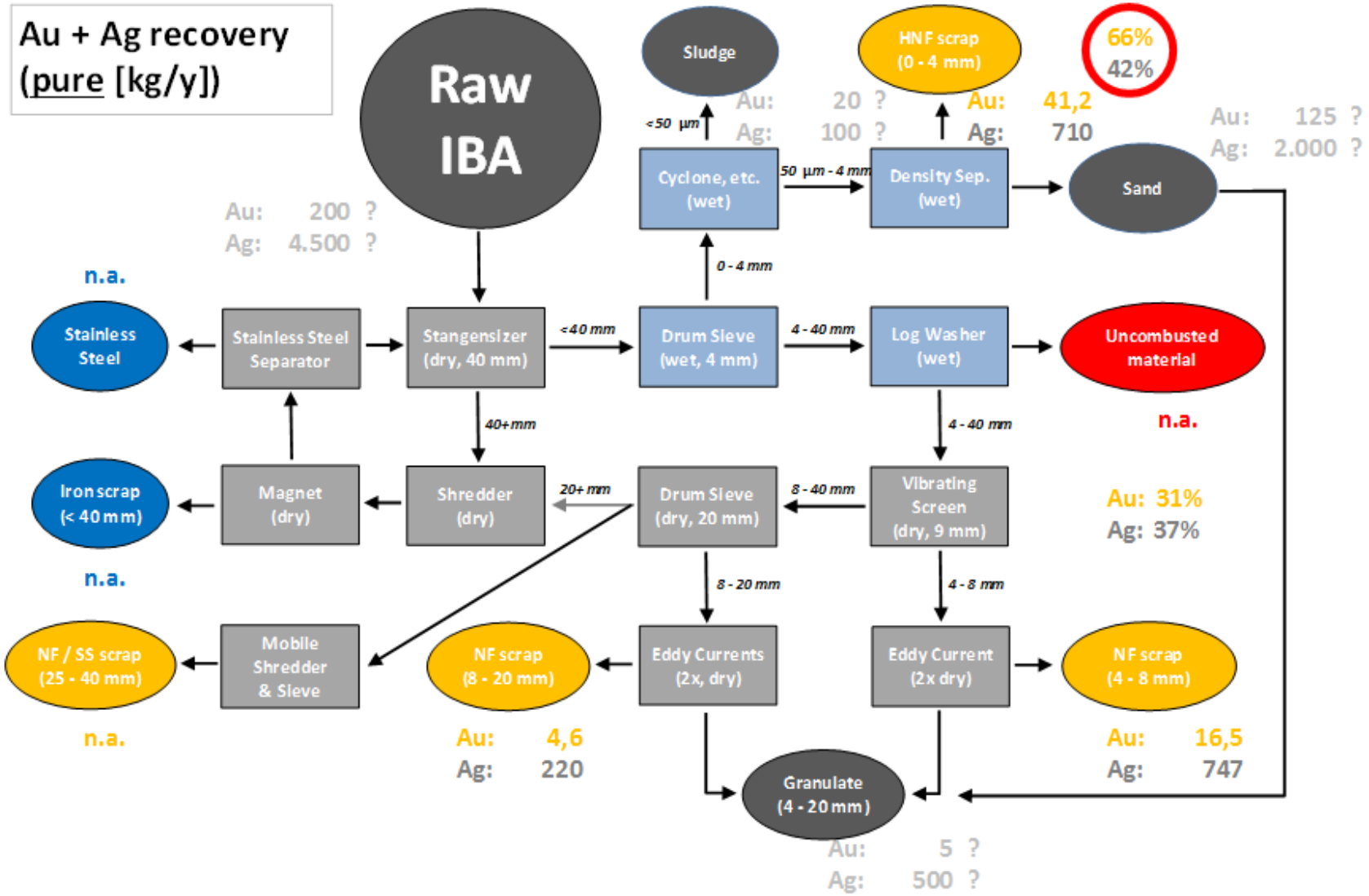


Overall picture, in 2 years

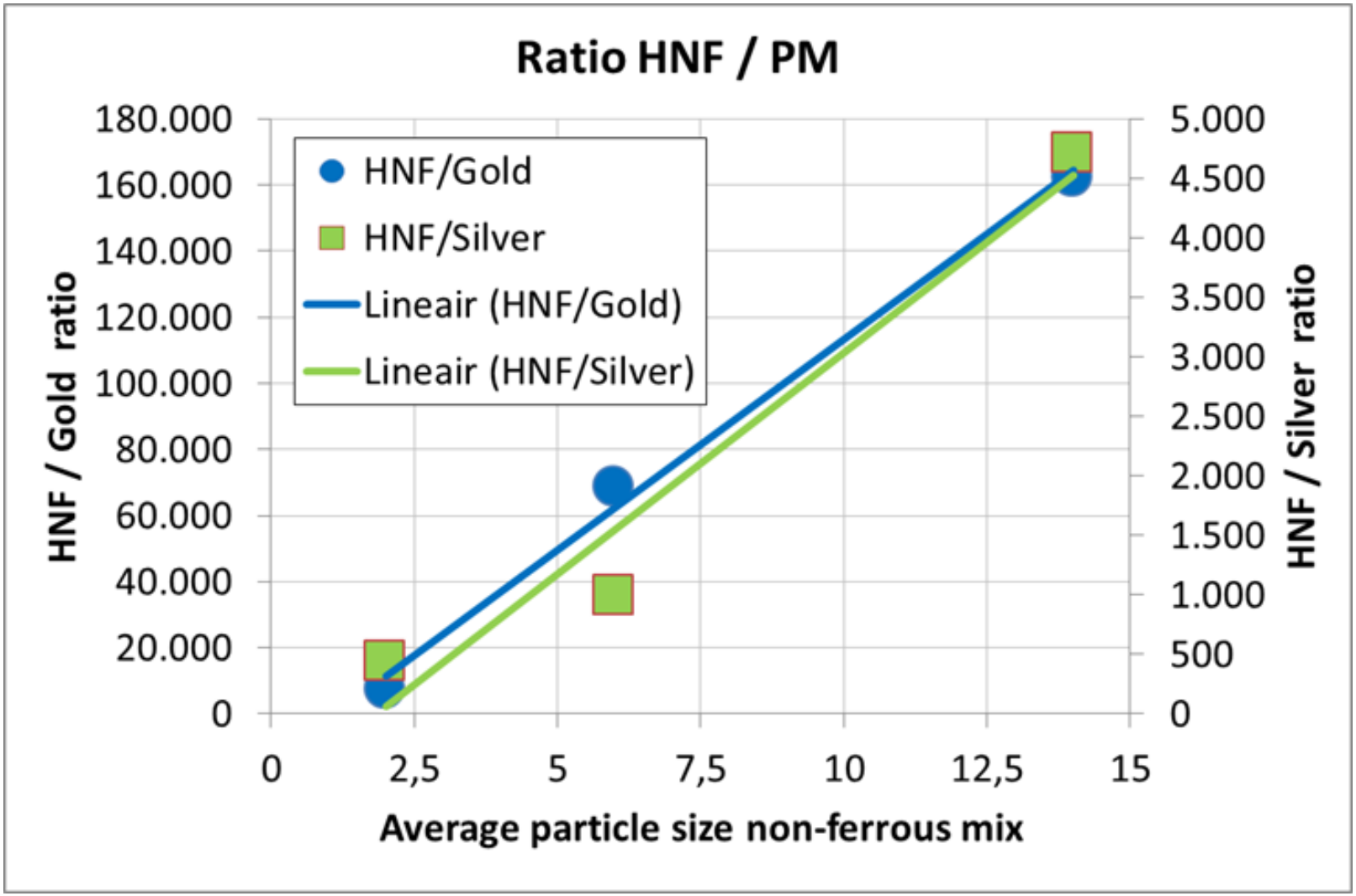




Overall PM Balance



Source of PM, Electronics?



Thanks for your attention!

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