



EU advances on WTE metal recovery



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WTER 2014 bi-annual meeting
October 9-10, 2014 – New York City

Contents

- 1. Resource recovery**
- 2. MARTIN dry bottom ash discharge system**
- 3. Processing of dry-discharged bottom ash**
- 4. Refining of metals**
- 5. Additional technologies**
- 6. Conclusions / Future prospects**

Resource recovery – Bottom ash resources

Ferrous Metals



Non - Ferrous Metals



Copper Coil



Stainless Steel



Minerals



Glass



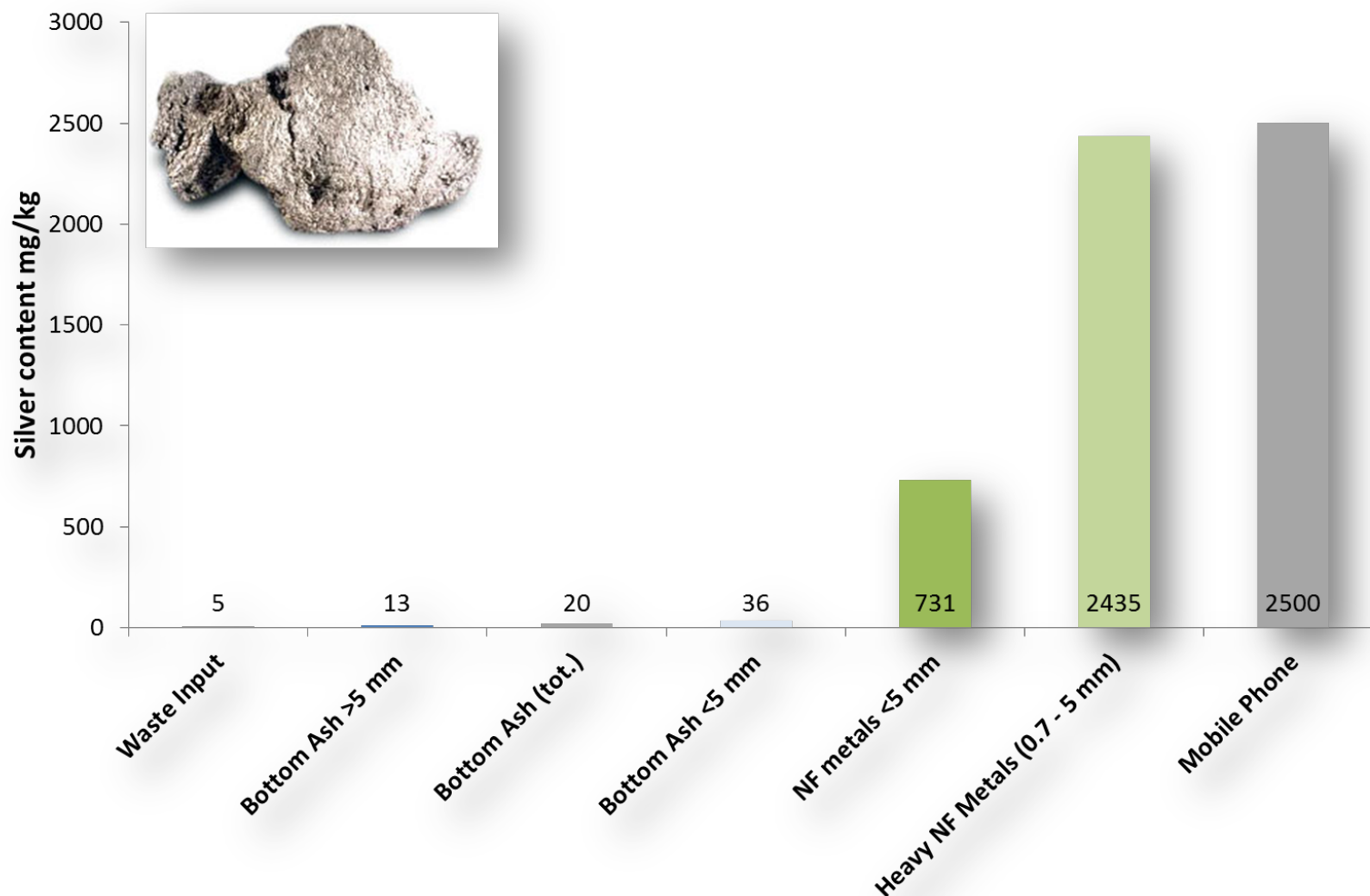
Precious Metals



Rare Earth Elements

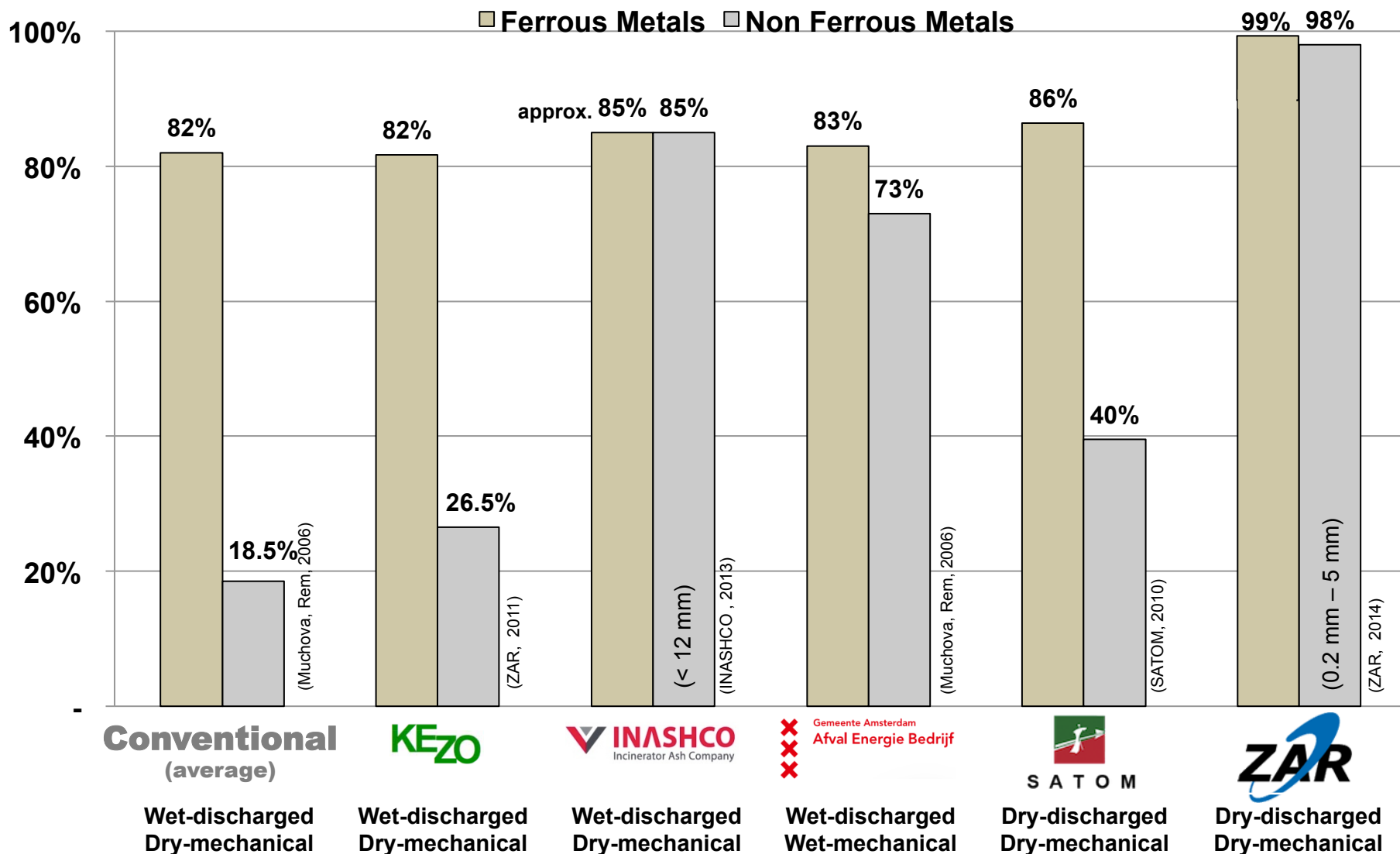


Resource recovery – Bottom ash content

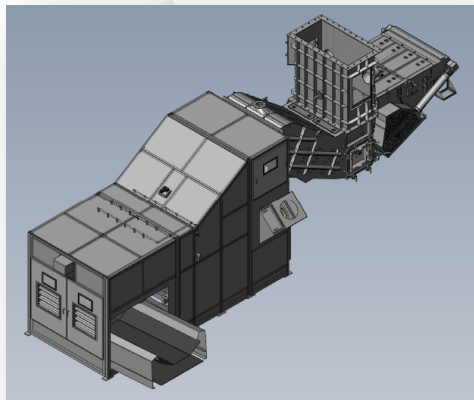
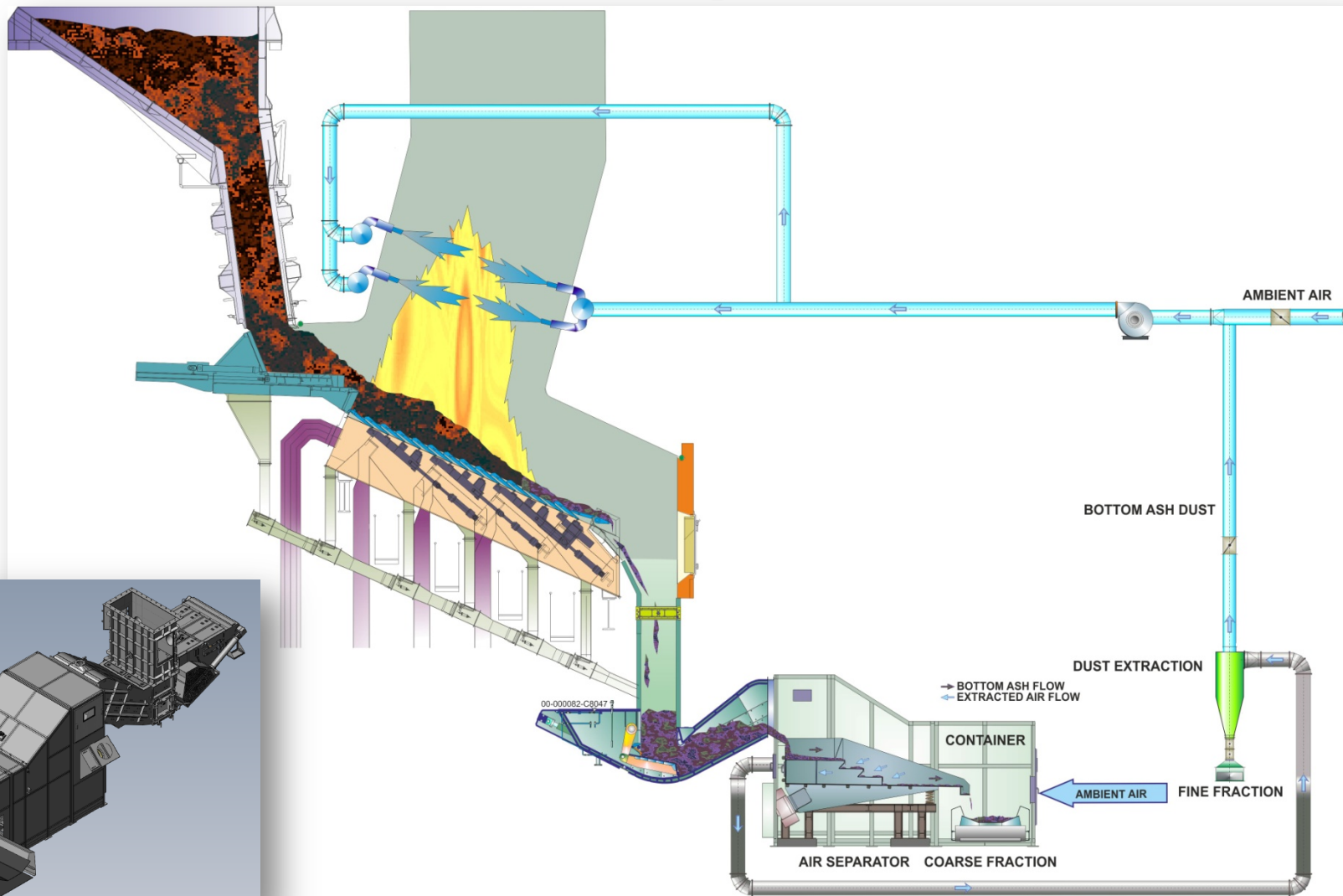


Source: Morf, AWEL, CH

Resource recovery – Metal recovery efficiency of different bottom ash processing concepts



MARTIN dry bottom ash discharge system – Concept



MARTIN dry bottom ash discharge system – Bottom ash fractions



Coarse fraction > 1 mm

metal enriched
material recovery

Fine fraction < 1 mm

nearly metal-free
material recovery
high mineral content



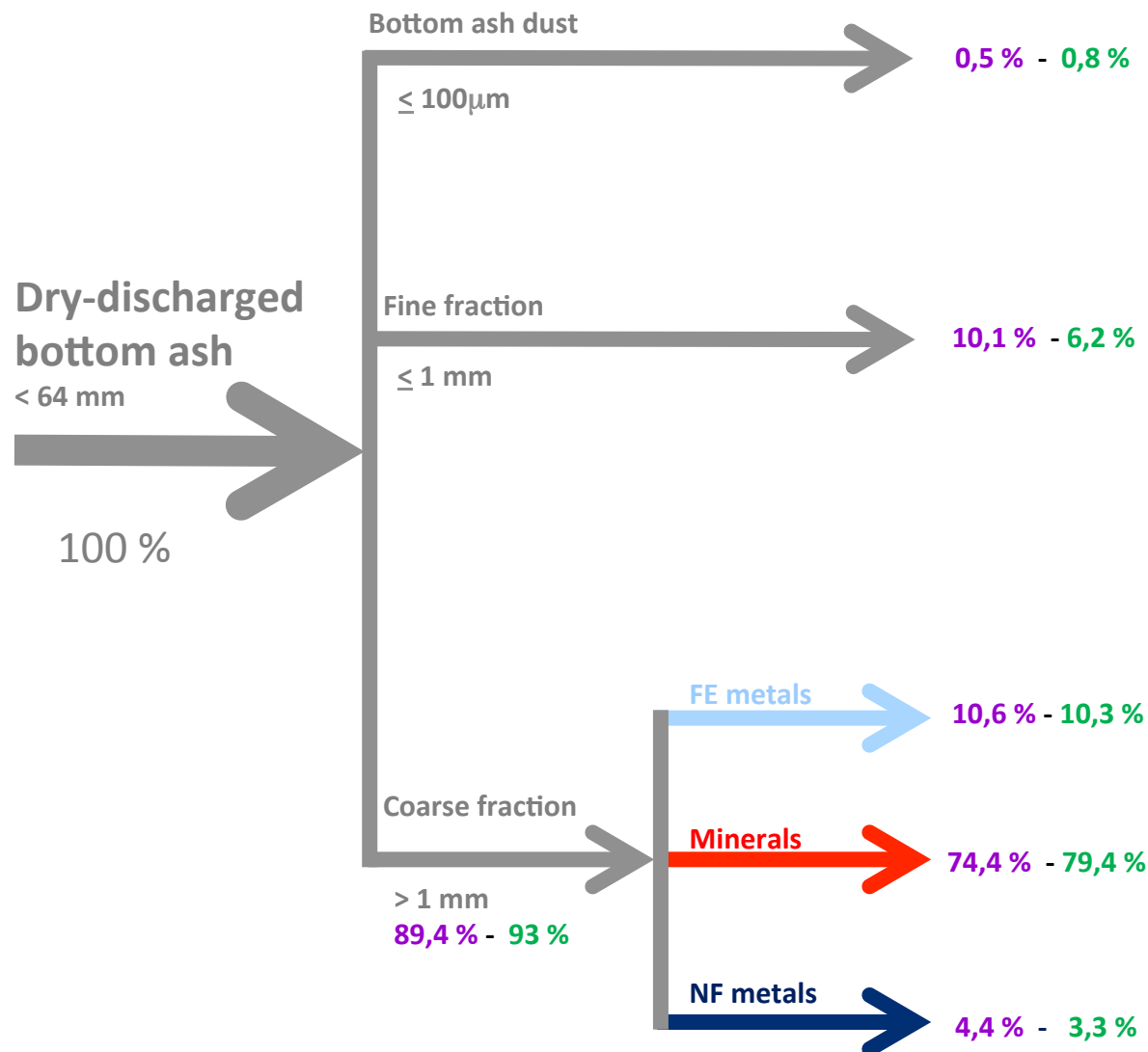
Source: SATOM Monthey, CH



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MARTIN dry bottom ash discharge system – Mass balance SATOM Monthey, CH

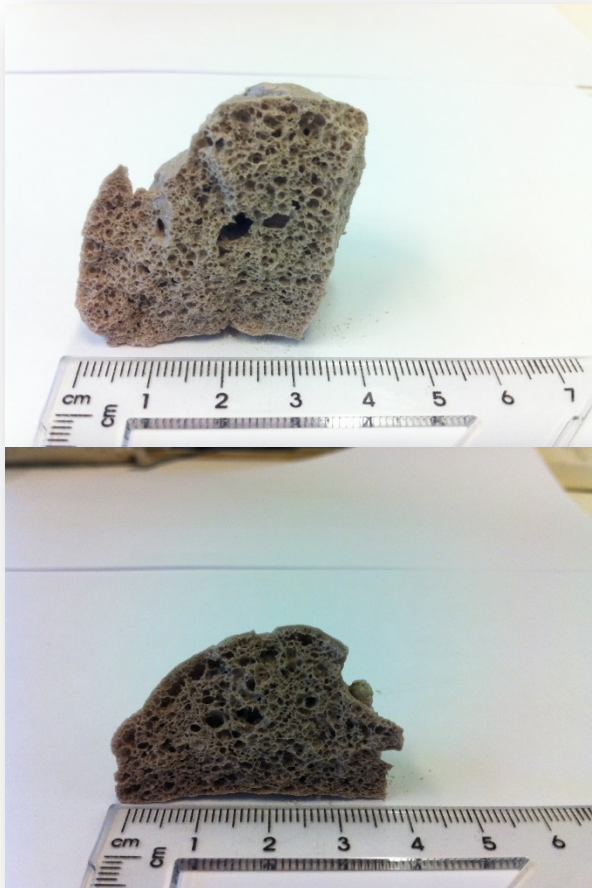


**Great influence
of waste input!**

Source: SATOM Monthey, CH

MARTIN dry bottom ash discharge system – Ceramics manufactured from fine fraction

Ceramic tile production



Production of foamed material

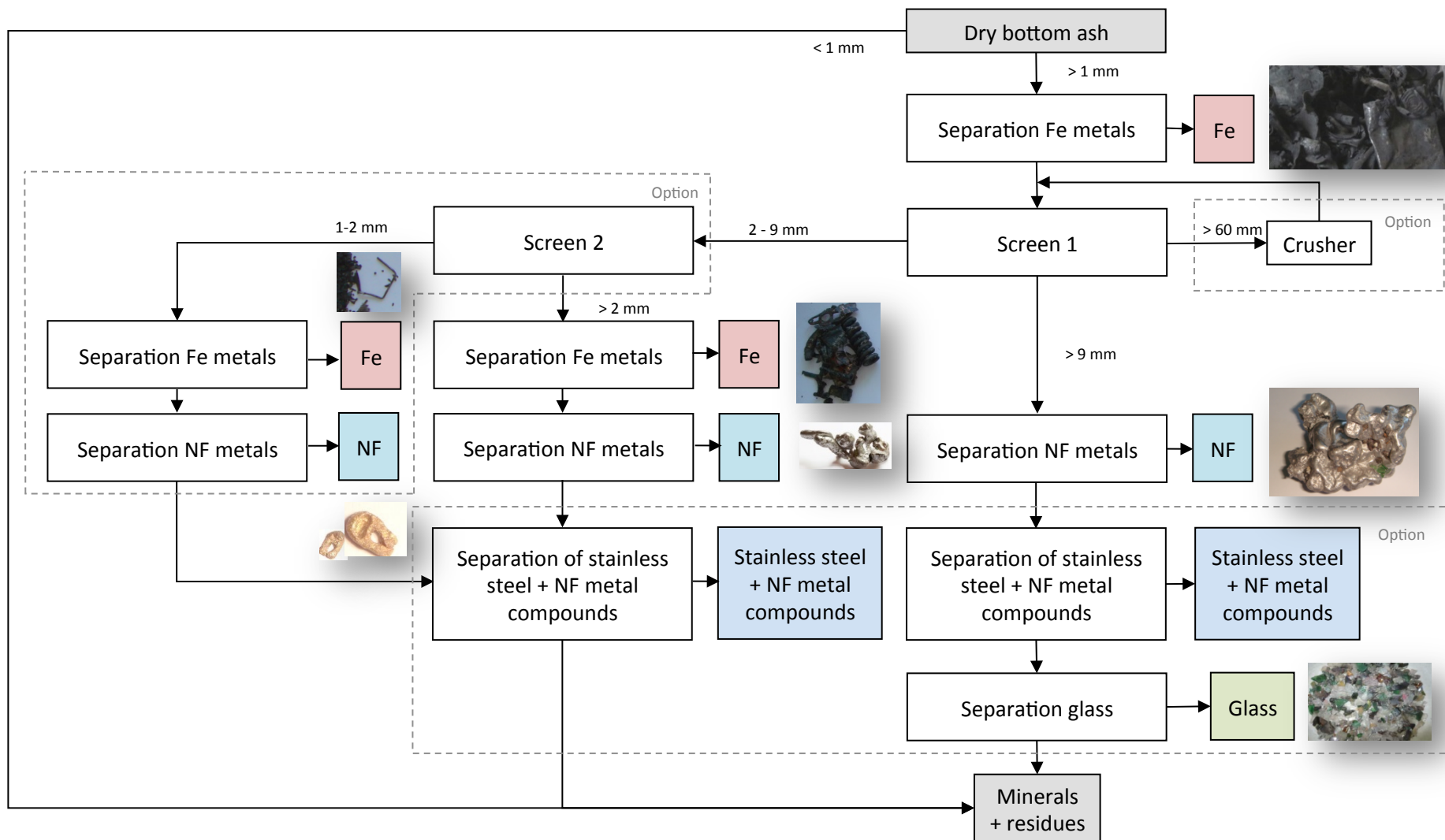
Imperial College
London



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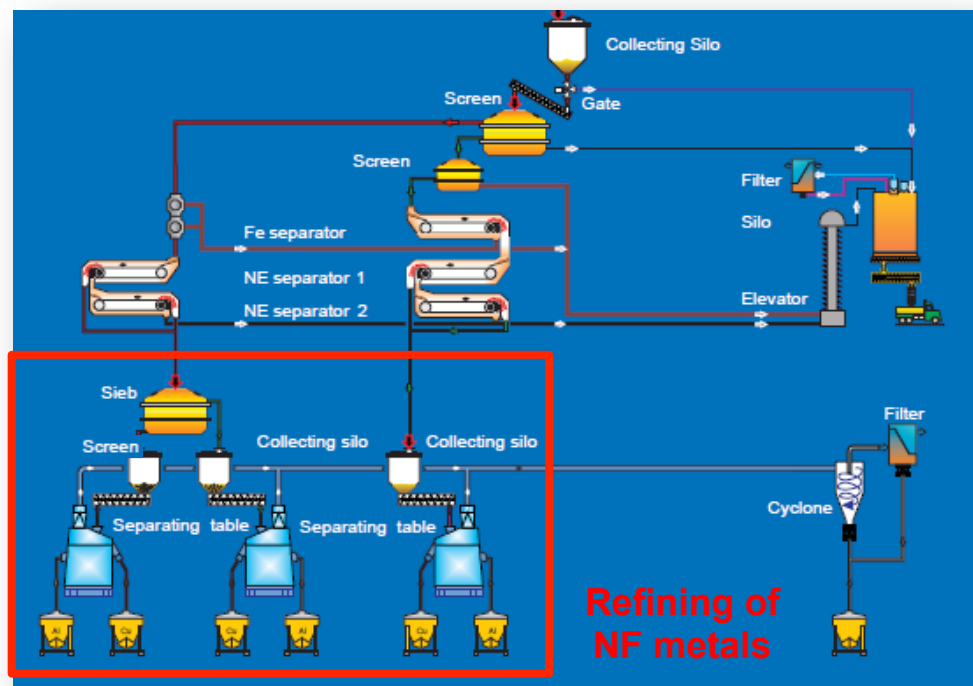
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Processing of dry-discharged bottom ash – Concept on-site processing facility



Processing of dry-discharged bottom ash – NF metals of fine fraction

- **Steel industry** (low contamination)
- **Metal smelting** (metal enrichment / refinement)
- **Production processes** (metal enrichment / refinement)



NF metal processing

1.0 - 5.0 mm

NF fine fractions processing

0.2 - 1.0 mm

On-site processing of sieved fine fraction < 5 mm

Source: ZAR, CH

Processing of dry-discharged bottom ash – NF metals of sieved fine fraction



Light NF metals
Aluminum



Heavy NF metals
Copper, brass etc.

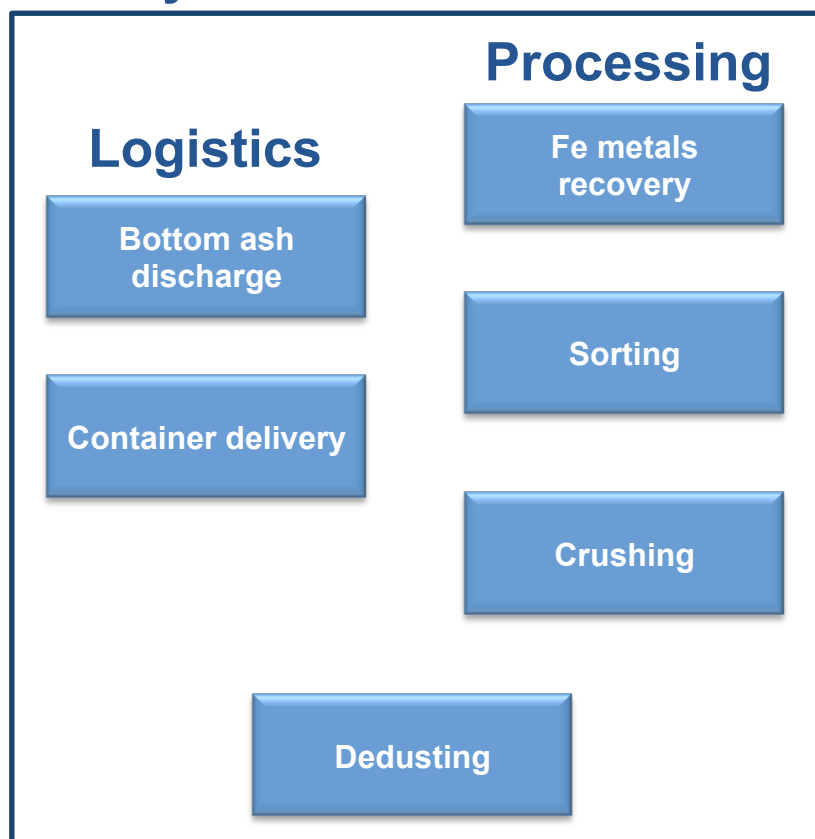


Eddy current separator 3. generation
Efficiency start 62 % / actual > 98 %

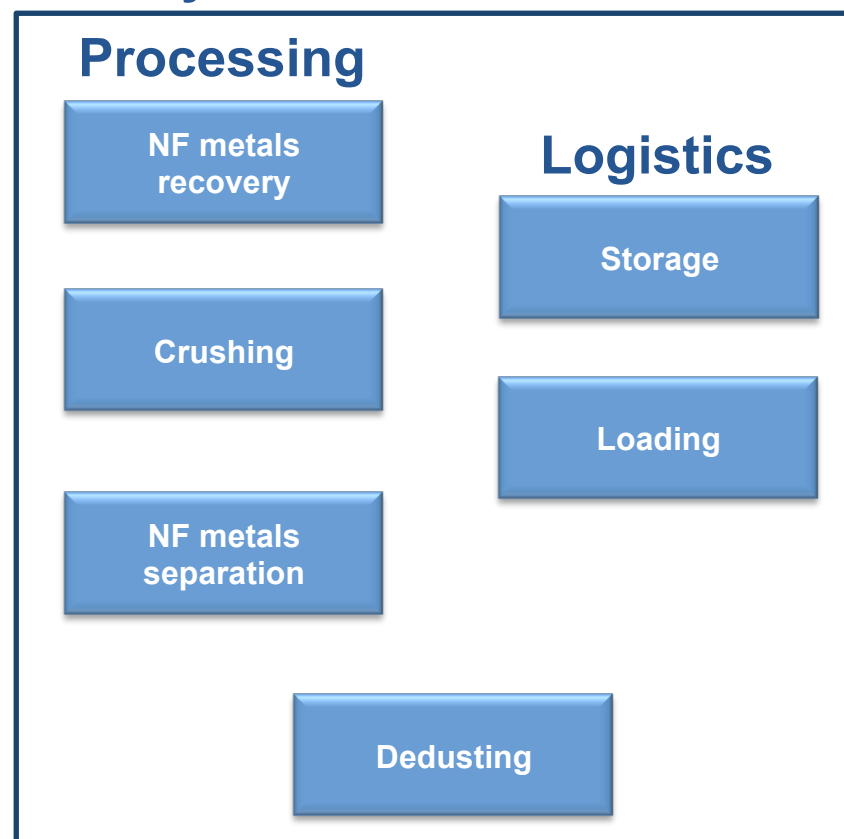
Source: ZAR, CH

Processing of dry-discharged bottom ash – ZAV bottom ash processing facility

Processing facility
dry bottom ash > 80 mm



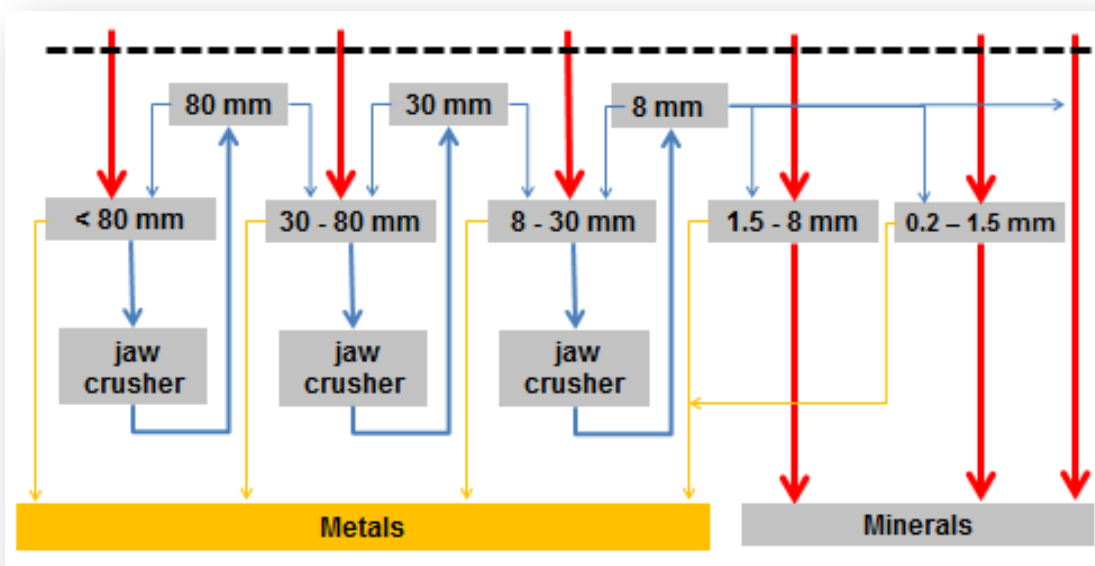
Processing facility
dry bottom ash < 80 mm



Refining steps included

Source: ZAV, CH

Processing of dry-discharged bottom ash – ZAV bottom ash processing facility



**Selective size reduction
of bottom ash**

Material flows

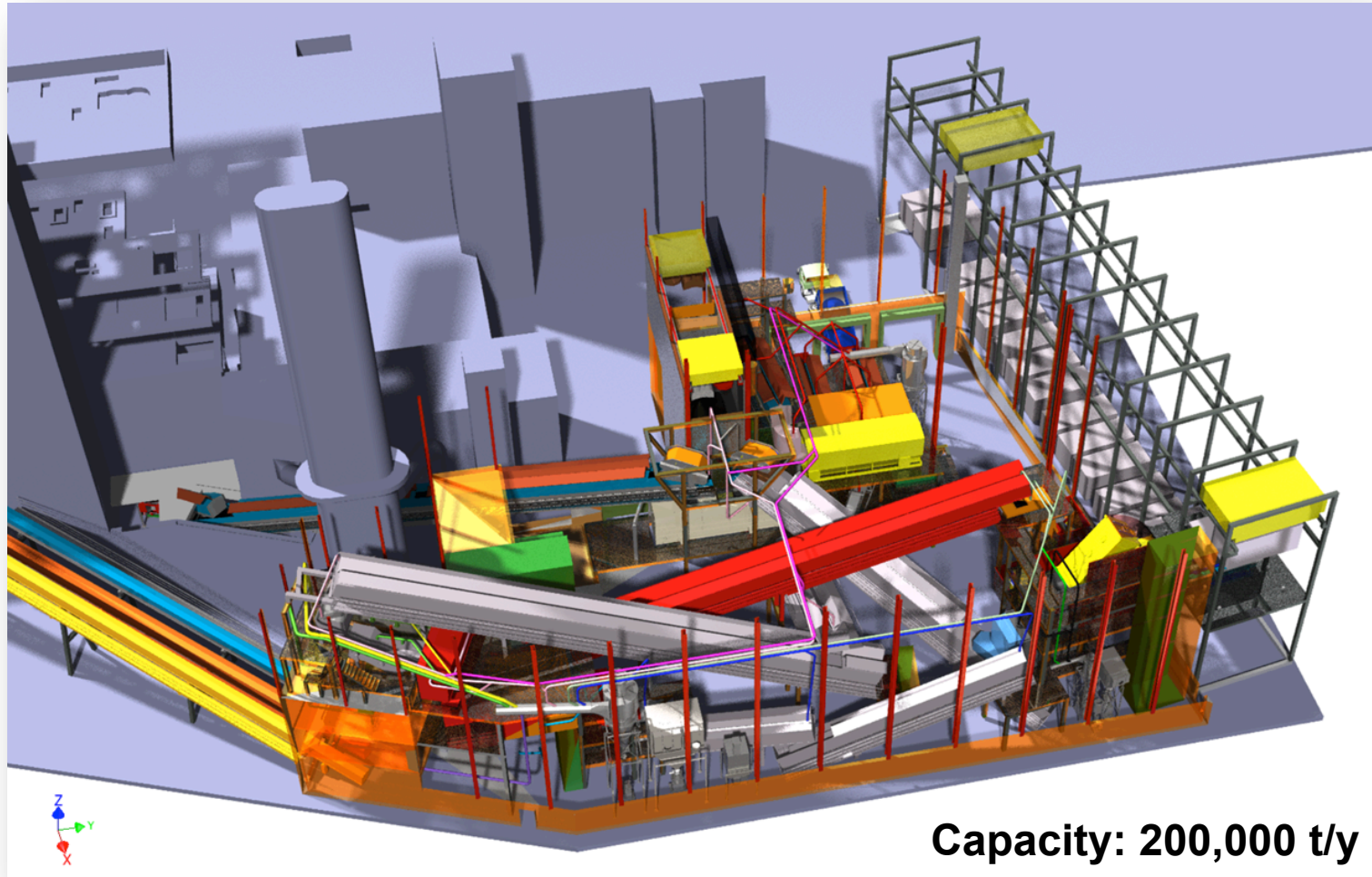
Fe metals	
NF metals	< 8 mm
Stainless steel	> 8 mm
Glass	8 - 30 mm
Mineral fractions	

Guaranteed recovery rates (metallic material)

Fe metals	> 98 %
Aluminum	> 95 %
Copper	> 90 %

Source: ZAV, CH

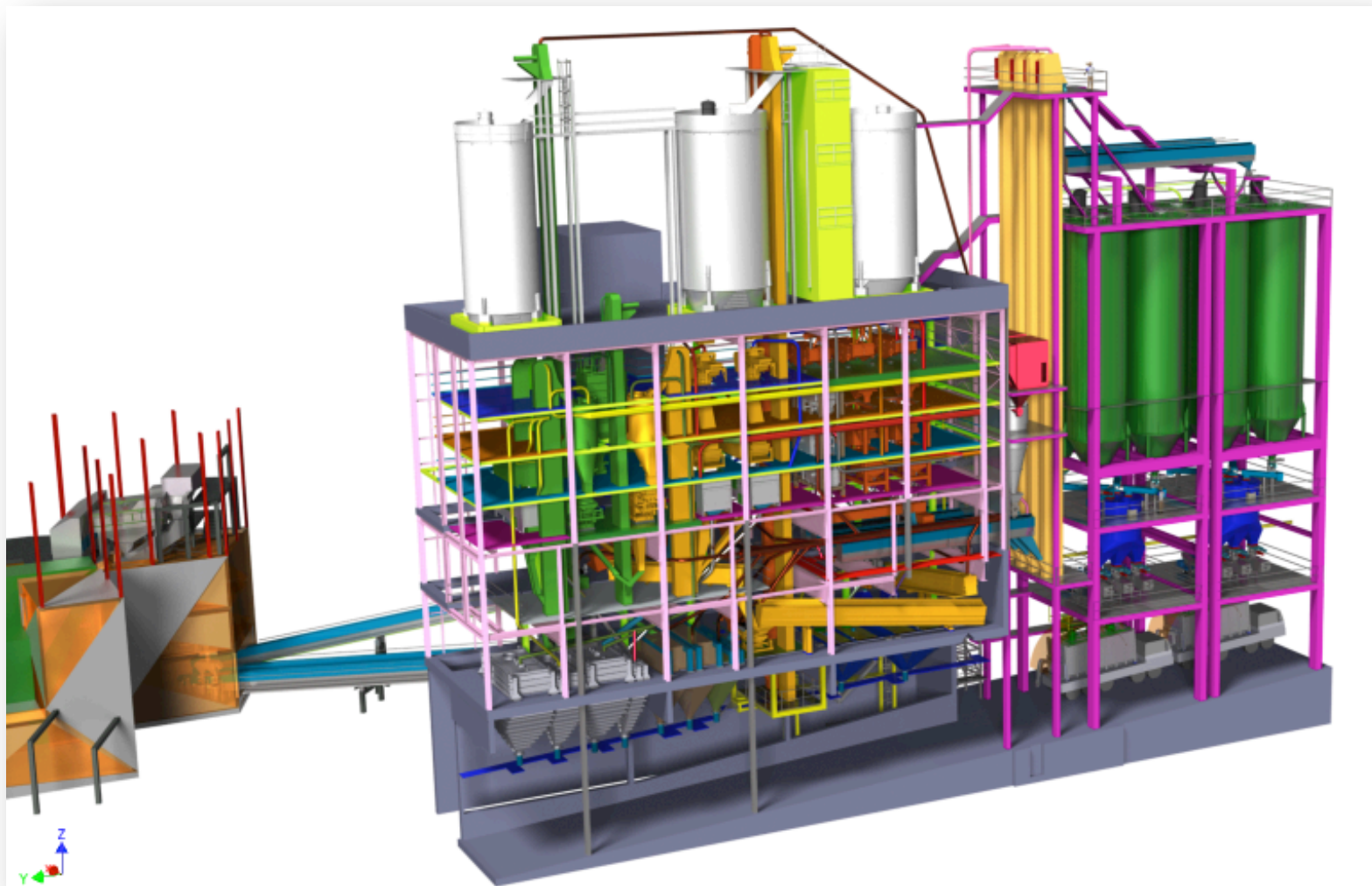
Processing of dry-discharged bottom ash – ZAV bottom ash processing facility



Capacity: 200,000 t/y

Source: ZAV, CH

Processing of dry-discharged bottom ash – ZAV bottom ash processing facility



Source: ZAV, CH



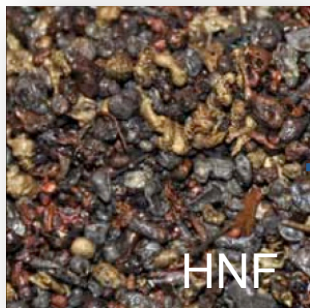
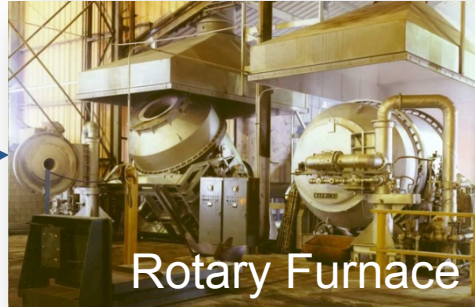
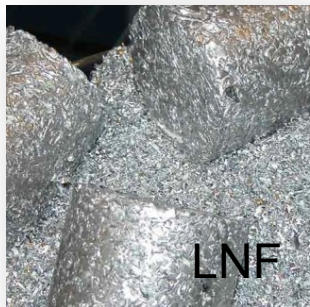
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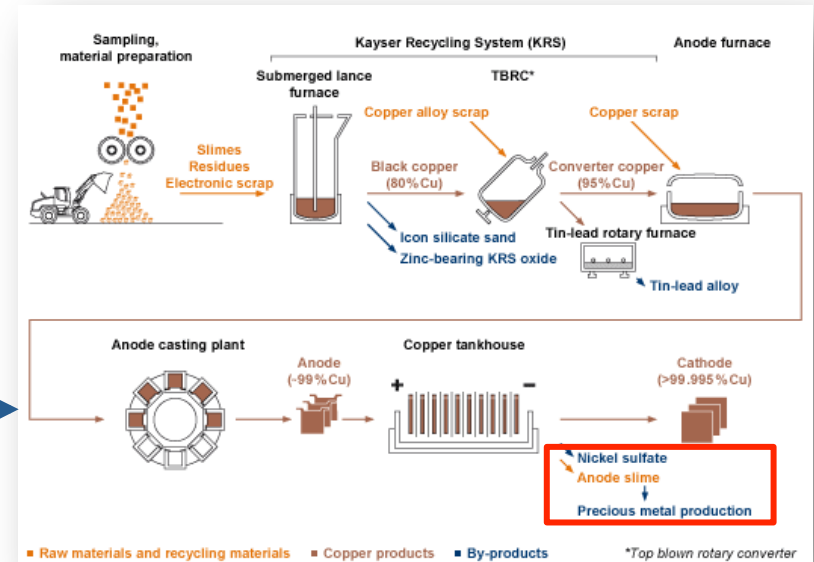
Refining of metals – Further steps



Off-site processing

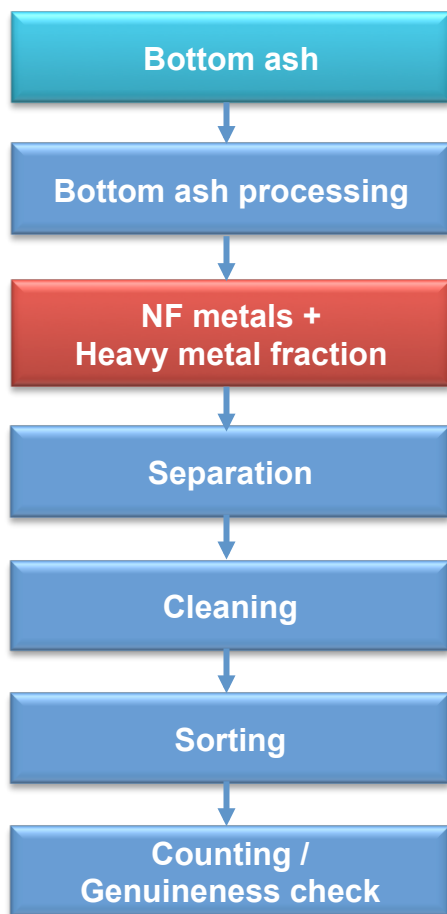


Secondary Copper Route



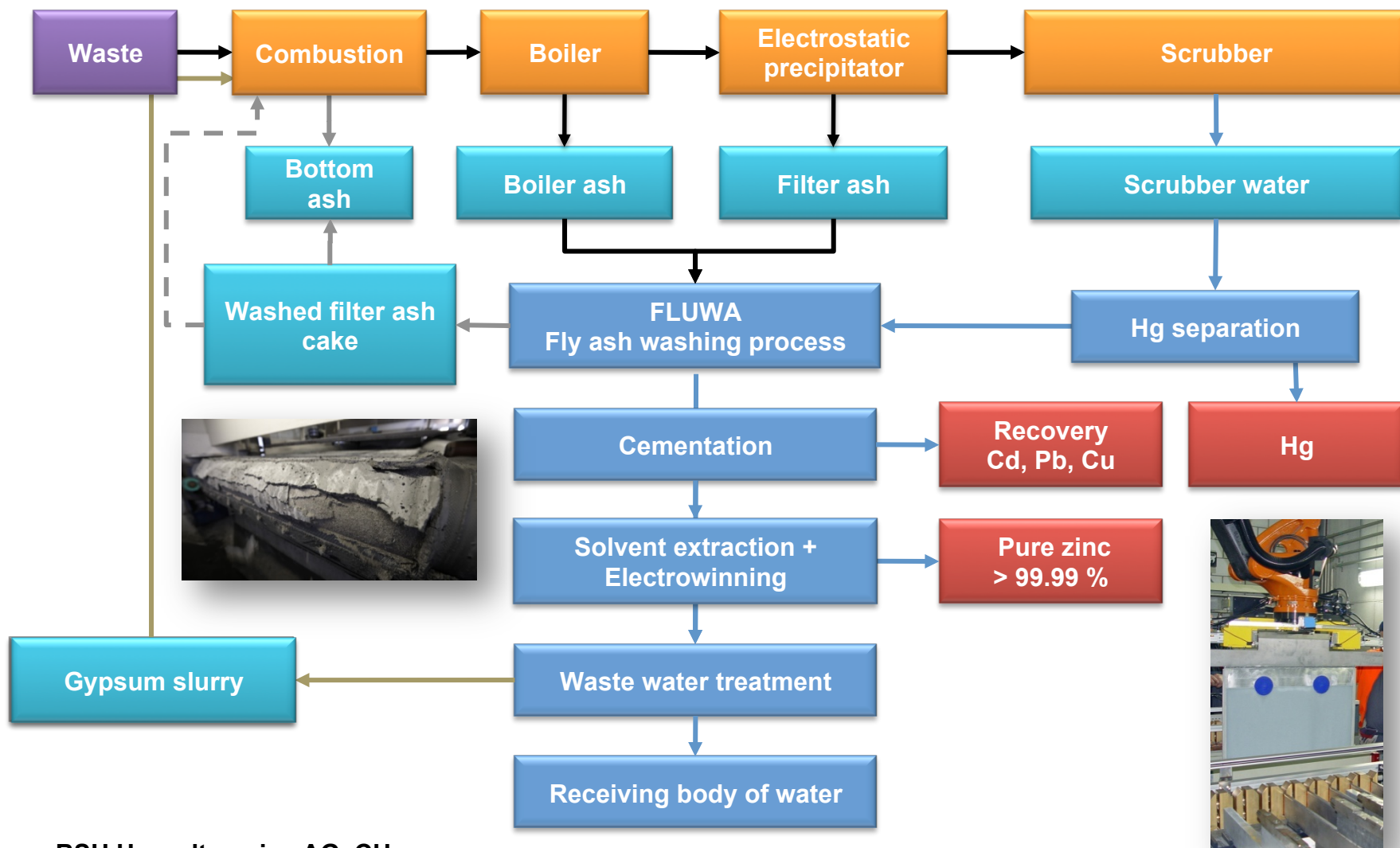
Sources: Allegheny Ludlum Steel Corp.; secowarwick; Aurubis

Additional technologies – Coin recovery from bottom ash



Source: Gesellschaft für Umwelt- und Energie-Serviceleistungen mbH, DE

Additional technologies – Metal recovery from filter ash (FLUREC process)



Source: BSH Umweltservice AG, CH

Conclusions / Future prospects

- **WtE residues contain a high potential in terms of resources**
- **Efficient treatment of dry-discharged bottom ash possible**
- **Qualitatively high-grade recovery of metals (Fe + NF)**
- **Maximum recovery of metals from bottom ash and filter ash in closed and process-integrated cycles**
- **On-site processing is possible but limited**
- **Additional refining of metals is necessary**
- **MARTIN is one of the leaders in pushing these developments**
 - **Industrial / development partner of SATOM Monthey**
 - **Industrial partner of / important donator to ZAR**
 - **High personnel / financial investment in urban mining projects**
 - **Industrial partner for metal recovery projects for the time being in EU**

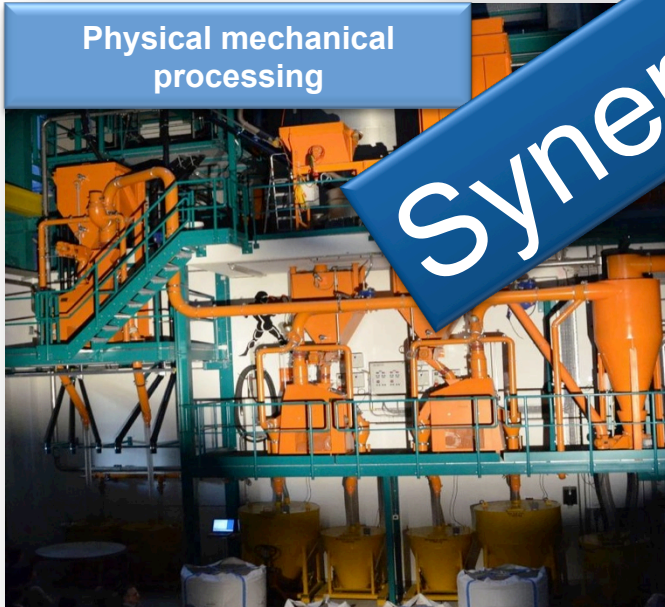
Large-scale implementations of high efficient metal recovery technologies from WTE residues are an essential part of resource recovery in Europe

Future prospects – Thermo-recycling

Thermal processing



Physical mechanical processing



Wet-chemical processing



Source: ZAR, CH



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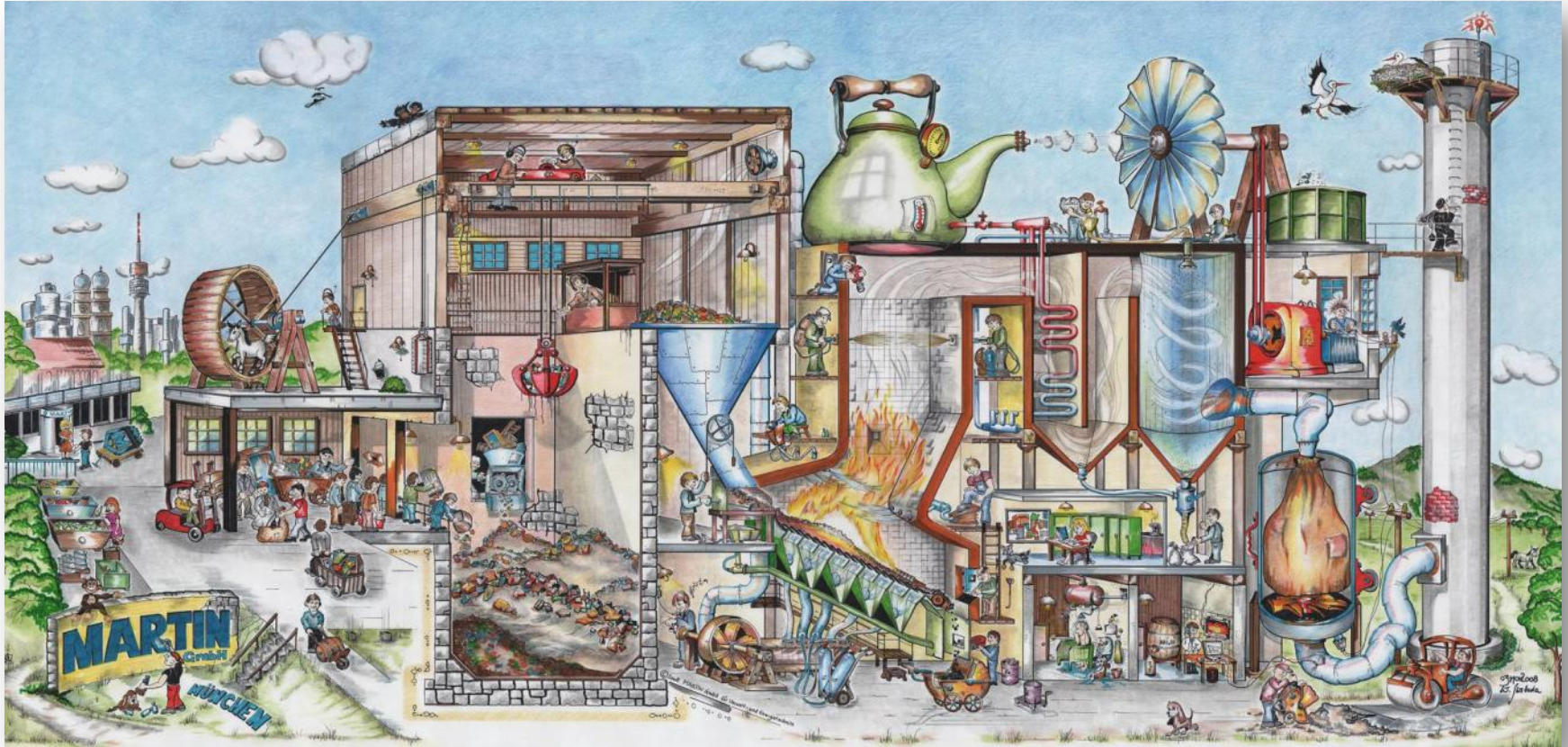
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Thank you very much for your kind attention



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