



# COMET TRAITEMENTS

CRITICAL RAW MATERIALS – RECYCLING SOLUTIONS

# COMET GROUP / COMET TRAITEMENTS



## COMET GROUP :

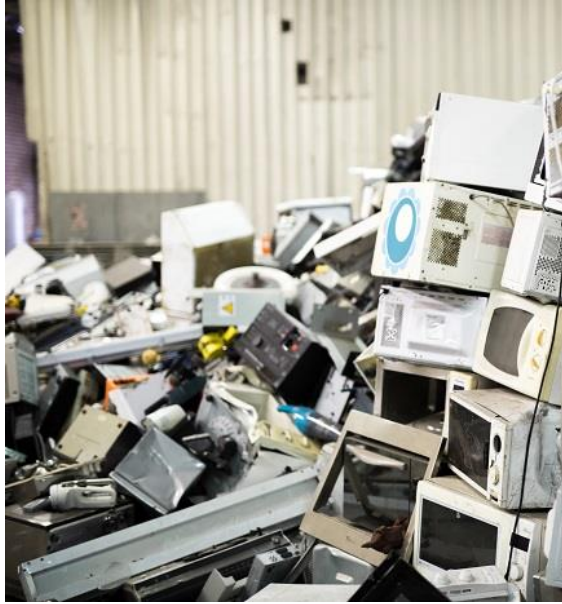
- ❑ 400 staff, 400 M€ Turnover
- ❑ Comet Sambre : 2 shredding sites, Charleroi (3,000 hp) and Mons (7,000 hp)
- ❑ 1,200,000 To/y of wastes – 800,000 To/y metallic scraps



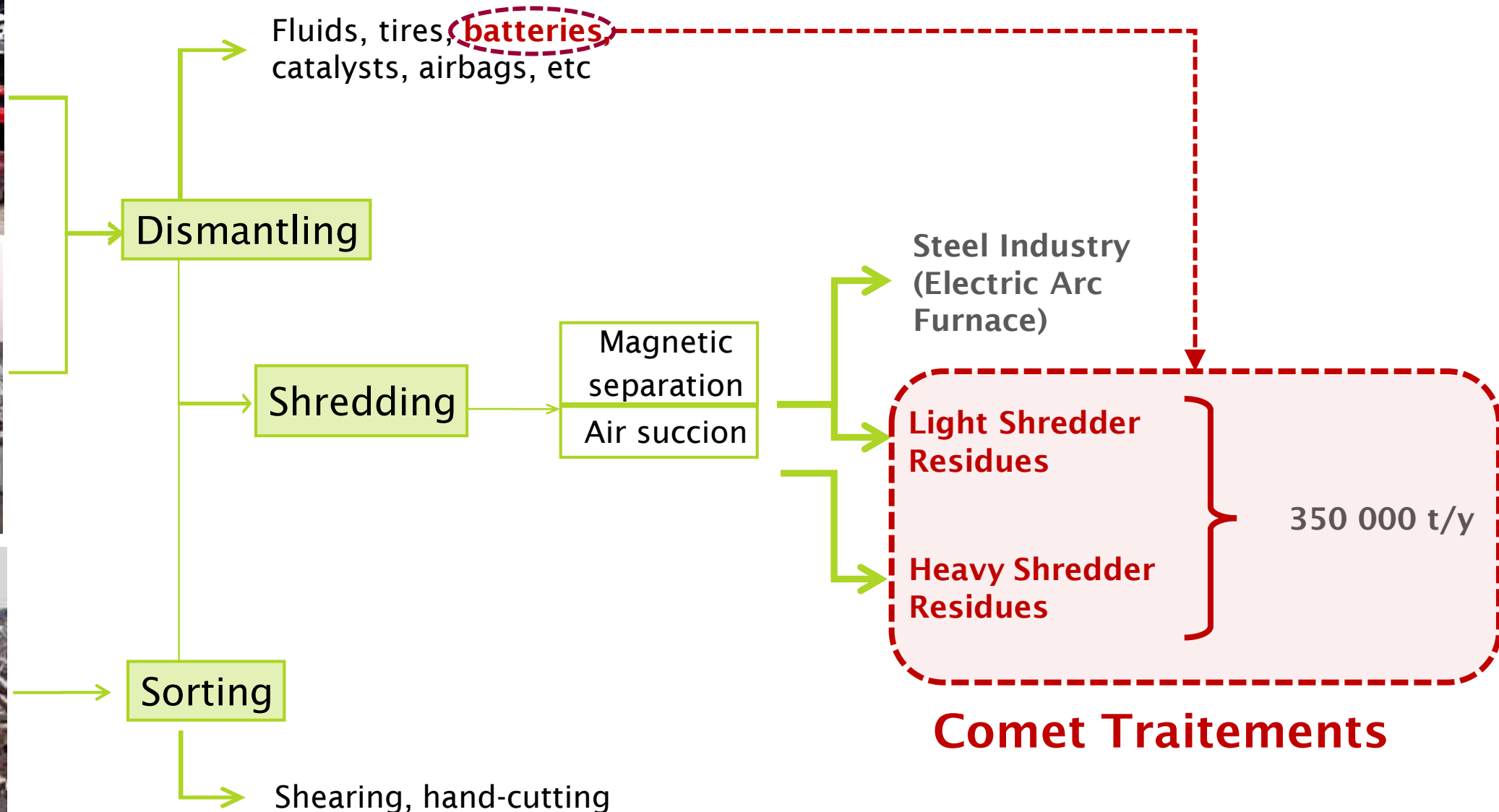
## COMET TRAITEMENTS : Shredder Residue processing and recovery

- ❑ Created in 2002
- ❑ 8 production units : Post Shredder Technology
- ❑ Treatment capacity : 350 000 To/y
- ❑ Staff: 130
- ❑ R&D team: 15 + 11 external researchers work on Comet projects

# FEEDSTOCKS



# COMET GROUP : URBAN MINING



# SHREDDER RESIDUES VALORISATION

97,8%

Minerals and Glass

→ Technical sand



Foam, wood...

Catalytic cracking  
→ Hydrocarbon

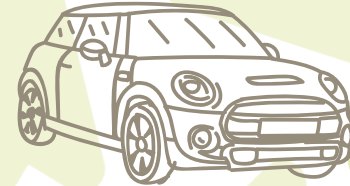
Non-ferrous metals

Robotized sorting Hydrometallurgy



Cu, Al, Zn, CRM : Co, REE, ...

Plastics  
Upcycling



# ENERGY TRANSITION & RAW MATERIALS



1 1.008 <b>H</b> HYDROGÈNE																	18 4.0026 <b>He</b> HÉLIUM
3 6.94 <b>Li</b> LITHIUM	4 9.0122 <b>Be</b> BÉRYLLIUM											5 10.81 <b>B</b> BORE	6 12.011 <b>C</b> CARBONE	7 14.007 <b>N</b> AZOTE	8 15.999 <b>O</b> OXYGÈNE	9 18.998 <b>F</b> FLUOR	10 20.180 <b>Ne</b> NEON
11 22.990 <b>Na</b> SODIUM	12 24.305 <b>Mg</b> MAGNÉSIMUM											13 26.982 <b>Al</b> ALUMINIUM	14 28.085 <b>Si</b> SILICIUM	15 30.974 <b>P</b> PHOSPHORE	16 32.06 <b>S</b> SOUFRE	17 35.45 <b>Cl</b> CHLORE	18 39.948 <b>Ar</b> ARGON
19 39.098 <b>K</b> POTASSIUM	20 40.078 <b>Ca</b> CALCIUM	21 44.956 <b>Sc</b> SCANDIUM	22 47.867 <b>Ti</b> TITANE	23 50.942 <b>V</b> VANADIUM	24 51.996 <b>Cr</b> CHROME	25 54.938 <b>Mn</b> MANGANÈSE	26 55.845 <b>Fe</b> FER	27 58.933 <b>Co</b> COBALT	28 58.693 <b>Ni</b> NICKEL	29 63.546 <b>Cu</b> CUIVRE	30 65.38 <b>Zn</b> ZINC	31 69.723 <b>Ga</b> GALLIUM	32 72.64 <b>Ge</b> GERMANIUM	33 74.922 <b>As</b> ARSENIC	34 78.971 <b>Se</b> SÉLÉNIUM	35 79.904 <b>Br</b> BROME	36 83.798 <b>Kr</b> KRYPTON
37 85.468 <b>Rb</b> RUBIDIUM	38 87.62 <b>Sr</b> STRONTIUM	39 88.906 <b>Y</b> YTRIUM	40 91.224 <b>Zr</b> ZIRCONIUM	41 92.906 <b>Nb</b> NIOBIUM	42 95.95 <b>Mo</b> MOLYBDÈNE	43 (98) <b>Tc</b> TECHNÉTIUM	44 101.07 <b>Ru</b> RUTHÉNIUM	45 102.91 <b>Rh</b> RHODIUM	46 106.42 <b>Pd</b> PALLADIUM	47 107.87 <b>Ag</b> ARGENT	48 112.41 <b>Cd</b> CADMIUM	49 114.82 <b>In</b> INDIUM	50 118.71 <b>Sn</b> ÉTAIN	51 121.76 <b>Sb</b> ANTIMOINE	52 127.60 <b>Te</b> TELLOURE	53 126.90 <b>I</b> IODE	54 131.29 <b>Xe</b> XÉNON
55 132.91 <b>Cs</b> CÉSIIUM	56 137.33 <b>Ba</b> BARYIUM	57-71 <b>La-Lu</b> Lanthanides	72 178.49 <b>Hf</b> HAFNIUM	73 180.95 <b>Ta</b> TANTALE	74 183.84 <b>W</b> TUNGSTÈNE	75 186.21 <b>Re</b> RHÉNIUM	76 190.23 <b>Os</b> OSMIUM	77 192.22 <b>Ir</b> IRIDIUM	78 195.08 <b>Pt</b> PLATINE	79 196.97 <b>Au</b> OR	80 200.59 <b>Hg</b> MERCURE	81 204.38 <b>Tl</b> THALLIUM	82 207.2 <b>Pb</b> PLOMB	83 208.98 <b>Bi</b> BISMUTH	84 (209) <b>Po</b> POLONIUM	85 (210) <b>At</b> ASTATE	86 (222) <b>Rn</b> RADON
87 (223) <b>Fr</b> FRANCIUM	88 (226) <b>Ra</b> RADIUM	89-103 <b>Ac-Lr</b> Actinides	104 (267) <b>Rf</b> RUTHERFORDIUM	105 (268) <b>Db</b> DUBNIUM	106 (271) <b>Sg</b> SEABORGIUM	107 (272) <b>Bh</b> BOHRIUM	108 (277) <b>Hs</b> HASSIUM	109 (276) <b>Mt</b> MEITNERIUM	110 (281) <b>Ds</b> DARMSSTADIUM	111 (280) <b>Rg</b> ROENTGENIUM	112 (285) <b>Cn</b> COPERNICIUM	113 (285) <b>Nh</b> NIHOIUM	114 (287) <b>Fl</b> FLÉROVIUM	115 (289) <b>Mc</b> MOSCOVIUM	116 (291) <b>Lv</b> LIVERMORIUM	117 (294) <b>Ts</b> TENNESSE	118 (294) <b>Og</b> OGANESSON

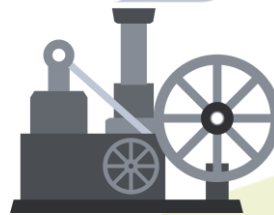
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LANTHANIDES														
57 138.91 <b>La</b> LANTHANE	58 140.12 <b>Ce</b> CÉRIUM	59 140.91 <b>Pr</b> PRASÉOYME	60 144.24 <b>Nd</b> NÉODYME	61 (145) <b>Pm</b> PROMÉTHIUM	62 150.36 <b>Sm</b> SAMARIUM	63 151.96 <b>Eu</b> EUROPIUM	64 157.25 <b>Gd</b> GADOLINIUM	65 158.93 <b>Tb</b> TERBIUM	66 162.50 <b>Dy</b> DYSPROSIUM	67 164.93 <b>Ho</b> HOLMIUM	68 167.26 <b>Er</b> ERBIUM	69 168.93 <b>Tm</b> THULIUM	70 173.05 <b>Yb</b> YTTÉRIUM	71 174.97 <b>Lu</b> LUTÉTIUM

ACTINIDES														
89 (227) <b>Ac</b> ACTINIUM	90 232.04 <b>Th</b> THORIUM	91 231.04 <b>Pa</b> PROTACTINIUM	92 238.03 <b>U</b> URANIUM	93 (237) <b>Np</b> NEPTUNIUM	94 (244) <b>Pu</b> PLUTONIUM	95 (243) <b>Am</b> AMÉRICIUM	96 (247) <b>Cm</b> CURIUM	97 (247) <b>Bk</b> BERKÉLIUM	98 (251) <b>Cf</b> CALIFORNIUM	99 (252) <b>Es</b> EINSTEINIUM	100 (257) <b>Fm</b> FERMIUM	101 (258) <b>Md</b> MENDELÉVIUM	102 (259) <b>No</b> NOBÉLIUM	103 (262) <b>Lr</b> LAWRENCIUM



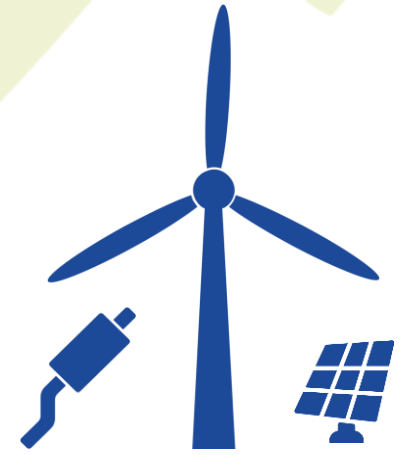
1700



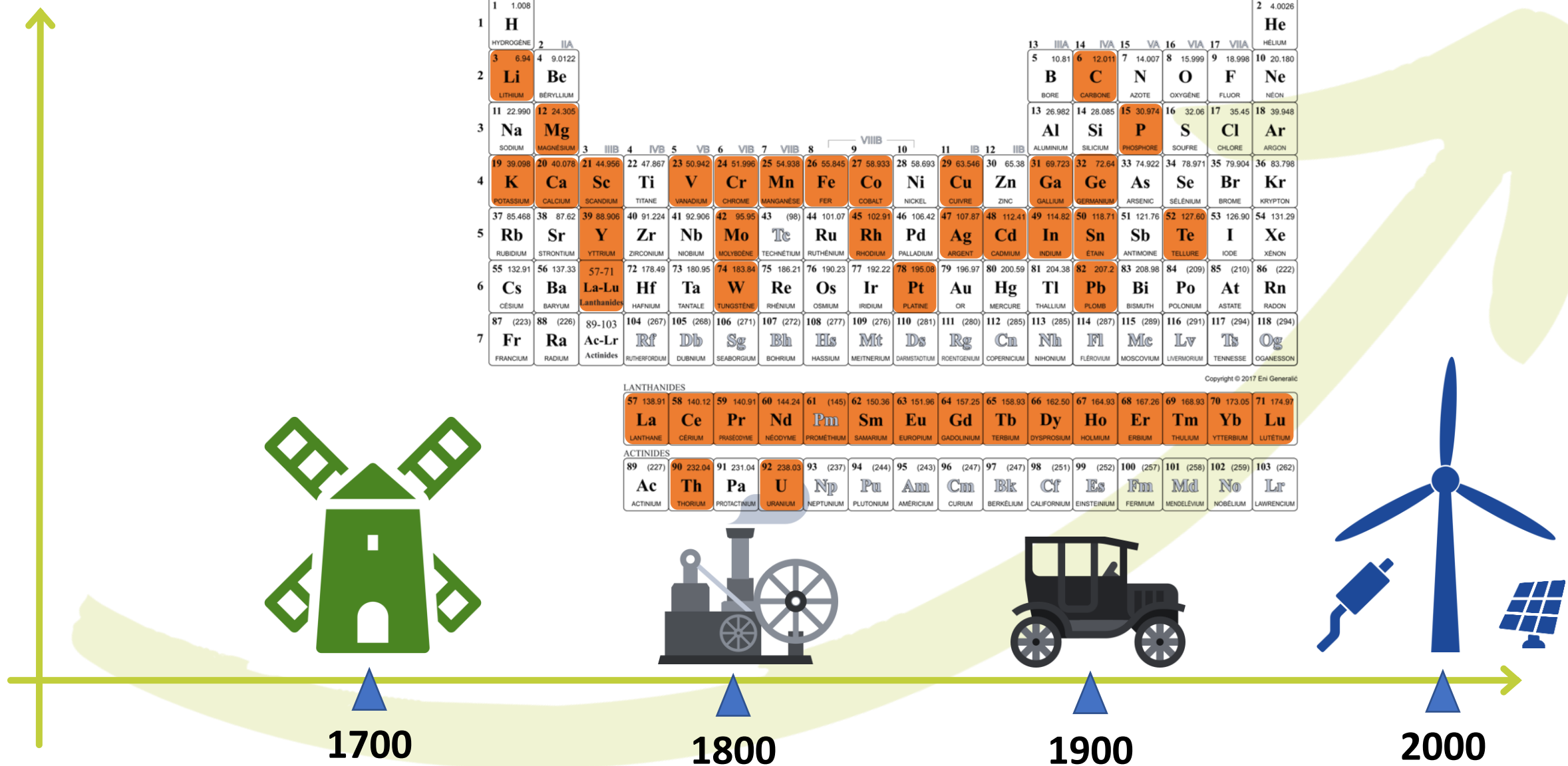
1800



1900



2000



# COMET TRAITEMENTS / RECYCLING INDUSTRY



- ❑ Recovery of Secondary Raw Materials from End of Life Vehicles, WEEE, E-mobility, photovoltaic panels,...
- ❑ Optimize the purification vs the economic value

- ❑ Challenges:

- ❑ New feedstocks



- ❑ Increasing complexity of the raw materials

- ❑ Contribute to the EU circularity needs (keeping Critical Raw Materials inside EU)

# COMET TRAITEMENTS : R&D



## Regional : Reverse Metallurgy R&D cluster

**MULTIPICK**

Industrialization of a smart robotized sorting line of metal scraps

**BIOLIX**

Development of a hydrometallurgical plant for copper recovery and purification

**CISTEMECC**

Setting up the circularity of the future e-Mobility value chain



Aluminium & Steel smart robotized sorting

**PLANUM**

Dismantling and valorisation of EoL aircrafts

**REMADE**

Valorisation of recycled metal scraps in powder metallurgy applications

**ECuME**

Li-Ion battery recycling

**PUR4UP**

Upcycling PP3 waste plastics in water sanitation application

**PUREZINC**

purifying zinc from zorba waste stream

**PURSILICON**

Valorisation of silicon recovered from EoL PV panels in batteries applications

**PHOENIX**

Development of a pyrolysis plant for ultimate plastic waste fraction

**SOLARCYCLE**

setting up the EoL PV recycling value chain



## European

Recycling of high-quality secondary thermoplastics and recovery of critical raw materials (antimony)



Second generation Methyl MethAcrylate



Aeronautics Smart Multimaterials Structures. Recovery of carbon fibre from composites by pyrolysis



Substitution of Critical Raw Materials on Aluminium Alloys for electrical vehicles



Recovery of silicon from EoL PV panels



Precious metal recovery from waste streams. Ag from EoL PV Panels



Recovery Of Cobalt from waste streams : batteries, metallic waste, ...



Platinum Group Metal recovery from catalytic converters



# COMET TRAITEMENTS & CRM



Comet's feedstock linked to CRM

Household appliances (WEEE)

E-mobility  
Used Vehicles (hybrid, electrical, hydrogen)

Mechanical dismantling  
Automatized sorting

Batteries & PCBs

Hydrometallurgical  
process  
NOVA

Hydrometallurgical  
process  
BIOLIX

Upcycling challenges:  
Bypass smelters for low grade  
components

Au  
Sn Ag

Cu powder

Li-ions batteries

Mechanical  
dismantling

Cu

Safety challenges:  
Safe recovery and dismantling of  
batteries  
Safe separation of blackmass

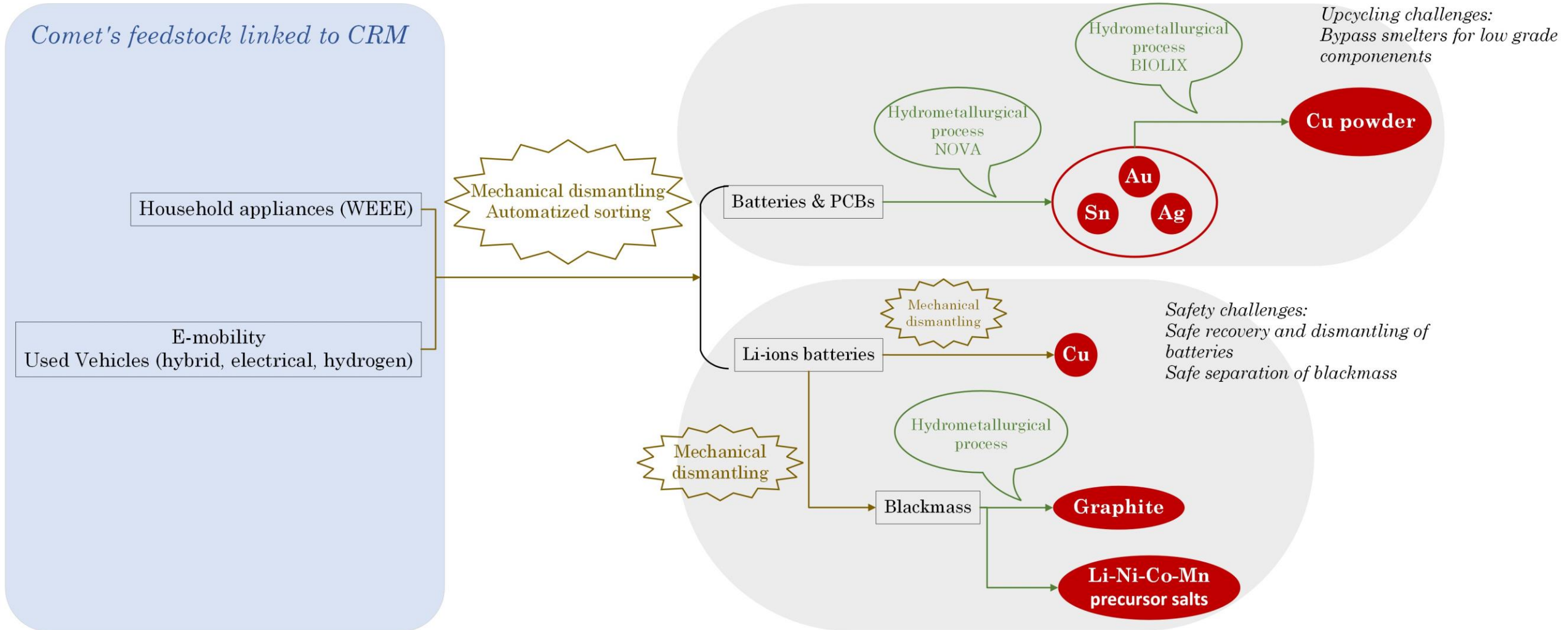
Mechanical  
dismantling

Blackmass

Hydrometallurgical  
process

Graphite

Li-Ni-Co-Mn  
precursor salts



# COMET TRAITEMENTS & CRM

Comet's feedstock linked to CRM

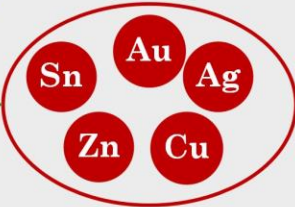
E-mobility  
Used Vehicles (hybrid, electrical, hydrogen)

Photovoltaic panels

Mechanical sorting

Polymetallic concentrates  
Precious metals

Pyrometallurgical process  
CUSCUS



Upcycling challenges:  
Bypass smelters and recover metals individually

Mechanical extraction rotors and magnets

Permanent magnets REE

Hydrometallurgical process  
REEFINE

Fe precursor salts

Nd-Dy-Pr

Recovery challenges:  
Recover the magnets usually lost with the scraps

Mechanical dismantling

Metallic concentrates  
Glass

Mechanical sorting

Si metal

Leaching

Ag

Recovery challenges:  
Separation of all the components

A photograph of an industrial facility, likely a recycling plant, featuring large piles of dark material, a yellow excavator, and complex piping and structures. The scene is reflected in a body of water in the foreground.

Thank you