

BAUXAL II

From aluminium salt slag to a refractory material:
The case of LIFE BAUXAL II

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BEFESA

Online, 21 January 2025



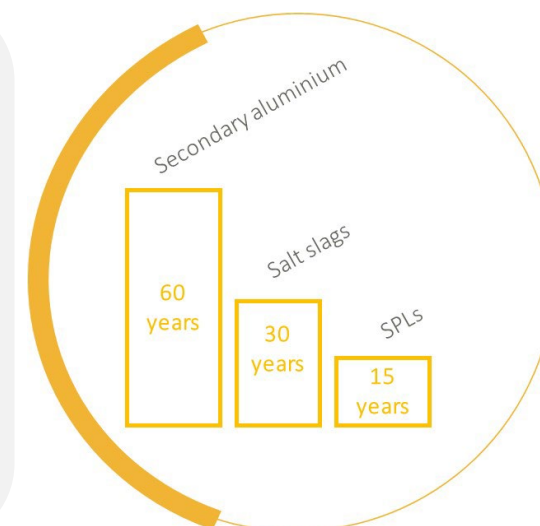
Befesa
Aluminium

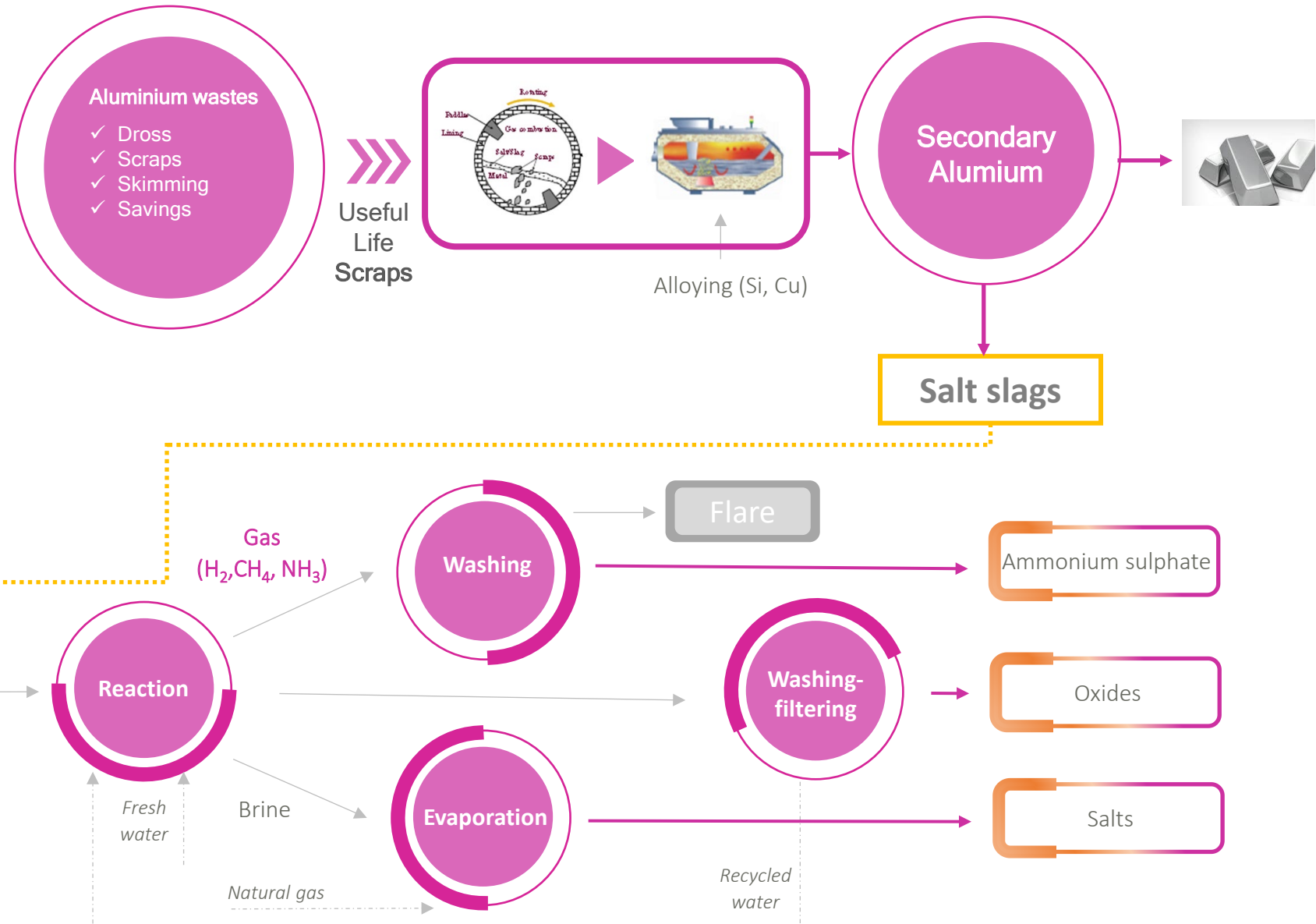
European leader in recycling aluminium wastes



- Salt slags and SPLs recycling 480.000 t/y in four plants.
- Primary and secondary dross and scraps recycling 200.000 t/y in three plants.
- World leaders in designing and selling equipment and technology for the aluminium industry.

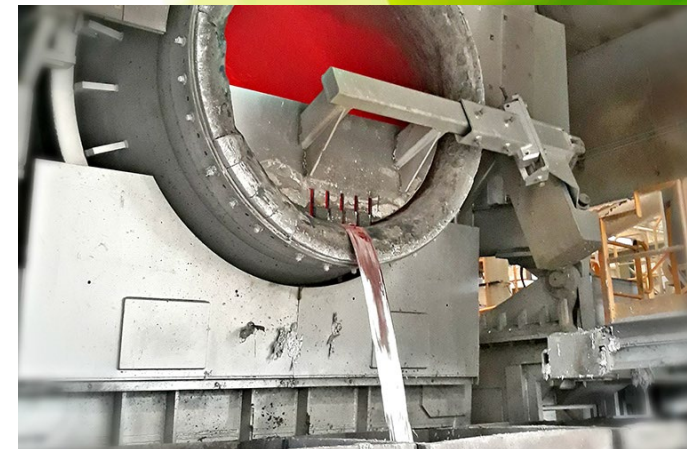
- R&Di team arranging to present demands without losing sight of the future.
- Engineering department for the design, construction and commissioning of equipment.



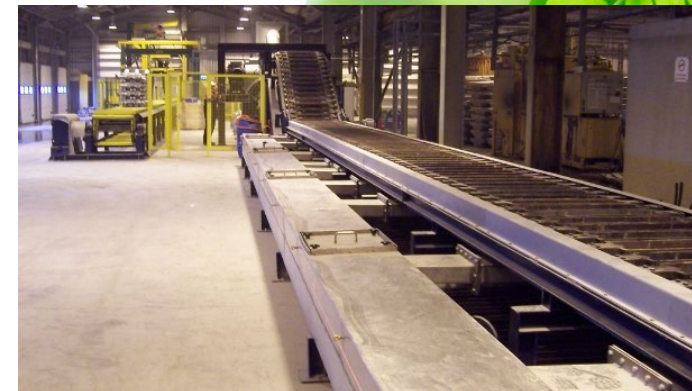
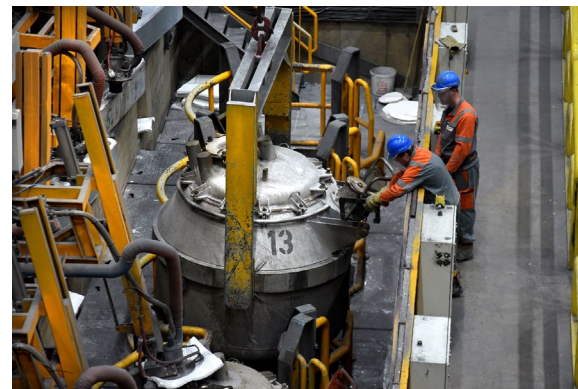


Secondary Aluminium production

Plant overview. Melting area



Plant overview. Ingot area



Salt slags recycling process

Plant overview. Crushing area



Plant overview. Reaction area



Salt slags recycling process

Plant overview. Evaporation area



Plant overview. Gas treatment



Aluminium salt slags



HAZARDOUS WASTE (LER 10 03 08)

- ☐ Highly flammable (H3-A)
- ☐ Leacheable (H13)
- ☐ Irritant (H4)
- ☐ Harmful (H5)

Al concentrates



Salts



Oxide



MARKET

Secondary Aluminium Oxide

ALTERNATIVE RAW MATERIAL

Landfill

1990

Soil
stabilization

Mineral
wool

Cement

Ceramics

High value
applications

Nowadays

NO DUMPING

RECYCLING



60-70%
 Al_2O_3

Impurities



BAUXAL II

Secondary Aluminium Oxide

Physical properties

Colour: grey
Density: 1,05-1,23 g/cm³
Wet (~15%)
Particle size: 0,2 mm (50% < 200µm)

Al ₂ O ₃	60-70	Al(OH) ₃ ·AlOOH (38%) α-Al ₂ O ₃ : Corundum (32%)
Fe ₂ O ₃	>2%	Fe metallic or oxide
SiO ₂	4-12%	Aluminium-silicate α-SiO ₂
MgO	5-10%	Spinel
Na ₂ O + K ₂ O	0,5-5%	Halogens salts
CaO	2%	Anortite
F	2-20%	Calcium fluoride, criolite
LOI	10-12%	OH ⁻

Non metallurgical Bauxite

Physical properties:

Colour: Red, grey or yellow
Density: 2,00-3,55 g/cm³
Dry

Al ₂ O ₃	>60%	Al(OH) ₃ ·AlOOH ()
Fe ₂ O ₃	<6%	Non metallurgical
SiO ₂	1-15%	α-SiO ₂
MgO	0-0,5%	
TiO ₂	3-5%	
CaO	0-0,5%	
Na ₂ O + K ₂ O	0,5-5%	
LOI	10-30%	Organics and OH ⁻

SECONDARY BAUXITE WITH 10% MgO (as SPINEL)

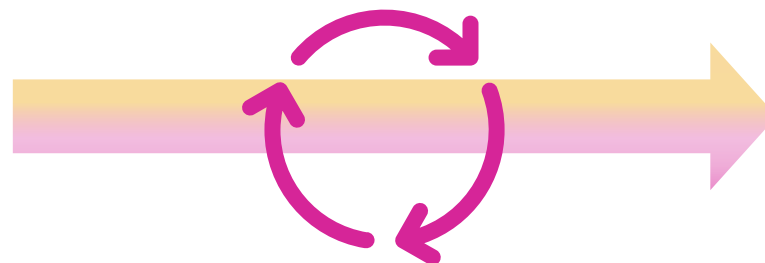
LIFE BAUXAL II- Valorisation towards circular economy of Aluminium by products as an alternative raw material for refractory grade bauxite



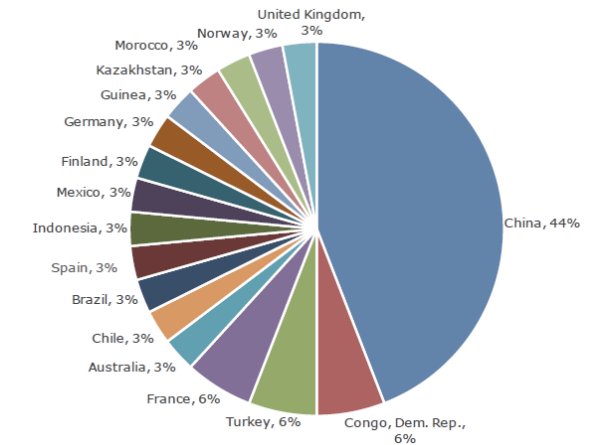
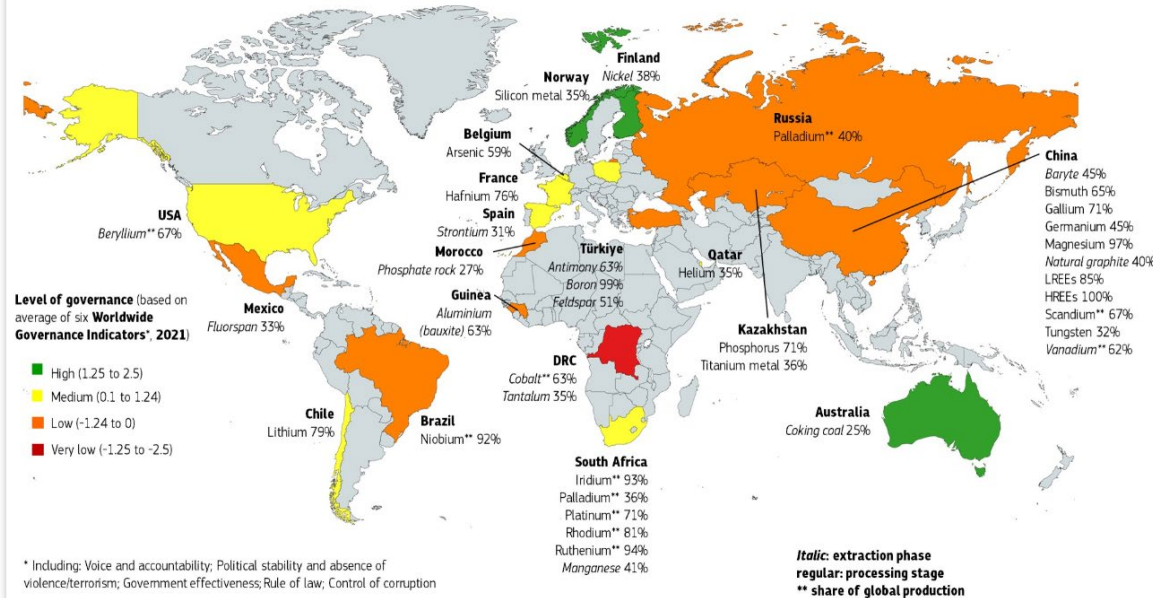
Main objective



Transform a product coming from de salt slag recycling process into an alternative raw material for refractory grade bauxite



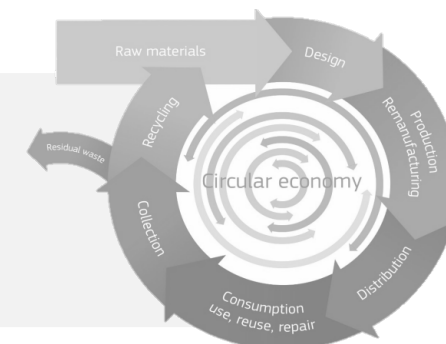
Major EU suppliers of CRMs (2023) and their level of governance

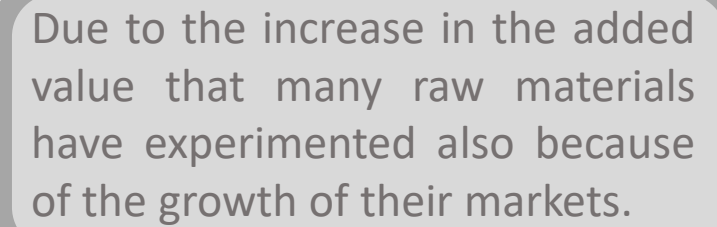


Europe imports the 44% of the total critical raw materials from **China**



- High resources demand
- Weakness of the global supply chains
- High dependency from the Asian market





OTHER OBJECTIVES



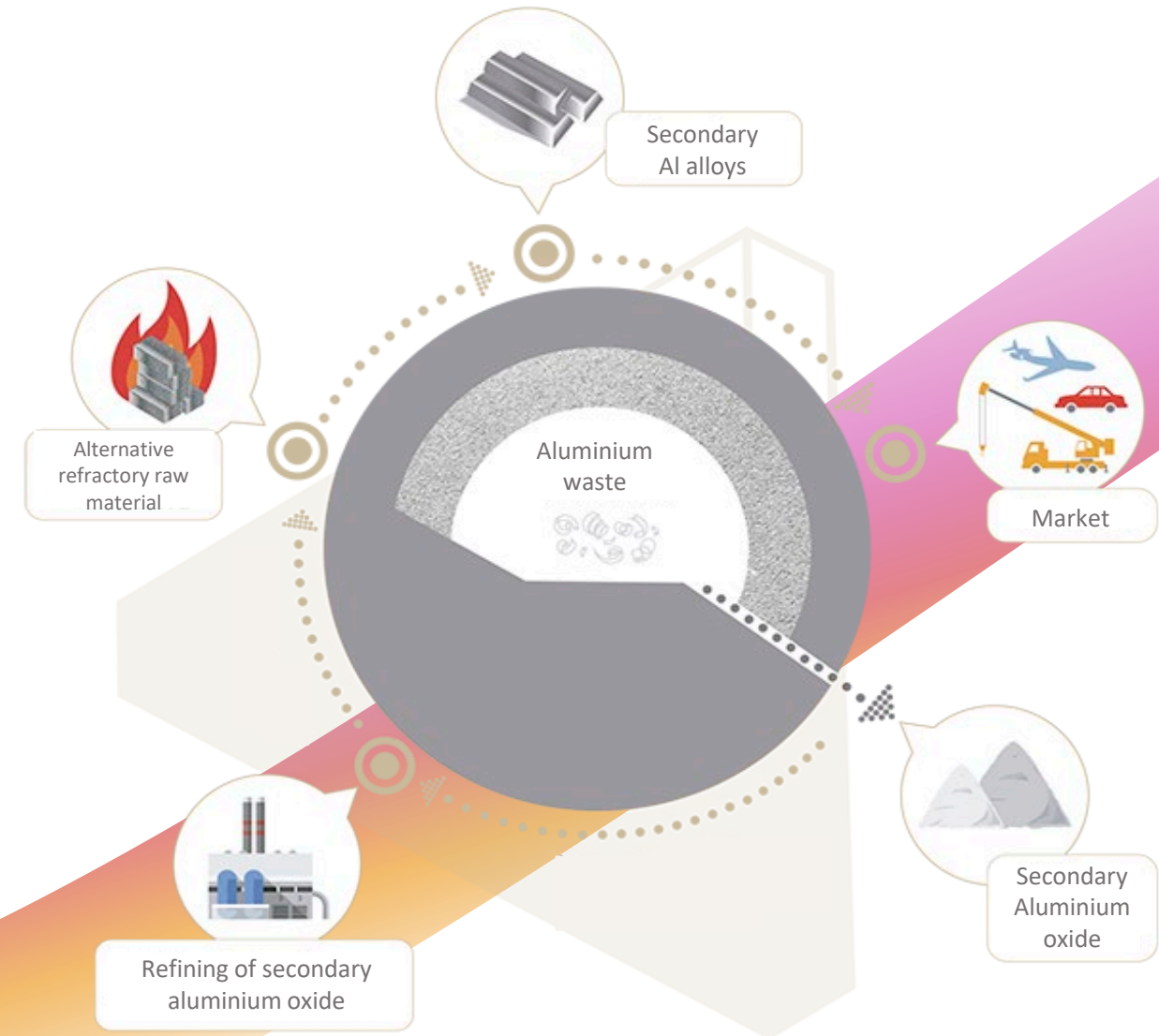
Circular economy. Reduction in the natural resources consumption and reintroducing a recycled product into the market.

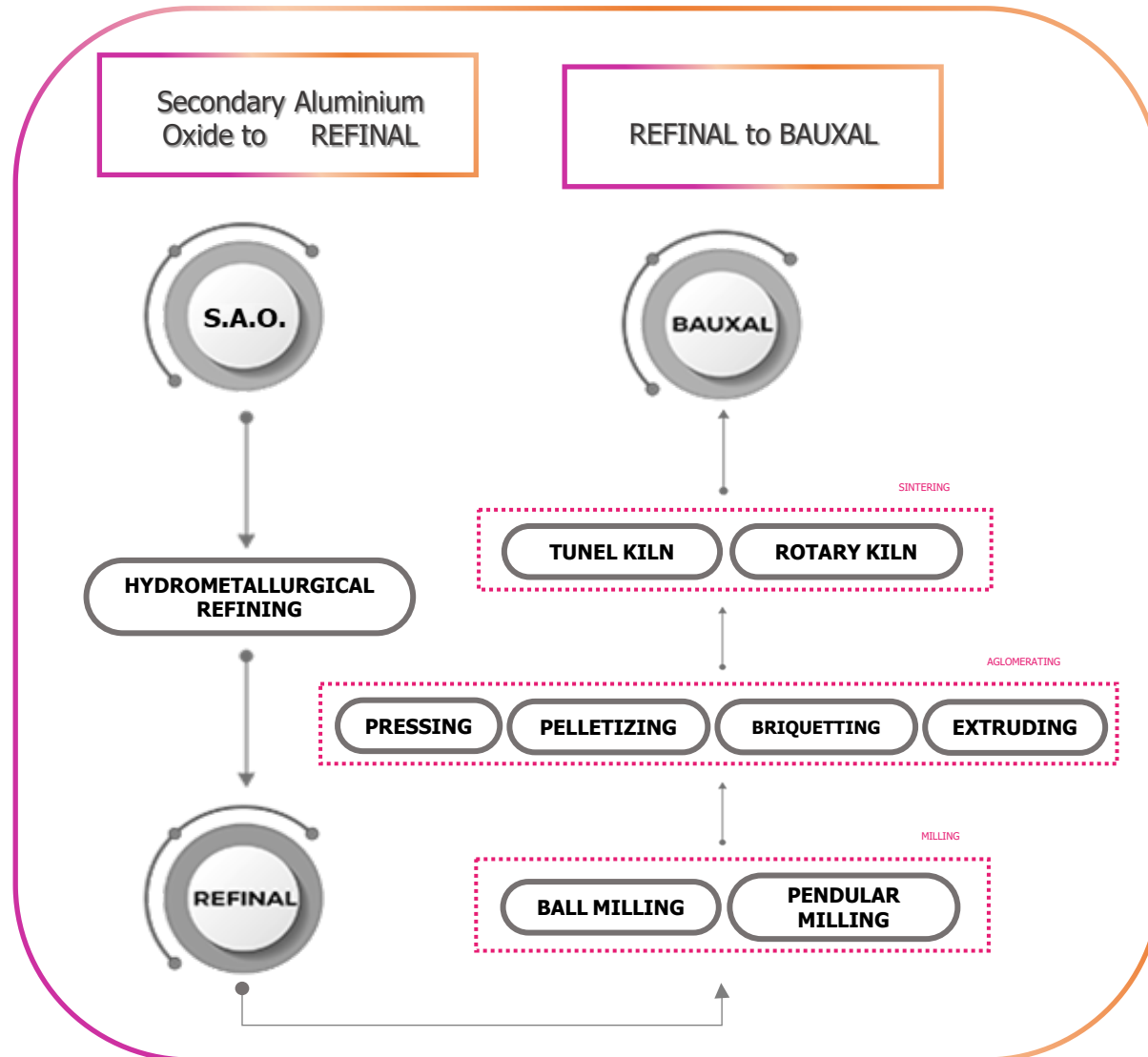


New innovative global **business** with high efficiency in terms of the use of natural resources.



Industrial goal. Substitution of the 20% of the European demand of refractory grade bauxite.





Hydrometallurgical Treatment Prototype



Refinal to Bauxal based Refractories

Bauxal based
recipes



Refinal

500t REFINAL



Extruded and
briquetting Refinal

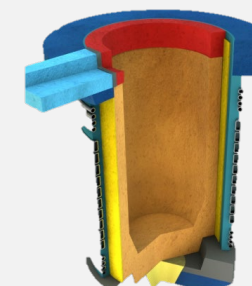
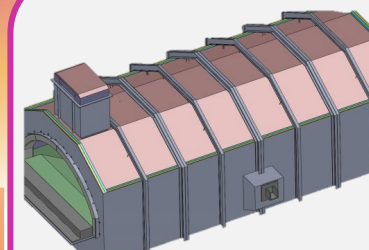


Sintered Refinal



250t BAUXAL

Validation trials



Industrial trials

BEFESA HOLDING REVERBERATORY FURNACE



40 tons

Work
layer

Safety
layer

>1 year

10.153
tons



Postmortem studies reported competitive properties with a 40% replacement rate of Bauxite by Bauxal.

Industrial trials

IRON TRANSPORT LADLE



10 tons

Safety
layer



STEEL TUNDISH LADLE



22 tons

Safety
layer



ALUMINIUM EQUIPMENTS Trowelable castable for repairs



16 tons



The developed materials do not
achieve sufficient properties to
be installed in demanding areas
of iron and steel applications

1t SALT SLAGS-> 0,871 t SAO -> 0,665 t REFINAL -> 0,379 t BAUXAL

- ❑ Befesa produces more than 400.000 t/y of secondary aluminium oxide coming from wastes and reintroduces them into the market as a source of alumina for different applications.
- ❑ The market for calcined bauxite in Europe for aluminum casting applications is slightly above 40,000 tons per year.
- ❑ Refinal and Bauxal are a real solutions of the Asian market dependency for the European refractory manufacturers.



Reduction of 3,9 tons of CO₂ eq. GHG



Reduction of 100 m³ in the water consumption



Reduction of 1000 kWh in the energy consumption



Reduction of 40,5 m² in the land exploitation

Thank you very much
for your attention

Any question?

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