Disruptive Precious Metals Recycling

Journey to ZERO emissions

European Chapter of IPMI
Nov. 2021

ORIGINS

Technology, our raison d'être

Metal78 was born thanks to a **disruptive technology®** (100% hydrometallurgical) developed by **CEIT.**

Metal78 extracts PGMs from end of life automotive catalysts, **including Silica Carbide** from Diesel Particle Filter and other contaminated materials that cannot be processed by the current smelting business.

ORIGINS

From Research to Market

Trade Secret

Patent Pending
PCT/ES2021/070845

CURRENT SHAREHOLDERS

Founders

- Management Team
- Technology Center

Investors

- Pension Fund GEROA
- Venture Capital clave

Strategic Partnership

- Engineering EIA21

OUR TECHNOLOGY ®

Main Advantages - 1.- TIME

1. PROCESS TIME REDUCTION (10 vs 100 days)

- ✓ Significant decrease in **Process Costs**.
- ✓ Hedging the PGM **Price Risk**.

OUR TECHNOLOGY ®

Main Advantages – 2.- Journey to ZERO emissions

2. NO FURNACES / SMELTERS

- ✓ Higher **energetic efficiency** (less than 200ºC).
- ✓ Another addittional reduction in **Process Cost,** and also in Capital expenditures (**CAPEX**).
- ✓ And **Zero CO2 emissions** associated to furnaces:
  - In the whole process, our **carbon foootprint is 63%* less** than current technology.
  - Important **Green Tax savings**.

* Metallurgical and Materials Transactions Volume 4E, December 2017: "*A Comparative Life Cycle Assessment of Recycling the Platinum Group Metals from Automobile Catalytic Converter: An Australian Perspective*"

OUR TECHNOLOGY ®

Main Advantages – 3.- VERSATILITY to address current and future challenges

3. VERSATILITY

- ✓ No limits of **SiC** (particle filters), other ceramic honeycomb like titanium oxide and also other materials that contain wolfram.
- ✓ Our process also recycles platinum catalysts from **fuel cell cars**, and **chemical and petrochemical industries.**

OUR TECHNOLOGY ®

Accessible, green and controllable

STANDARD REAGENTS

Commercial, Cheap and Available

NO COLLECTOR METALS

(Pb, Fe, Cu, NiS...)

INDUSTRIALIZABLE

Chemical-Physical Route

AUTOMATABLE

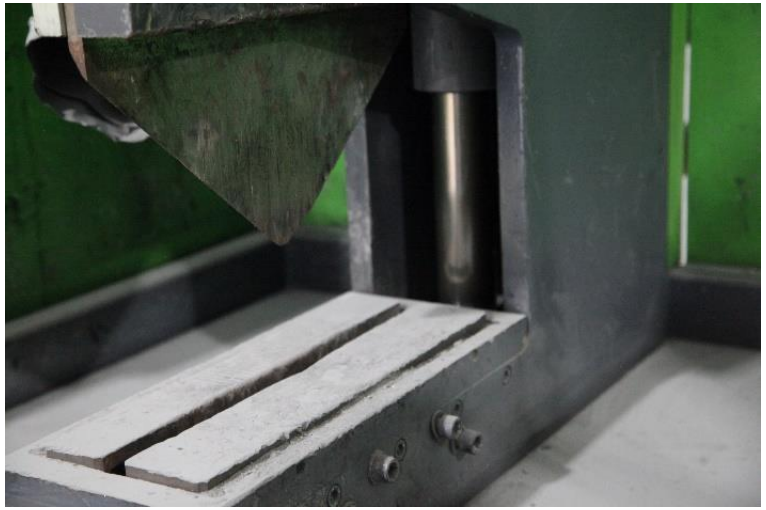
Control

OUR TECHNOLOGY

Phase - 1

1. GRINDING

- ✓ Specific grinding system: fast, continues and compact process.
- ✓ Great **control of particle size** and contamination agents.

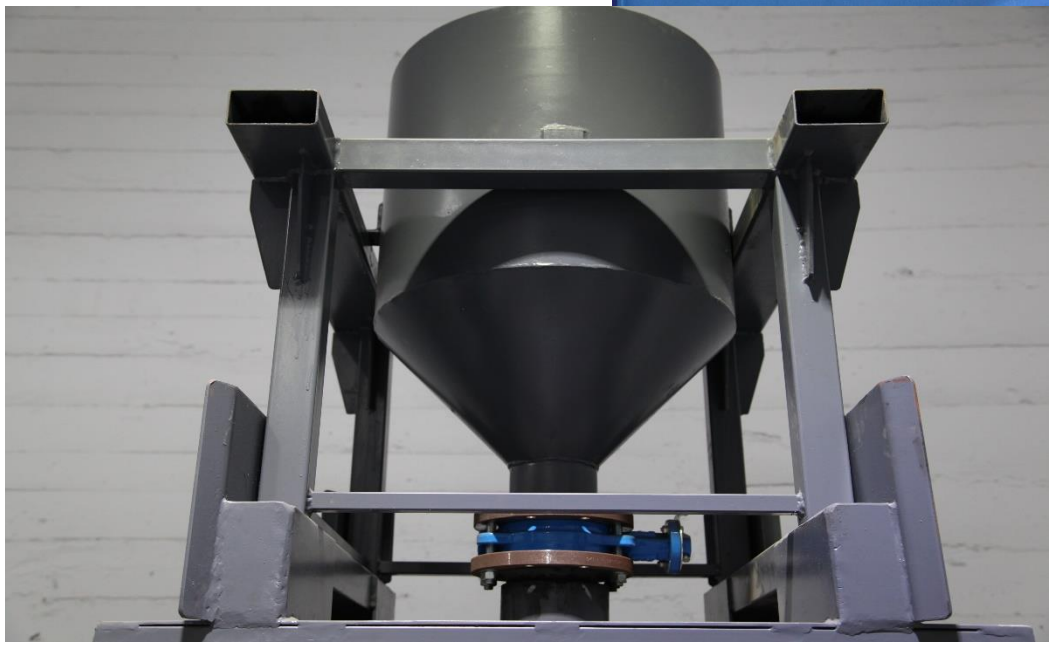


OUR TECHNOLOGY

Phase - 2

2. PHYSICAL-CHEMICAL PROCESS

- ✓ Extraction and precipitation of the PGM in a **solid concentrate form.**
- ✓ **Combination of five different steps**: leaching steps, redox reactions…
- ✓ A **good control of parameters** (time, temperature, reagent proportion…) is critical to obtain a high yield in the process.
- ✓ Recovery: current **yield > 98%.**

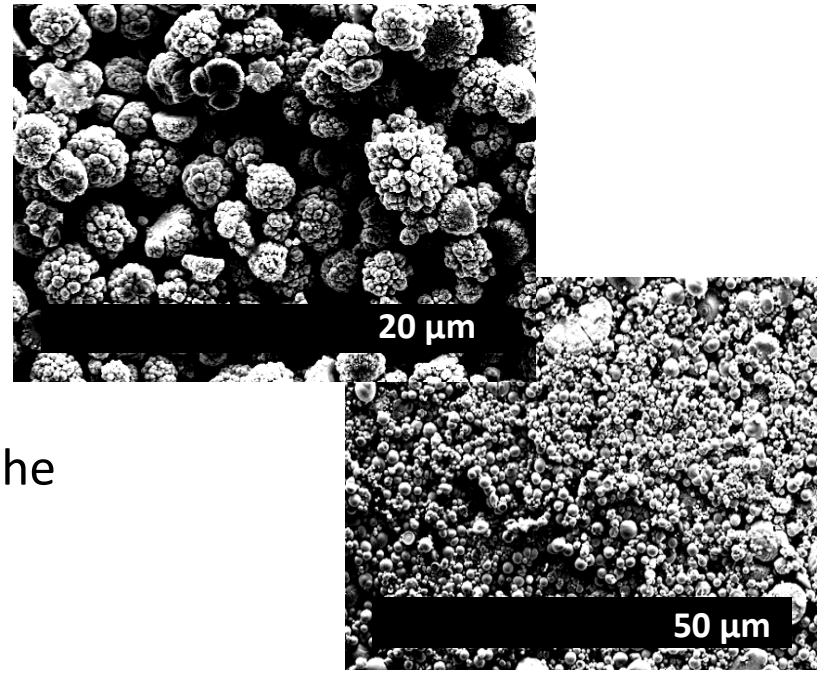


OUR TECHNOLOGY

Phase - 3

3. REFINEMENT

- ✓ Obtaining higher **purity of PGM concentrate**.
- ✓ Combination of precipitations and consecutive reductions from the concentrates obtained in PHASE 2.



Phase - 2

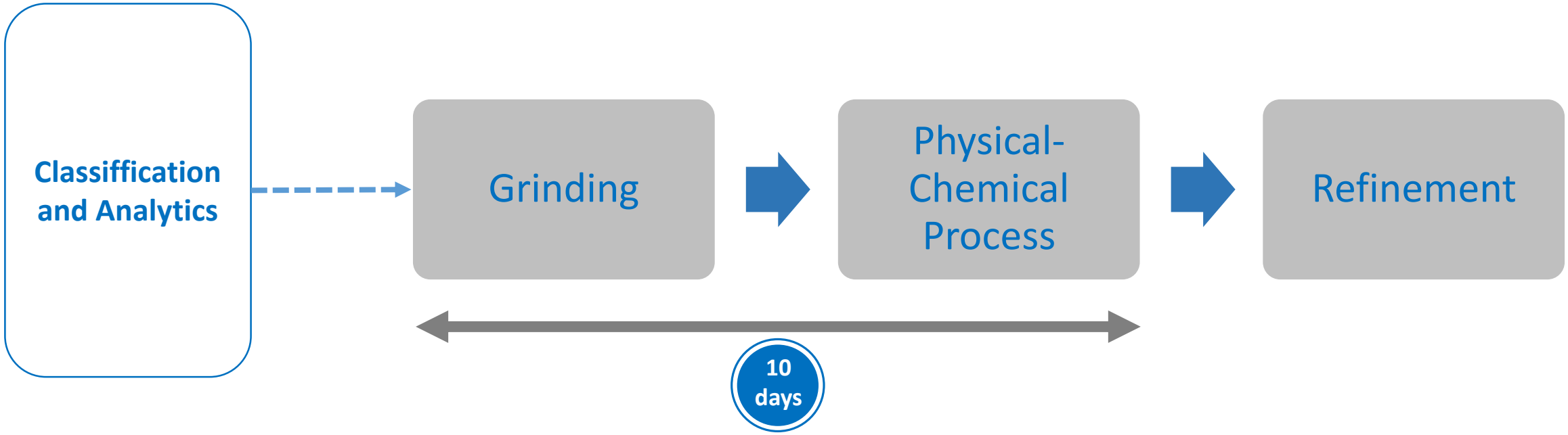
Solid powder (PGM concentrate)
Purity: **Pt/Pd/Rh 80-85%**
Impurities: Cu, Ti, Fe, Ce…

Phase - 3

Solid powder (PGM concentrate)
Purity: **Pt/Pd/Rh > 99 %**

OUR TECHNOLOGY

Three phases plus analytics



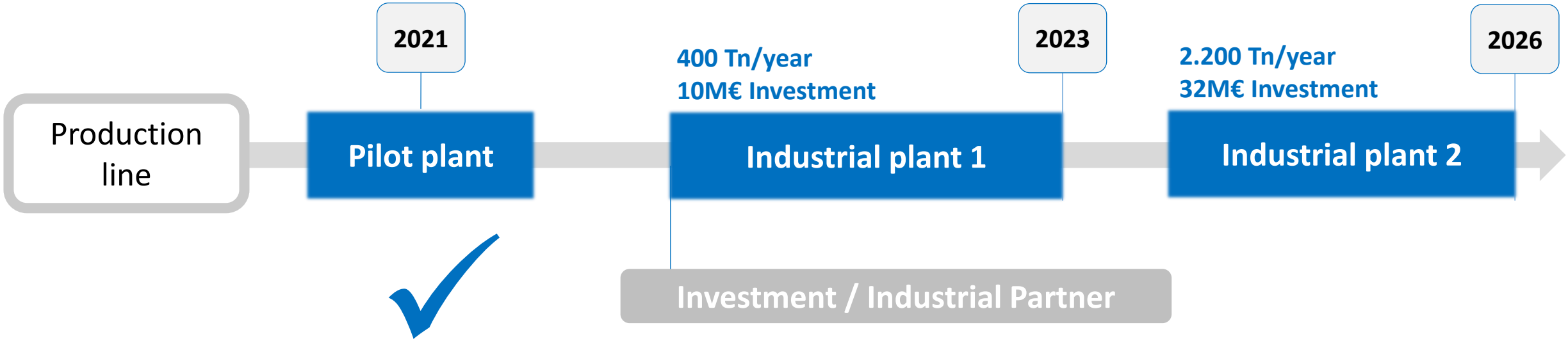
OUR ROADMAP

The PGM Industrial Recycling Plant of the Future.

Current Facilities of the validated Pilot Plant

- 800 m^2 (pilot plant and offices).
- Capacity to process 200 kg/day.

Industrial Plant



HUMAN TEAM

The key factor

President

Antonio González

Engineer and IESE MBA with more than 20 years in the innovation field and creating deep-tech companies

CEO

José Manuel Muriel

Engineer with more than 25 years in the business of recovery and recycling companies

CTO

Mikel Azcona

PhD. in chemistry with more than 12 years in innovative process development and industrial scale-up

Laboratory Manager

June Izquierdo

Degree and Master in Chemistry

Plant Manager

Ruben Álvarez

More than 10 years mananing production teams

“I never think of the future. It comes soon enough.”

Albert Einstein

BRINGING THE FUTURE OF PGM RECYCLING TO PRESENT

VERSATILE

100%

Probabilities to recycle filters from SiC particles

Recycling 100% compatible with SiC Ceramic honeycomb.

EFFICIENT

90%

Reductions in time and cost process

It only lasts 10 days.

76%

More energy efficient process

Top necessary temperature less than 200 °C.

CLEAN AND CLIMATE FRIENDLY

63%

Lower environmental impact

CO_2 emissions are Dramatically reduced.

It's a matter of time…

Bidasoa Metal 78, S.L.

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