



# Disruptive Precious Metals Recycling

4<sup>th</sup> EDITION

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INTERNATIONAL  
CIRCULAR  
ECONOMY  
MEETING

**January 2022**

# 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

## SHAREHOLDERS

### Founders

- Management Team
- Technology Center

### Investors

- Pension Fund **GEROA**
- Venture Capital **clave**

### Strategic Partnership

- Engineering **EIA<sup>21</sup>**

# OUR TECHNOLOGY ®

Main Advantages - 1.- TIME

## 1. PROCESS TIME REDUCTION (10 vs 100 days)

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



## Main Advantages – 2.- Journey to ZERO emissions

### 2. NO FURNACES / SMELTERS

- ✓ Higher **energetic efficiency** (less than 200°C).
- ✓ Another additional reduction in **Process Cost**, and also in Capital expenditures (**CAPEX**).
- ✓ And **Zero CO<sub>2</sub> emissions** associated to furnaces:
  - In the whole process, our **emission 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”

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** (carbon base and ceramic support), and **chemical** and **petrochemical industries**.
- ✓ **H<sub>2</sub>** generation, storage and transportation
  - ✓ PEM electrolysis cathodes directly
  - ✓ Anodes with previous treatment



# OUR TECHNOLOGY ®

Accessible, green and controllable

**STANDARD REAGENTS**

**Commercial, Cheap and Available**

**NO COLLECTOR  
METALS**

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

**INDUSTRIALIZABLE**

**Chemical-Physical Route**

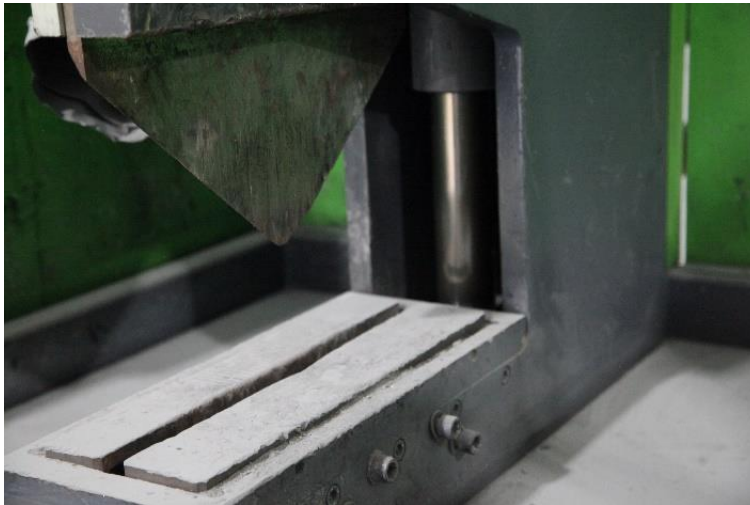
**AUTOMATABLE**

**Control**

## Phase - 1

### 1. GRINDING

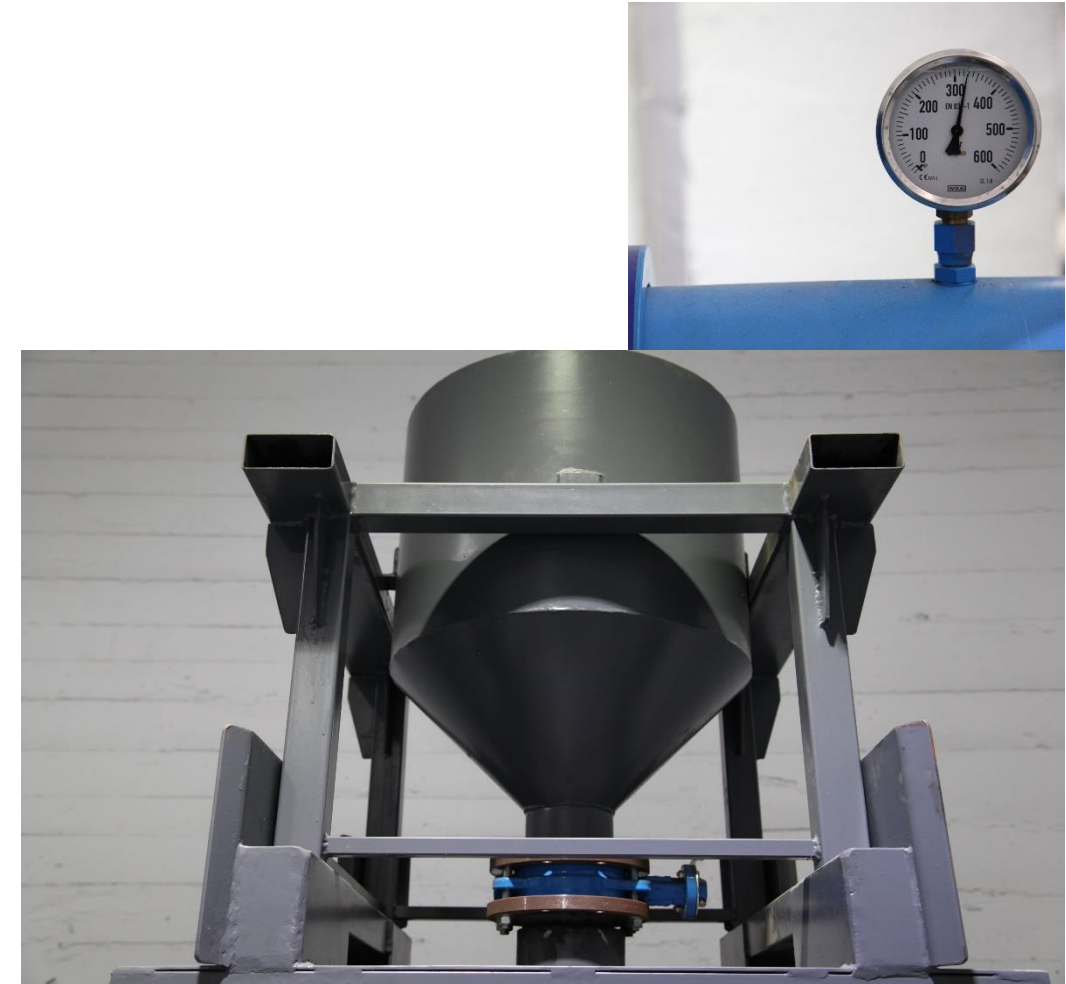
- ✓ Specific grinding system: fast, continues and compact process.
- ✓ Great **control of particle size** and contamination agents.





### 2. PHYSICAL-CHEMICAL PROCESS

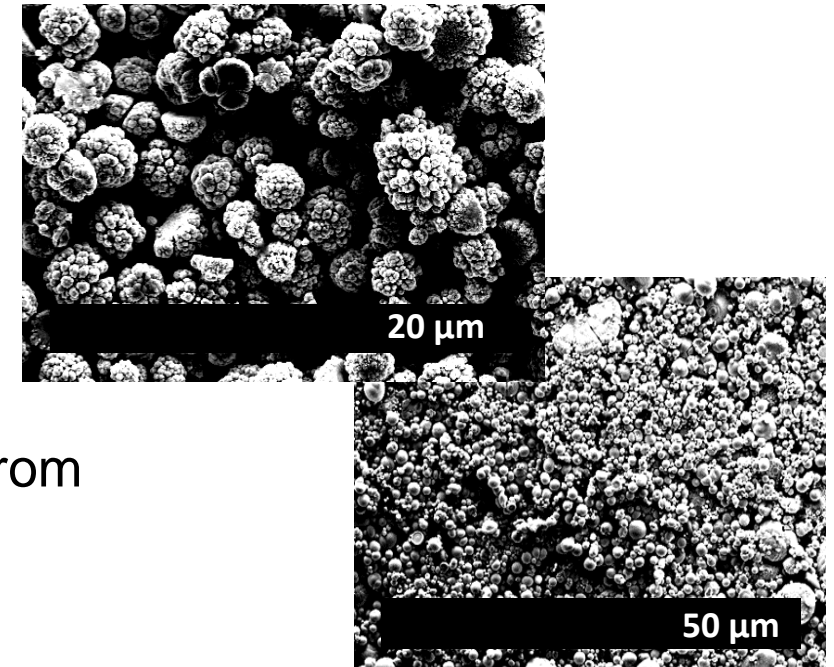
- ✓ Extraction and precipitation of the PGM in a **solid concentrate form**.
- ✓ **Combination of five different steps:** leaching steps, redox reactions...
- ✓ A **good control of parameters** (time, temperature, reagent proportion...) is critical to obtain a high yield in the process.
- ✓ Recovery: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



## 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...

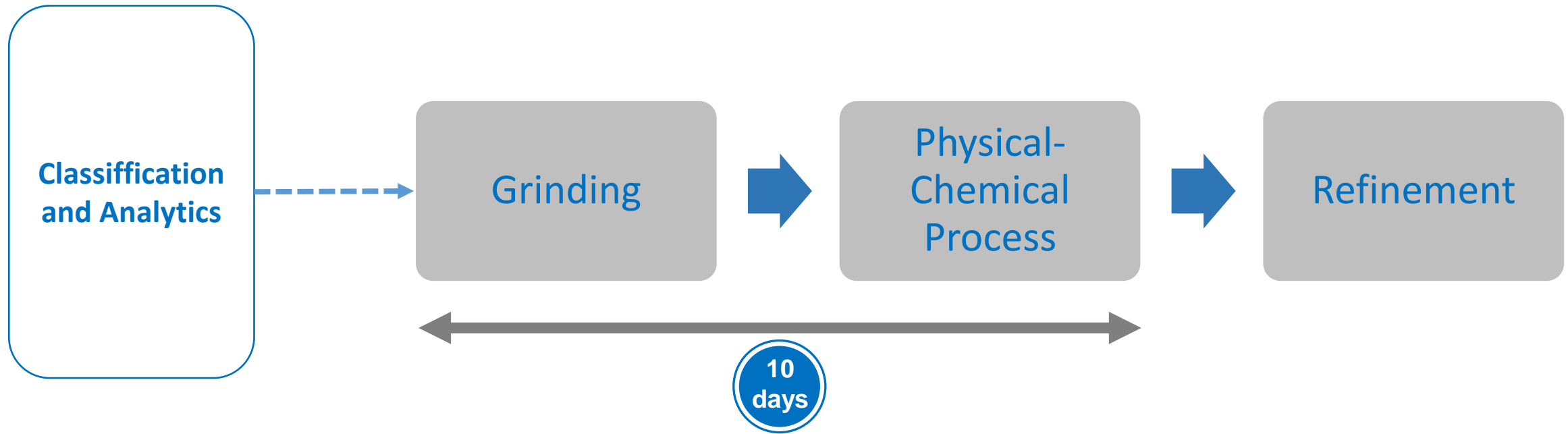


### Phase - 3

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

# OUR TECHNOLOGY

Three phases plus analytics



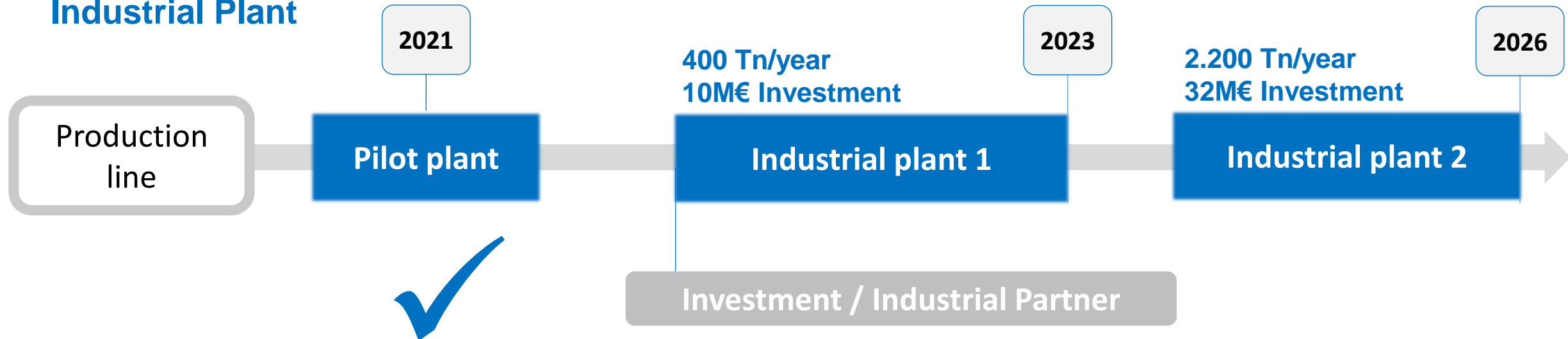
# OUR ROADMAP

The PGM Industrial Recycling Plant of the Future.

## Current Facilities of the validated Pilot Plant

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

## Industrial Plant



# MAKING THE PGM RECYCLING MORE

## 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 takes 10 days.

**76%**



**More energy  
efficient process**

Top necessary temperature  
less than 200 °C.

## CLEAN AND CLIMATE FRIENDLY

**63%**



**Lower environmental impact**

CO<sub>2</sub> emissions are  
Dramatically reduced.

**It's a matter of time...**

# BIDASOA METAL 78 S.L.

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