



# EASME session at RM Summit 2020

## 2<sup>nd</sup> part: H2020 and EIT RawMaterials synergies

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### Coordinators



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Project Agreement Number: 730224

Project Agreement Number: 19148

# Why PLATIRUS Project?

## Platinum Group Metals (PGMs) are *Critical Raw Material*

- **Commercially important:** jewelry, automotive, electronics
- **Europe highest demand** of PGMs in the world

**Risk of supply:** Deficit between demand and current supply. Imported from countries of geopolitically unstable areas.

**Environmental Impact:** High CO<sub>2</sub> emissions from mining and primary reserves.

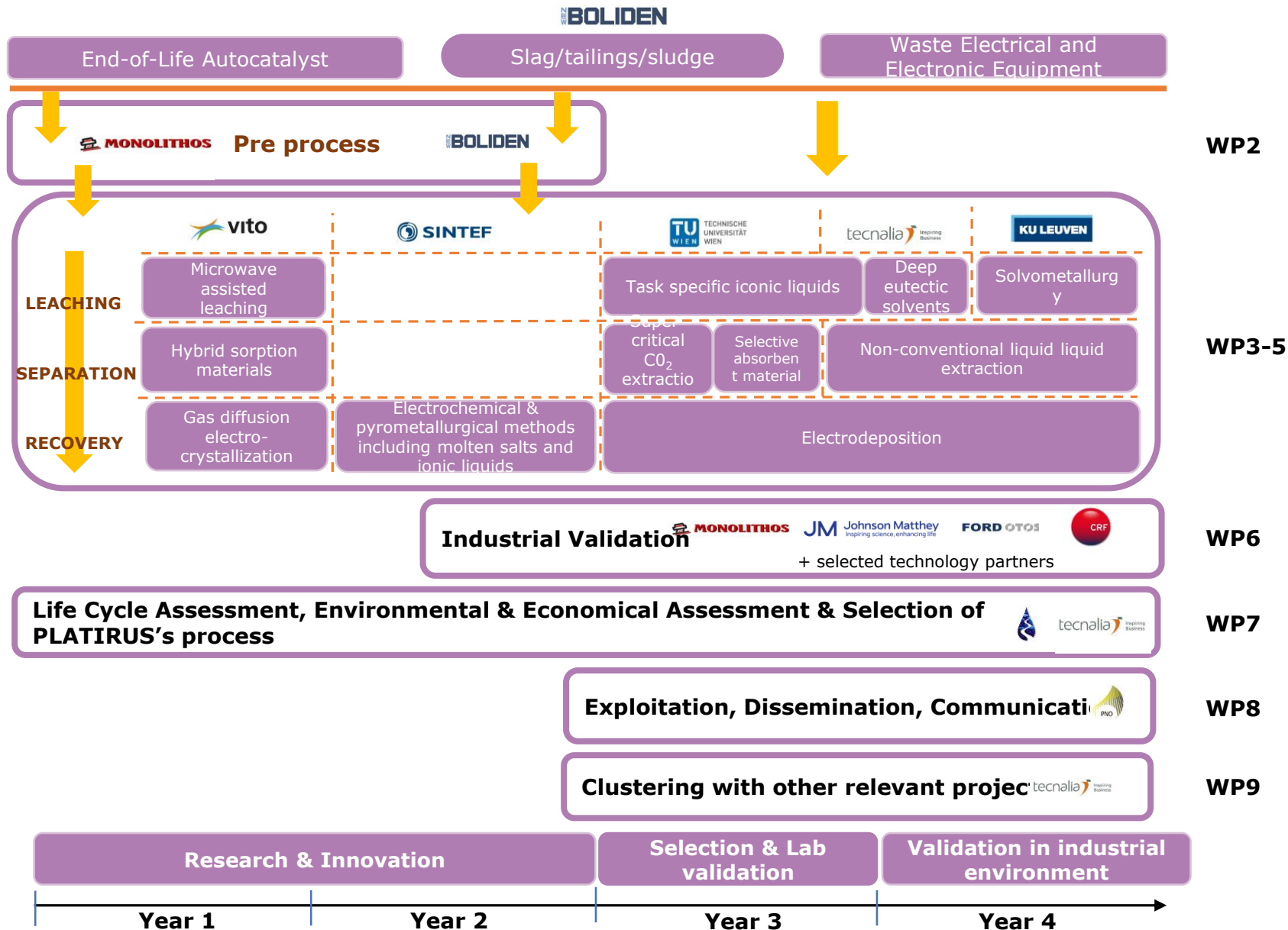
**PGM recycling :** PGMs recovery from end-of-life autocatalysts has potential impact in the supply-demand gap. However, current recycling processes are energy consuming and require high capital investment costs.

## PLATIRUS project PLATInum group metals Recovery Using Secondary raw materials

### GENERAL OBJECTIVES

- ☐ Development of a novel cost-efficient PGMs recovery technology based on ionometallurgy, solvometallurgy and hydrometallurgy
- ☐ Energy reduction and miniaturization
- ☐ Reduction of environmental impacts
- ☐ Large industrially relevant scale (TRL 5)

# PLATIRUS value chain, partners and their roles



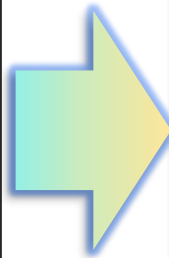
| No | Innovation Title                                                                                                                                                           | Market Maturity of the Innovation | Partner            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|
| 1  | Advanced leaching of PGMs from automotive catalyst materials                                                                                                               | Market ready                      | VITO               |
| 2  | Improved ionic liquids leaching and pre-concentration of PGMS from spent car catalysts                                                                                     | Market ready                      | KULEUVEN           |
| 3  | PGMs recovery by Gas-Difussion Electrocrystallization (GDEx)                                                                                                               | Market ready                      | VITO               |
| 4  | Process for recovering PGMs from material like ores, tailings and recyclates by selective chlorination and subsequent reduction into metals in a molten salt rection media | Market ready                      | SINTEF             |
| 5  | Process from separation of PGMs and gold (Au) by split-anion extraction with ionic liquids                                                                                 | Market ready                      | TWIEN and KULEUVEN |
| 6  | Regenerable solid phase extraction (SPE) material to selectively separate PGMs meytals                                                                                     | Market ready                      | VITO               |

## CEBRA as Circular Economy Model for PGMs sustainability

- EIT Raw Materials Upscaling project (**TRL5 to TRL7**).
- Grant amount: 1,996,860 €
- Duration: **36months** 01/01/2020 – 31/12/2022
- CEBRA combines **Novel Process Innovation Technologies** PLATIRUS and PROMETHEUS (GA: 778893) delivering a Circular economy model for PGMs sustainability.

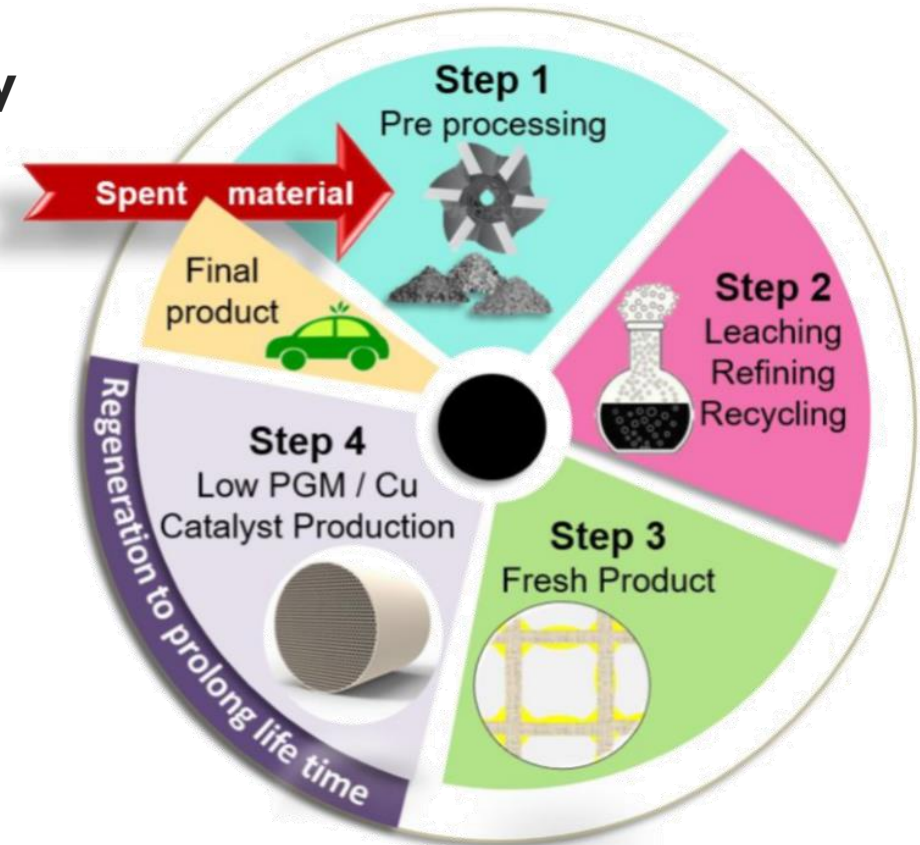
### Problem:

PGM are classified as Critical Raw Materials (**CRMs**). The EU is **dependent** on PGMs' imports (*South Africa and Russia*).



### Solution of CEBRA:

1. Integrate **100% recycled PGM** in the manufacturing of automotive catalytic converters (ACC).
2. Perform **partial substitution** of PGM by copper (*lower-cost and politically less sensitive*).





### MONOLITHOS Circular Economy Model:

*Production of new ACC, based on recycled PGMs from spent ACC*



## CEBRA as Circular Economy Model for PGMs sustainability

### OBJECTIVES:

- **Manufacture a new class of ACC within three years of the termination of the CEBRA.**
- **Upscale at TRL7 two innovative technologies currently at TRL5:  Platirus and  Prometheus**
- **Construct a pilot plant for ACC production with a PGM mixed-metal active slurry.**

Novel outcome of **CEBRA**

**'Recycle & Substitute'**

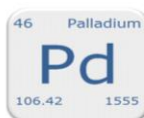
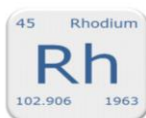
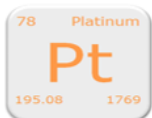
*Substitution of **60%** PGMs with Cu  
&  
Re-use of **100%** Recycled PGMs*



## CEBRA & PLATIRUS synergy

**Richest secondary resource in PGMs: Pt, Pd, Rh (2-5g PGMs per ACC)**

**Processing of 4 Kg of spent ACC equals to mining of 1,000kg PGMs ores**



**Spent catalyst collection & sorting & pre-processing**



**A novel cost-efficient PGMs recovery technology based on energy reduction & eco-efficiency**

**European Patent: REE extraction by DES (No: EP17382134)**

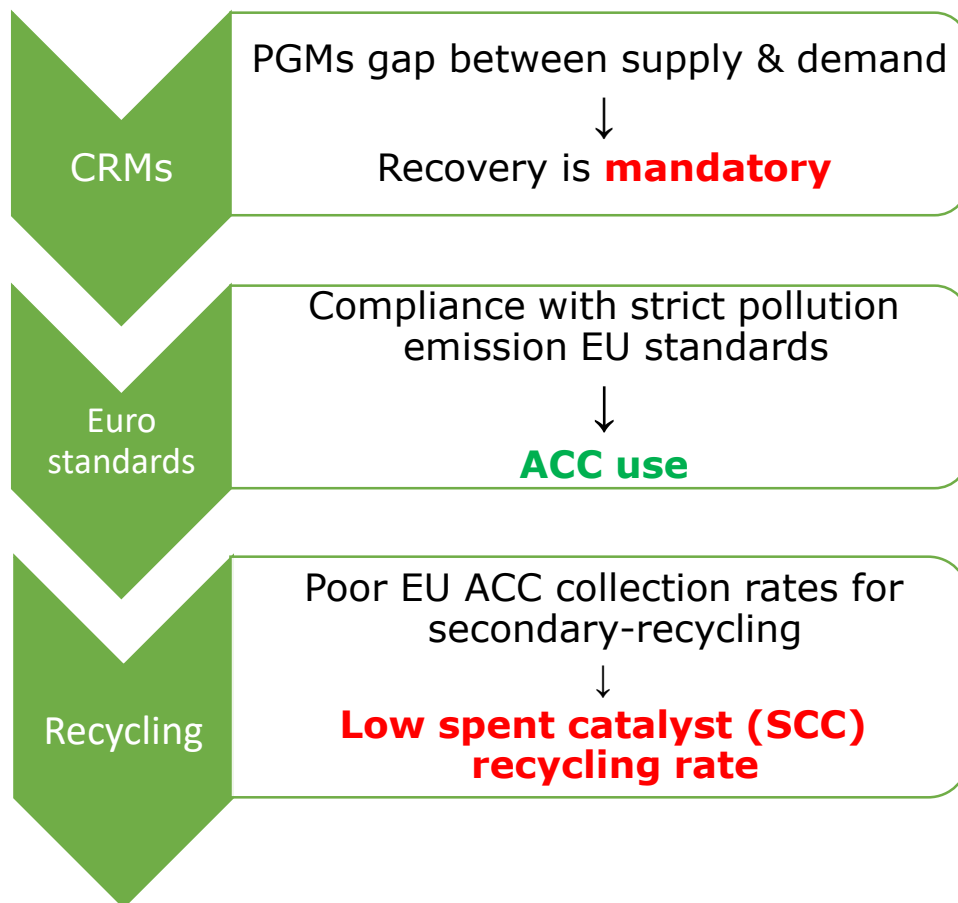
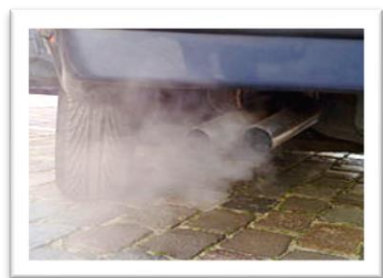
**Mature technology on PGMs recovery: Deep Eutectic Solvents - DES (TRL5).**

**Novel ACC design by decreasing PGMs quantity via partial substitution by Cu along with the re-use of 100% recycled PGMs.**

**A novel full-scale catalyst with 85% less PGMs and same performance with commercial catalyst**

**European Patent has been granted on November 2019 (EP3569309)**

## CEBRA Challenges



## CEBRA Resources



Experts for spent ACC collection



Experts for spent ACC pre-processing



Experts for spent ACC recycling



Technological equipment for ACC manufacturing



Financial resources during CEBRA execution



Value chain for CEBRA follow-up



## CEBRA Impact, Results & Outcomes

### IMPACT

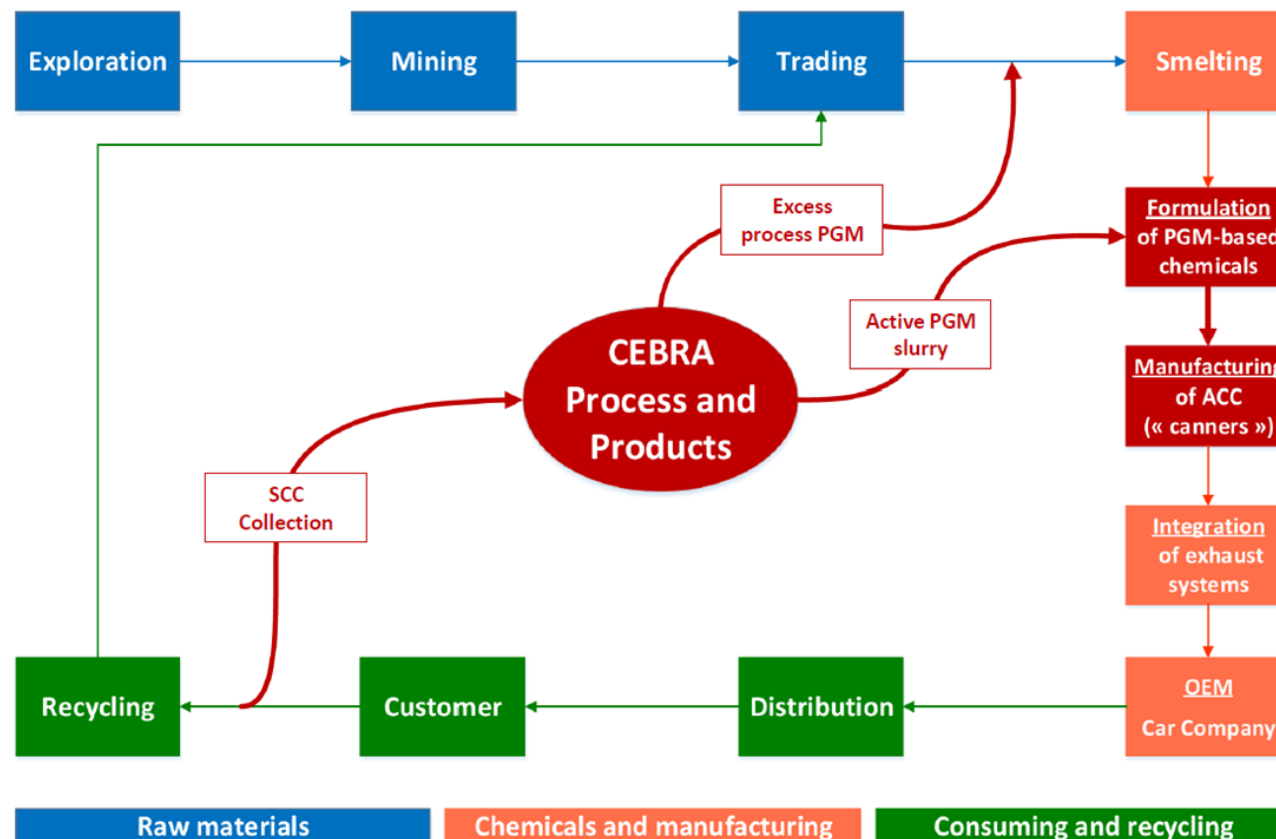
- Securing raw materials supply
- Designing materials solutions
- Raise consumer awareness to collect ACC

### OUTCOMES

- Production of 20 full scale catalysts
- Commercialization of CEBRA product
- Value chain recycling network

### RESULTS

- Environmental and economic sustainability
- Raised awareness on SCC recycling
- Drive innovation, education



CEBRA ACC placed on the market

Optimized network system for spent ACC collection

Bring technology to pyrometallurgical recycling companies

## Conclusions

- *ACC recycling is crucial for European and global policy priority*
- **CEBRA:**  
*Integrated Circular Economy Business model for decoupling Europe from PGM supply*
- **PLATIRUS:**  
*upscaling a novel cost- and energy-efficient, miniaturized PGM recovery and raw material production process.*
- **CEBRA & PLATIRUS upscaling benefits:**
  1. Key Enabling Technology contributing to **PGMs sustainability at a significant extent**
  2. Fabricating novel full-scaled ACC with low PGM quantity, 100% recycled, with superior performance
  3. Raise awareness about **spent ACC collection & recycling**



# Platirus

***The PLATIRUS project is funded by the EU in the frame of Horizon 2020 TOPIC SC5-13-2016 grant agreement number 730224.***

<https://www.platirus.eu/>

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**Thank You**  
**For Your Attention**



***The Cebra project is funded by the EU in the frame of Horizon 2020 agreement number 19148.***

<https://www.cebra-eitproject.eu/>