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# Precious Metal Catalyst Treatment in Plasma Heated Reactors

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# What will we discuss today?

- Basic considerations and background
- Example of economics
- What is the solution?
- PGE sampling and assay



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# What will we discuss today?

- Processing spent catalysts
- Environmental issues
- Basic rules for selecting the most effective refiner



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# Background and Considerations I

- PGE catalysts contain: Pt, Pd, Rh
- In some cases Re
- Ceramic support carriers
- Special case – activated carbon base
- Other PGE wastes



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## Background and Considerations II

- PGE – substantial cost burden
- Lease rates vs. Purchase considerations
- Goal of catalyst owner: highest recovery rates, short reclamation turnaround at competitive price



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# HOW TO ACHIEVE THIS?

**CHOOSE THE MOST  
EFFECTIVE REFINER**



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## Case to consider I

- 40t of Pt catalyst, 0.6% Pt equals 240kg Pt
- Value \$12M, lease rate 6%
- Weekly costs \$14,000
- Yearly \$728,000
- Reclamation turnaround difference 6 weeks
- Cost difference \$84,000



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# Need for Optimum PGE management

- Negligence leads to poorer returns
- Analyzing and questioning refiner
- Specialised department
- Wrong refiner – costly consequences



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## What is the solution? I

- PGE refiners and different technologies
- Processes and procedures in value added chain
- Subcontracting the job
- Results in higher final costs



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## What is the solution? II

- Plasma heated reactors
- Value added chain under one roof:
  - Sampling and Assay
  - PlasmaEnvi arc furnace
  - Environmental technologies
- Highest value and returns to the catalyst user



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# Disadvantages of Plasma Process

- Need of highly-educated personnel
- Relatively high investment costs



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# SAMPLING

- Reducing large quantities to smaller portions
- State-of-the-art equipment
- Effective sampling protocol



# ASSAYING

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- Based on instrumental technique, AA, ICP
- Risk of exaggerating this aspect

## WHY?



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## Case to consider II

- High analyte concentration, deviation 0.01% relative
- Envi labs low analyte concentration, deviation 25% relative
- PGE labs – 1% relative on 0.1% level
- High PGE precision – precise **sampling protocol**



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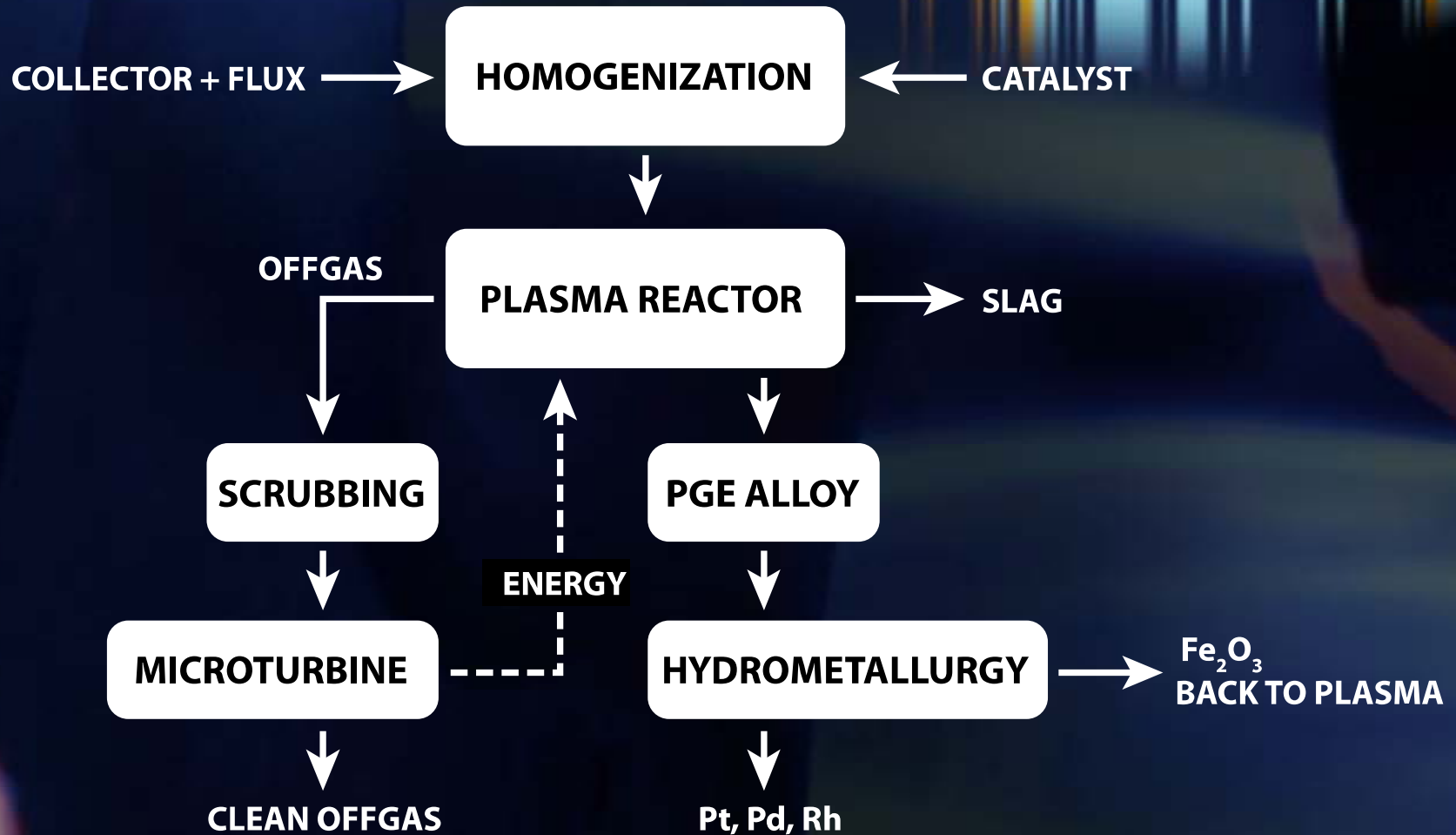
# Processing spent PGE catalysts

- Plasma process with novelty features
- DC installation with reverse polarity
- PGE collection in magnetic collector
- Direct hydrometallurgy follows
- Plasma process requires fraction of the time when compared to conventional processes



# Plasma Process

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# Environmental Issues I

- Risk of fines for catalyst owner
- Hazardous wastes of catalyst treatment
- Inherent risk in subcontracting treatment job
- Liability of catalyst owner



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# Environmental Issues II

- Whole reclamation system in-house
- Solid, liquid, gaseous streams under one fluid process
- Major advantages of Plasma process:
  - vitrified nonleachable slag,
  - synthesis gas



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# Environmental Issues III

- Plasma process – no landfilling waste
- Emission 20 times lower than current EU legislation **WHY?**
- Microturbine technology
- Energy regeneration min. 60%

# Basic rules for selecting the most effective PGE refiner



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- Look for one using the plasma process
- Inspect refiner's treatment flowsheet
- Put main emphasis on sampling protocol
- Assay lab equipped with AA and ICP
- All processes should be in-house
- Ask for environmental documentation
- Require to be present during sampling



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## Summary

Precious metals business procedures require great consideration by both cooperating parties. It is important to manage the reclamation process with thoroughly-researched and efficient methods. By selecting both the Plasma process for reclamation and an effective refiner, you are sure to reach the most profitable *and* responsible business solution.