TECHNOLOGY FOR USING RECYCLED PERMANENT MAGNETS

UrbanGold recycling for a green future

meltop WE PUSH BOUNDARIES

EM-TECH

Copper recovery ensures process viability

Enables permanent magnet recycling despite cost barriers

Provides insights into future EPR in e-motor

CHALLENGES:

Electric motors contain both copper, which is highly valuable, and permanent magnets made of rare earth elements (REE), which are critical but costly to recycle. Current recycling methods often neglect magnet recovery.

SOLUTION:

Within EM-TECH, UrbanGold's team developed an end-of-life scenario that aims to recover both copper and permanent magnets. Copper drives most of the economic return (profit driver), while magnets represent the main processing cost (cost driver). Nevertheless, their work demonstrates that magnet recycling is technically feasible and essential for closing material loops.

The Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) show that the process reduces environmental impacts compared to virgin production. The cost structure and revenue stream clearly highlight that recycling e-motors can be profitable through copper but requires supportive frameworks to ensure magnet extraction. These findings provide valuable guidance for establishing Extended Producer Responsibility (EPR) in specific e-motors with permanent magnets. The introduction of EPR schemes may also imply adjustments to the End-of-Life Vehicle (ELV) Directive to guarantee the systematic recovery of critical materials. Next steps include conducting a market study of available end-of-life e-motors, mapping acceptance facilities within existing vehicle recycling systems and a business model exploration. This will provide the necessary basis for integrating magnet recovery into future EPR schemes.

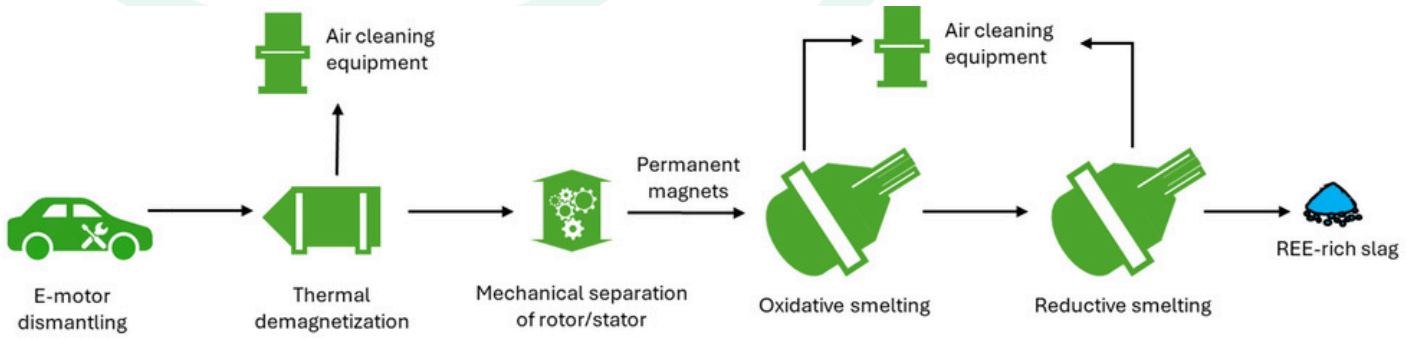

Figure 1: Proposed end-of-life scenario

Funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101096083. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor the granting authority can be held responsible for them.