umicore
materials for a better life

Challenges to Secondary Production of CRMs

10th CRM DAY

Brussels, 21 March 2018

Who we are

A global materials technology and recycling group

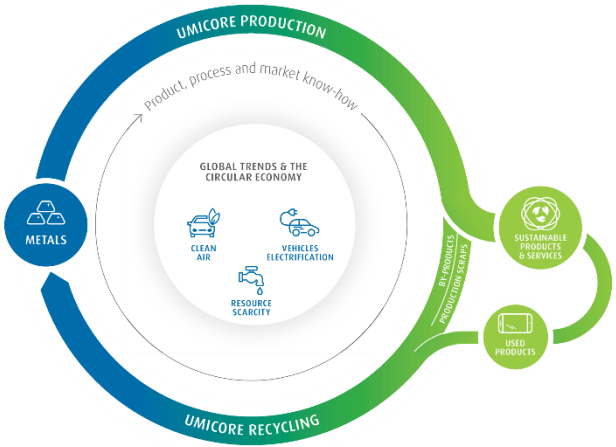
One of three global leaders in emission control catalysts for light-duty and heavy-duty vehicles and for all fuel types

A leading supplier of key materials for rechargeable batteries used in electrified transportation and portable electronics

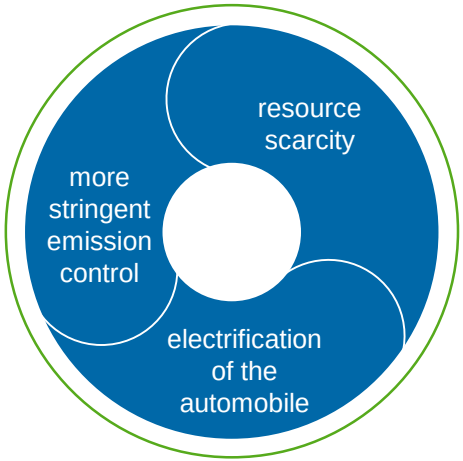
The world's leading recycler of complex waste streams containing precious and other valuable metals

Our foundations

Unique business model



Supportive megatrends



Industry leader in sustainability

Challenges to Secondary Production of CRMs

- Collection of waste
- Transport of hazardous waste
- Fate of final fraction of recycling

Collection of waste

Example: Portable L-ion Batteries

- Li-ion batteries contain CRMs: Co, F, natural C
- World wide, < 5% of Li-ion batteries are collected
- Co recycled from EU portable batteries, put on market > 3 years ago, would be enough to ‘fuel’ > 400 000 EV’s
- This year, an amount of Co to ‘fuel’ 2 M EV’s will be put on market in electronic devices; potential to recycle in 2023, but will be lost, if we don’t collect 

Li-ion batteries: access for recycling

Where are all those batteries?

- Hoarding effect: although use phase of consumer electronics is < 3 years, average age of *collected* Li-ion batteries is > 6 years (study Möbius); the study doesn't estimate the age of wasted or 'not in use' *non-collected* batteries
- Not removed from WEEE: batteries that are not removed form WEEE is WEEE-dismantling facilities are lost for recycling
- Export of EEE for 2nd hand use. 2nd hand use in developing countries is OK, but they way how end of life EEE is treated is not
- Waste bin: significant traces of Co and Li in municipal waste incinerator bottom ashes

In general: a lot of CRM's from electronics are lost due to poor collection, inappropriate product design, substandard treatment; illegal/dubious export

Transport of Hazardous waste

Waste classification is not harmonized ➔ goods blocked in transit countries. Example:

- **Electronic scrap**
- **Considered in Hungary, Austria and Belgium as non-hazardous waste**
- **And during a control in Germany: hazardous waste**

STRICTEST PROCEDURE WILL BE APPLIED – NOTIFICATION PROCEDURE

- Different Member States = different items in the notification file
- Systematic requests for additional information
- Exceeding of time frames

Fast Track procedure for pre-consented recovery facilities

1 2 3 4 5 6 7

~~1. SUPPLIER SENDS COMPLETE NOTIFICATION FILE TO COMPETENT AUTHORITY (DISPATCH - DESTINATION)~~

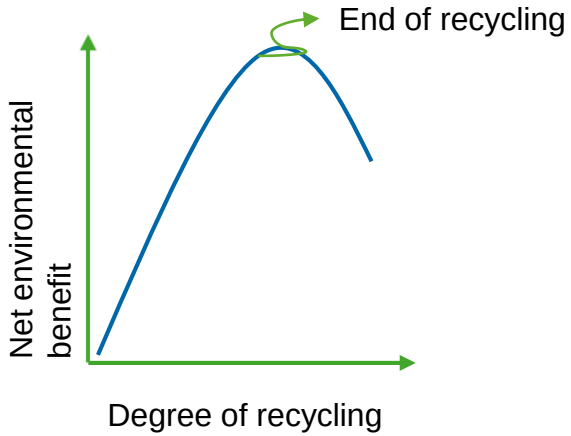
~~2. COMPETENT AUTHORITY SENDS AKNOWLEDGEMENT AND REQUEST FOR ADDITIONAL INFORMATION (3 DAYS)~~

~~3. COMPETENT AUTHORITY SENDS FINAL DECISION (30 DAYS)~~

4. SUPPLIERS SENDS PRE-NOTICE (3 DAYS IN ADVANCE)
5. TRANSBOUNDARY TRANSPORT TAKES PLACE
6. RECYCLER CONFIRMS RECEIPT OF THE WASTE (WITHIN 3 DAYS)

~~7. RECYCLER CONFIRMS RECYCLING OF THE WASTE (WITHIN 1 YEAR)~~

Fate of final fraction of recycling



- Recycling should end when further processing doesn’t deliver further environmental benefits; on the contrary: further recycling will create environmental burden instead of credits
- The endpoint can shift to the right thanks to new technologies or better product design
- But anyway: there will be a ‘final fraction’: what to do with that?

Example of final fraction: metallurgical slag

Encyclopaedic definition:

Slag = A nonmetallic product resulting from the interaction of flux and impurities in the smelting and refining of metals.

Slag consists mainly of ‘inert’ materials (SiO_2, CaO, Al_2O_3, …) but always contains some miner traces of heavy metals. They can be designed to be used in construction, but there is a risk of leaching of heavy metals (maybe in a 2nd life) ➔ use restriction

Options:

1) Further purifying ➔ energy cost/CO_2-footprint
2) Use (with restrictions) ➔ risk of leaching metals
3) Landfill ➔ land use and delayed leaching risk

} Environmental impact assessment

“Closing the Loop”

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