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End-of-Life e-Vehicles
And what about the batteries?

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Umicore

International Transport Forum

Decarbonising Transport Initiative

EXPERT WORKSHOP

Mapping standards for low- and zero-emission electric heavy duty vehicles

17-18 February 2020 – Paris, France

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

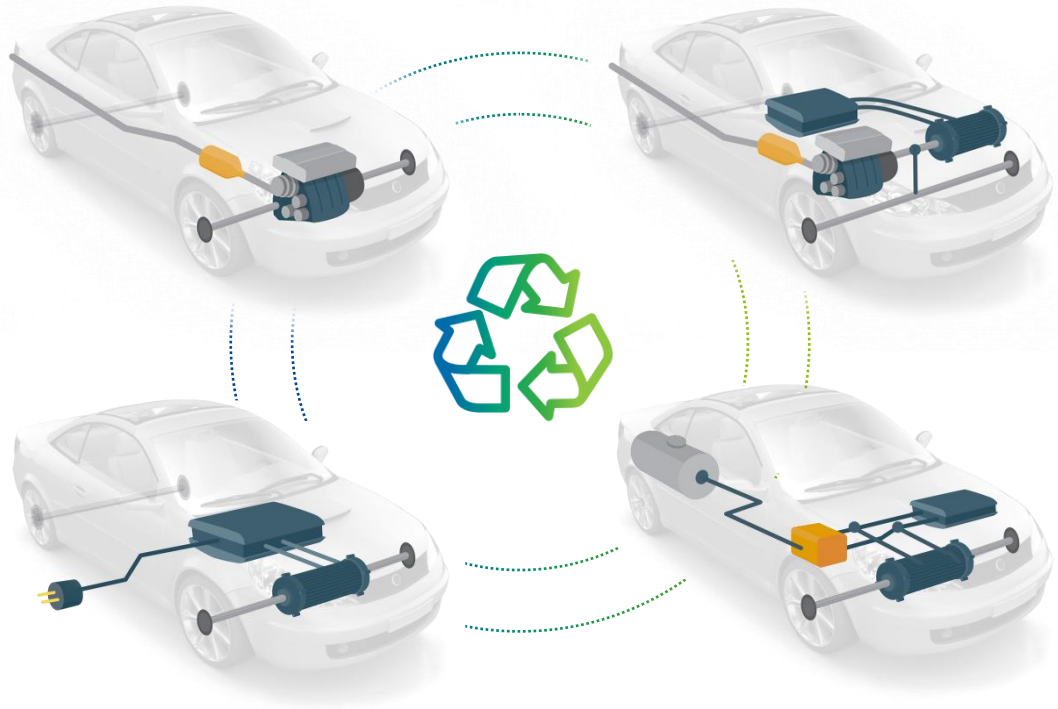
The world's leading recycler of complex waste streams containing precious and other valuable metals

Unique position

in clean mobility materials

ICE
Emission control catalysts

BEV
Battery materials

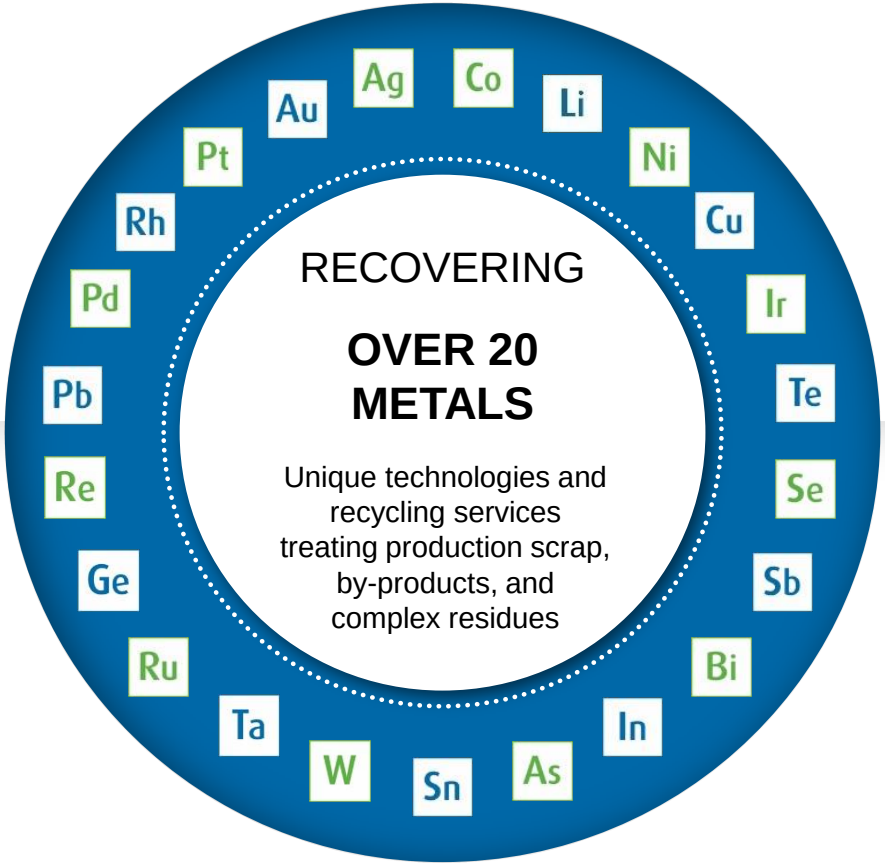


(p)HEV
Battery materials and emission control catalysts

Fuel cells
Electro-catalyst and battery materials

Unique position

in recycling



Regulatory Framework ELV-Batteries

Ruled by two outdated Directives and one non-existing Regulation

- End-of-Life Vehicles Directive ➔ not designed for EV's
- Batteries Directive ➔ not designed for Li-ion batteries
- Ecodesign 'Batteries' Regulation ➔ traceability to improve 2nd life and recycling

} Merger?

End-of-Life Vehicles Directive

It’s easy: remove the batteries

Regulatory uncertainty: how to include battery recycling efficiency in the ELV-recycling target?

Removal of batteries is mentioned as a ‘depollution’ operation, not as an operation to ‘promote recycling’

The first Mercedes HEV contained 600 kg of batteries ➔ impact on ELV recycling target

HTTP://WWW.AUTOFANS.BE/REPORTAGES/VARIA/35453-ELEKTRO-DINOS-MERCEDES-W123-PLUG-HYBRID

Batteries Directive

2nd life or recycling?

Inauguration ESS system consisting of used EV-batteries (Umicore – Engie project)

Regulatory uncertainties:

- Batteries have to be recycled, but is 2nd life a way of recycling?
- Who has recycling obligations after 2nd life?

Batteries refurbished out of control of 1st producer ➔ 2nd producer should take Extended Producer Responsibility

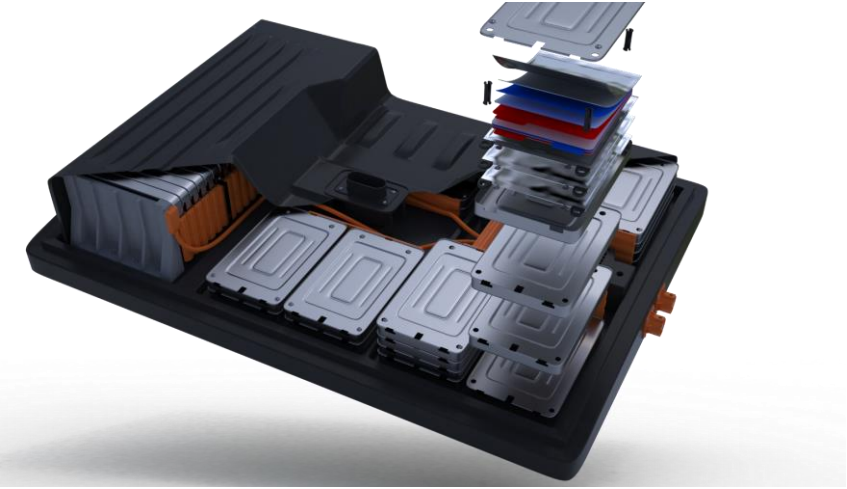
Batteries Directive

2nd Life: what about exported batteries?

- Export of 2nd hand materials is often a disguise for export of waste
- Even real 2nd hand materials have an end-of-life phase! Are we ready to take them back if no decent local recycling facilities would exist? Look what happens with WEEE and Pb-batteries!

Batteries Directive

Recycling: is it a Battery or a Pack?



Regulatory uncertainty:
BD imposes a recycling-target of 50% w/w of the battery, excluding the ‘pack’ materials.
However, unclear whether an EV battery-pack is a Pack or a Battery?

An EV battery (pack) consists of 60% w/w of cells; the other 40 % are steel, Al, Cu, electronics ➔ after dismantling and sorting, easy to recycle. Are they counted for RE? If yes ➔ low regulatory stimulant to recycle cells

Batteries Directive

Recycling Efficiency: quantity or quality?

Black mass from shredded batteries

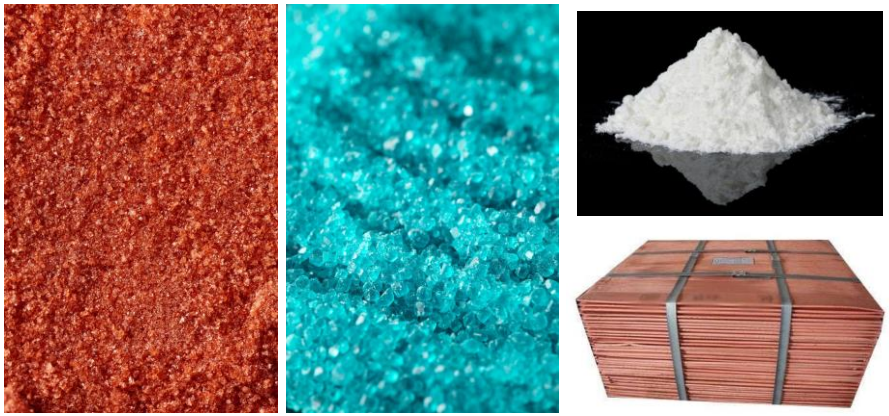
50% losses during refining!

Regulatory uncertainty: What is a qualified output fraction? End-of-Recycling criteria are unclear, confused with End-of-Waste

High RE-numbers can be obtained by reporting on intermediates with EoW status, containing O, C, H, that are emitted as H_2O and CO_2 in a later refining stage

Batteries Directive

Recycling Efficiency: quantity or quality?



Co-, Ni-, Li-salts and Cu cathodes

Regulatory (lack of) ambition:

- ‘how much’ is a qualifier for collection
- ‘what, how, yield’ are qualifiers for recycling

- Instead of ‘high’ but blunt RE-targets, the ambition should be to go for high yields for metals that matter, in processes with a low environmental impact
- From a Circular Economy perspective, the most important elements to recycle from EV-batteries are Co, Li, Ni and Cu.

➔ industry standard, complementing a reviewed BD?

Eco-design Batteries (sustainability requirements)

Can this (future) Regulation contribute to battery recycling?

https://flipthefleet.org/resources/nissan-owners-how-to-scan-your-battery/

Regulatory draft:

- Traceability: whereabouts, use-profile
- Information: disassembly manual

Information on a need-to-know basis along the value chain. From a resource perspective, following information would be useful:

- primary sourcing (responsibly sourced materials?);
- state of health (suited for second life?);
- 1st producer and last owner (to know who has to hand in the battery to whom for recycling);
- dismantling instructions (not only to know, but also to oblige pack designer to think about disassembly)

Legislative framework End-of-Life treatment

Proposals

ELV:

- Clear cut with BD: once a battery is removed from ELV ➔ BD
- Don’t include battery RE in ELV RE because other calculation method

BD:

- No-nonsense approach: circular economy as driver for recycling targets
  - Clear EPR-rules for 2nd life batteries
  - Specific RE for Li-ion batteries with focus on metals that matter
  - Distinction between EoW and EoR to ensure quality recycling

Ecodesign (sustainability requirements)

- Design a traceability system including essential information on EoL-management

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