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Umicore’s contributions to a sustainable circular battery value chain in Europe

Umicore 2030 RISE

We are a global circular materials technology company

COLLEAGUES
11,050

PRODUCTION SITES
46

R&D | TECHNICAL CENTERS
15

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

Revenues	Adjusted EBIT	Adjusted EPS	R&D spend
€ 4.0 bn	**€ 971 m**	**€ 2.77/share**	**€ 245 m**

Mobility transformation radically accelerating

Uniquely positioned to help the world transition to cleaner mobility

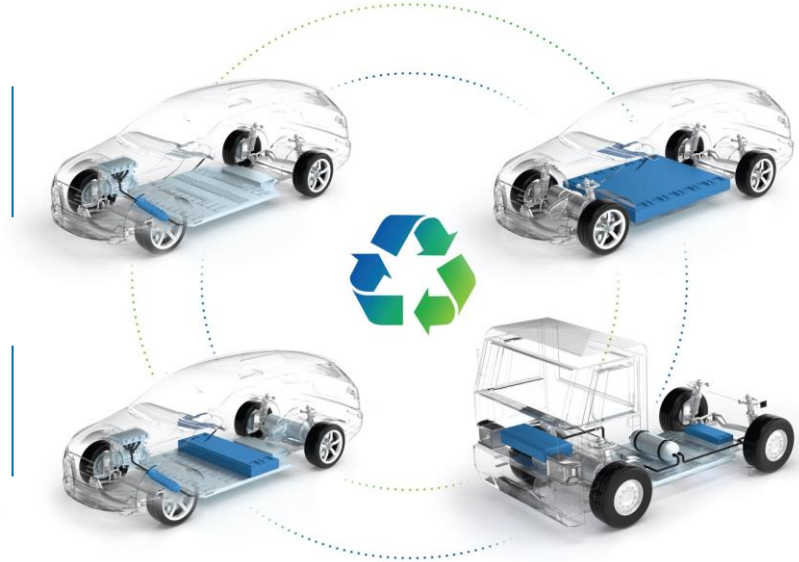
ICE equipped vehicles will remain the dominant clean mobility drive train for the next 10+ years

Internal Combustion Engine

Emission control Catalyst

Plug-in Hybrid Electric Vehicle

Battery active materials and emission control catalysts



Full Electric Vehicle

Battery active materials

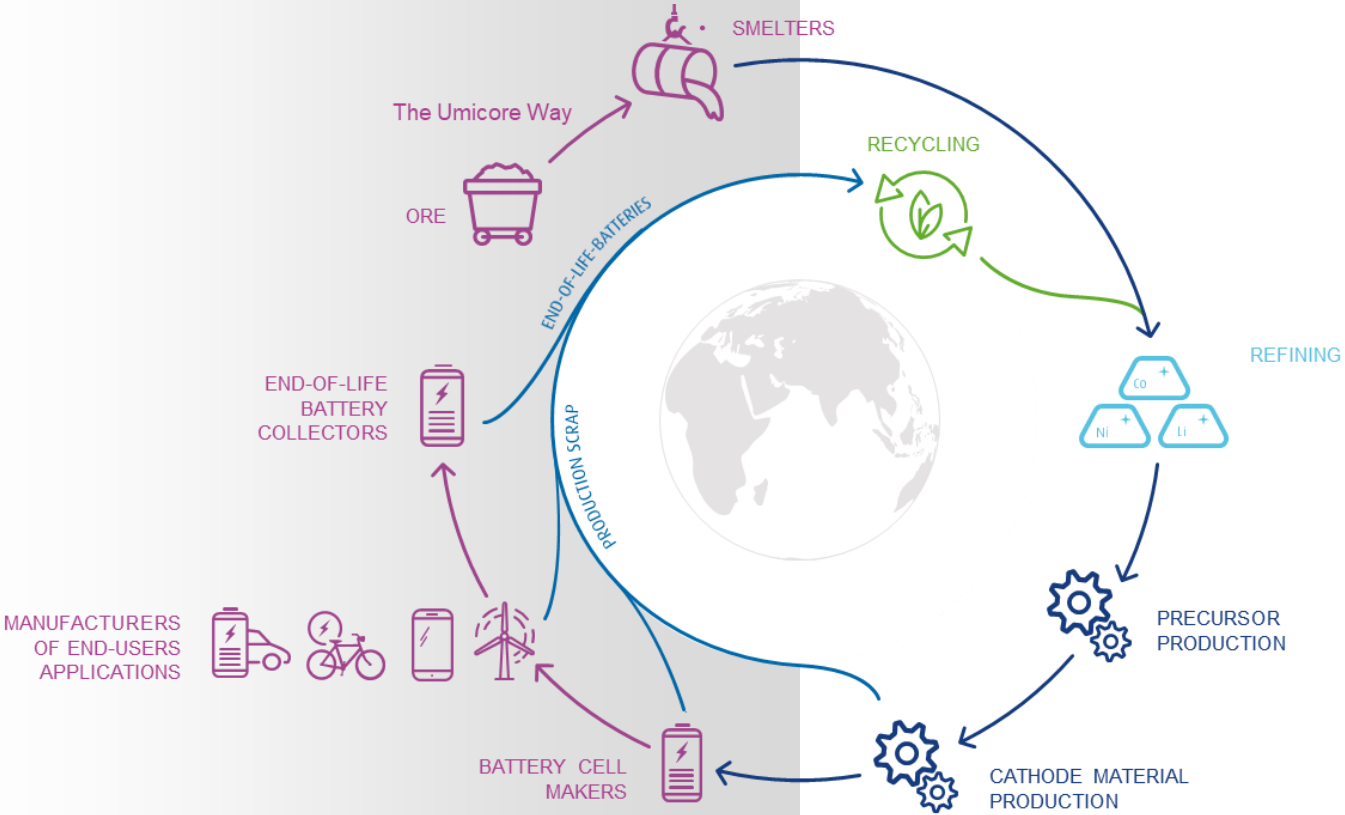
Fuel Cells Vehicle

Electro-catalyst and battery active materials

Prime electrification path for light transportation

Prime electrification path for heavy transportation

Umicore in the battery value chain



We are a global leader in active materials for rechargeable batteries

Global cathode supply chain

Umicore's unique Co/Ni supply chain set-up

Raw materials

Metal

Intermediate
CHIP (Cobalt)
MHP (Nickel)

Recycling

Hoboken, BE

Metal salts

	Asia	North America	Europe
Refining	 Ganzhou, CN Cobalt  Jiangmen, CN Nickel	 Loyalist, CA (Planned)	 Kokkola, FI Cobalt  Olen, BE Nickel
Precursor	 Cheonan, KR  Jiangmen, CN	 Loyalist, CA (2026)	 Kokkola, FI  Olen, BE
Cathode	 Cheonan, KR  Jiangmen, CN	 Loyalist, CA (2026)	 Nysa, PL

The next decade

Arrival of a whole new set of cathode requirements

In 2030, the ideal cathode will have to…

…**Have a significant lower CO_2 footprint**

…Use **cheaper, less volatile** metals

…have considerably **lower production cost**

…Contain **recycled** metals

…Be produced at a volume of **10X** of today's volume

…Work at **higher voltage** & with more challenging **fast charging** conditions

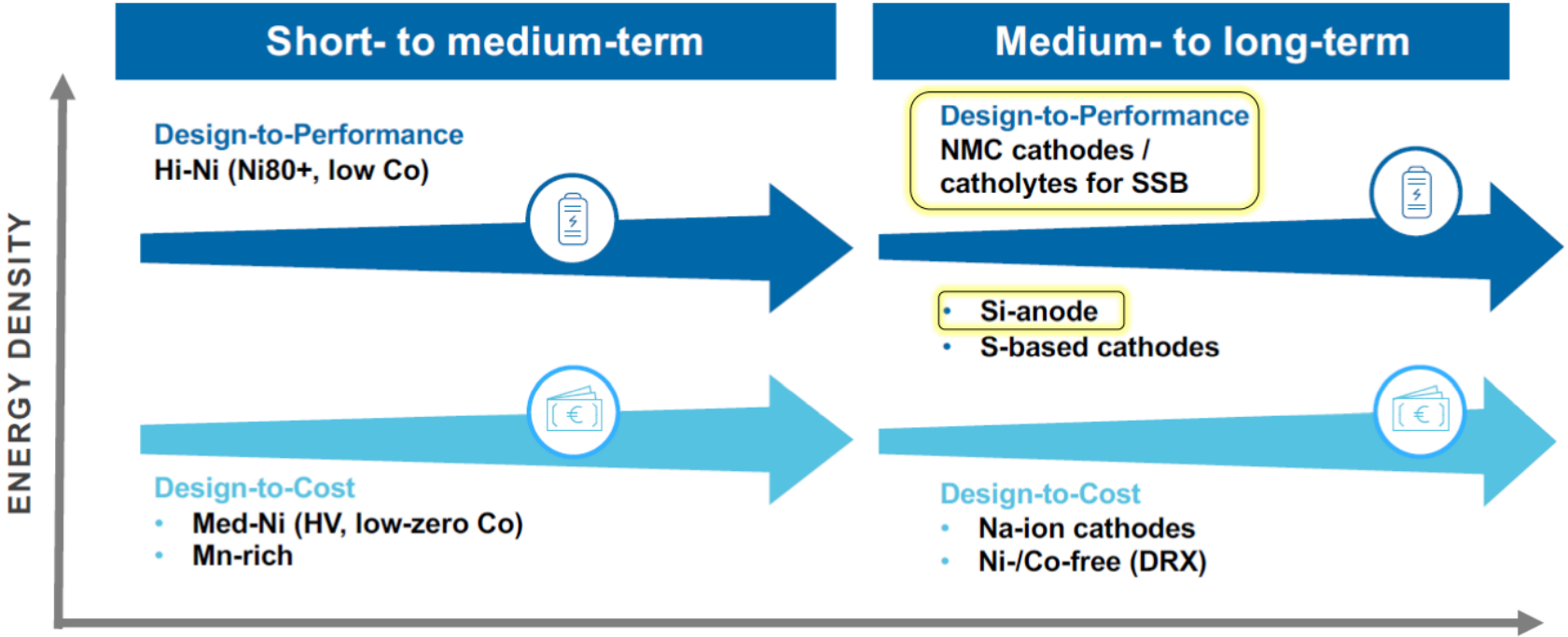
…Produced **in EU**

How is Umicore reacting?

- CO_2 roadmap that reduces footprint over 50%
- Mn-rich cathode materials
- Breakthrough processes
- Closed-loop is up & running
- Ramp-up of EU & North American footprint
- Work on **pCAM & CAM** to ensure performing matrials
- Fully **independent EU** footprint

Cathode materials … A broad chemistry portfolio

Future split into two main development directions



Battery Recycling Solutions

Capture profitable growth in circular battery value chain

Recycled material up to
96% lower CO_2 footprint
vs. primary materials

R Supporting our customers with a circular offering from the start with industrial scale operation since 2011

I Long standing materials and process technology know-how

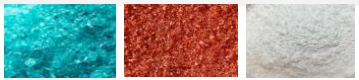
S Embedded sustainability value through sustainable recycling operations

E Over 10 years of pilot scale experience gives a head start to scale to 150kt capacity units

LCA-analyses performed according the ISO14040/44

Leveraging historical competence

Resulting in a simple and highly scalable process

Umicore	Others
Pretreatment (optional)	**Pretreatment** (optional)
Pyro metallurgy 	**Heat treatment (optional)**
	Shredding
	Physical separation
Hydro metallurgy 	**Hydro metallurgy**

- Combining high temperature and wet chemical process steps is mandatory to meet all key requirements
- Pyro-step efficiently reduces complexity in a unique way
- Proprietary Umicore technology covered by more than 20 patents of which already 15 granted

Ambitious path aiming at treating 150 kt input volume by 2030

Where to play

Scale up as frontrunner in Europe and prepare industrial presence in North-America

Plan to build a 150 kt plant in **Europe by 2026** and prepare for **North-America** entry 1-2 years later

Leverage the optimal pyro-hydro balance as differentiating technology

Combining proprietary state-of-the-art pyro- and hydro-metallurgical processes to recycle a wide variety of batteries and production scraps in the most sustainable way

Attract multiple sources for short- and long-term feed

EV-battery production scraps in short-term

End-of-Life EV-battery volumes to rapidly scale in mid-term

Complemented by end-of-life portable electronics

R Reliable Transformation Partner

I Innovation & Technology Leader

S Sustainability Champion

E Excellence in execution

umicore

materials for a better life