SOUTHERN AFRICAEUROPE CEO DIALOGUE 2014 2023 10th Anniversary

The European House Ambrosetti

SOUTHERN AFRICA EUROPE CEO DIALOGUE

10th Edition

Marriott Hotel Melrose Arch - Johannesburg

November 9-10, 2023

PRESENTATION BY STANLEY STEENKAMP

In cooperation with:

GAUTENG PROVINCIAL GOVERNMENT REPUBLIC OF SOUTH AFRICA

GAUTENG GROWTH AND DEVELOPMENT AGENCY

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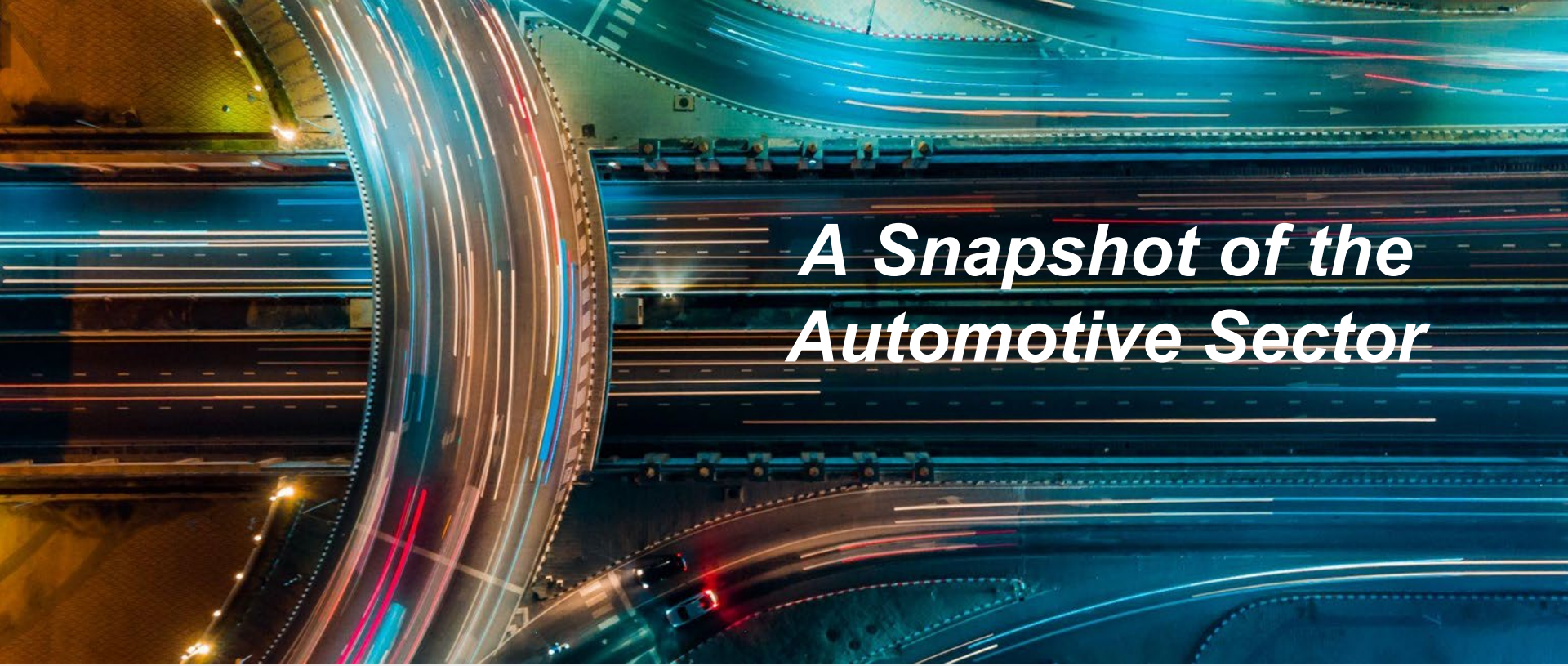


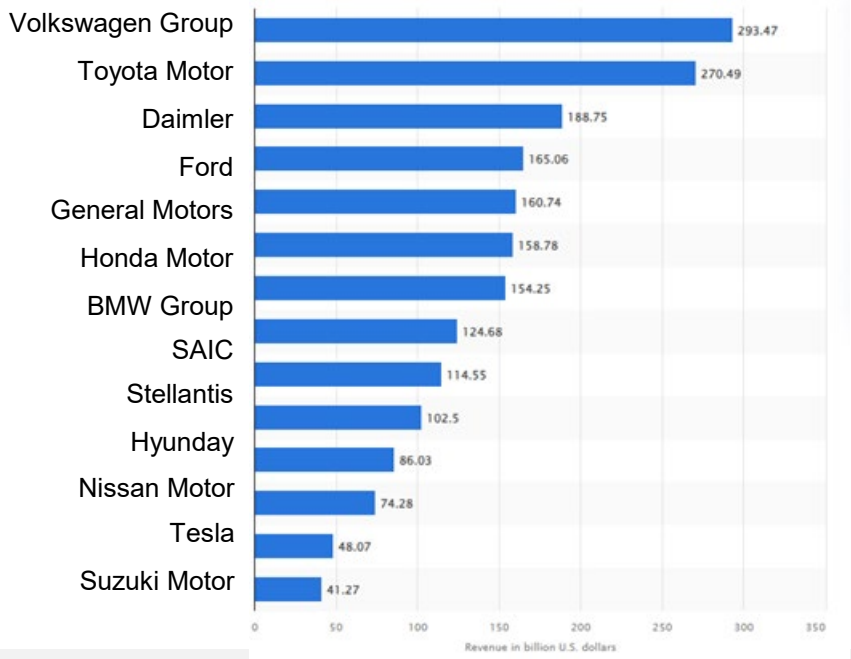
A Snapshot of the Automotive Sector

Content

1. Overview of the Automotive Sector
2. Evolution of the Automotive Sector
3. Challenges in the Automotive Industry

Overview of the Automotive Sector - Main automotive manufacturers

Revenues of leading automakers worldwide in 2022 (billion US Dollars)

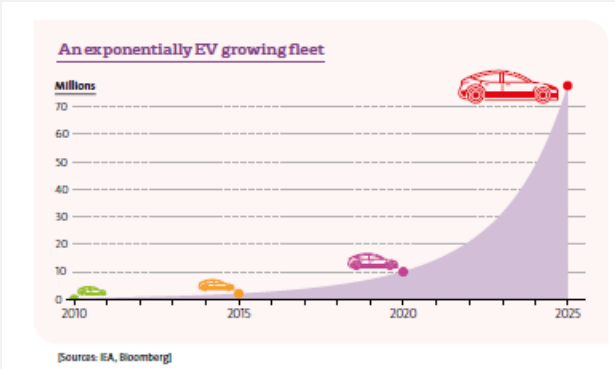


Statista

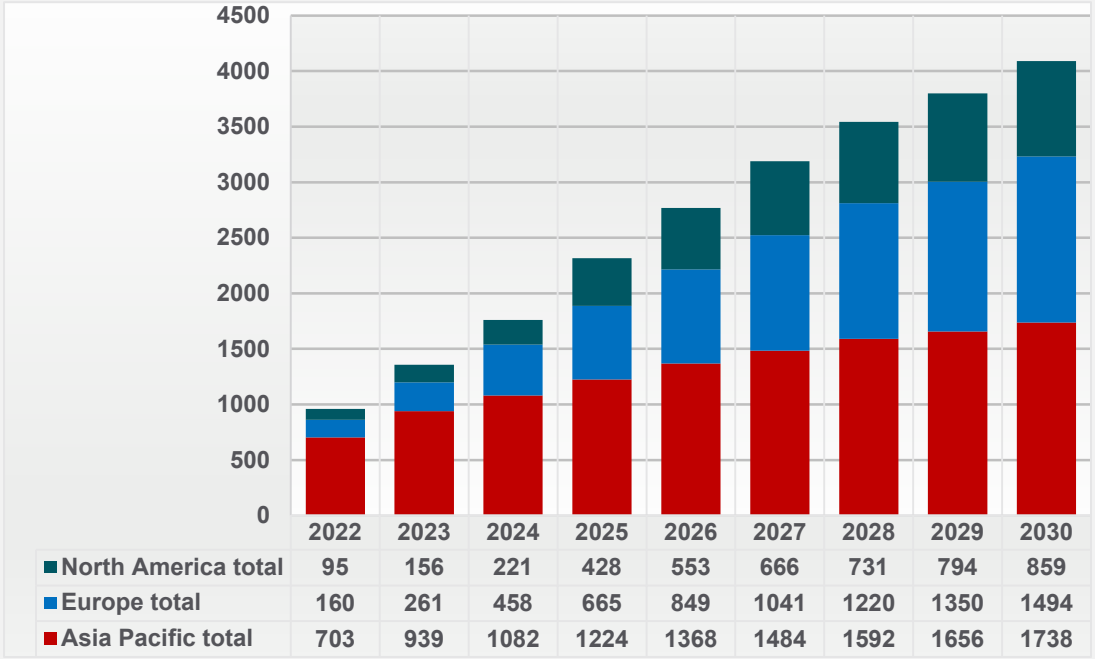
Market capitalizations of 3 car manufacturers:

- USD 705 bn => Tesla
- USD 248 bn => Toyota
- USD 94 bn => BYD

(Companies market Cap – 09/11/2023)



Overview of the Automotive Sector – Gigafactories in manufacturing new Batteries feed the need for raw materials



	2022	2023	2024	2025	2026	2027	2028	2029	2030
North America total	95	156	221	428	553	666	731	794	859
Europe total	160	261	458	665	849	1041	1220	1350	1494
Asia Pacific total	703	939	1082	1224	1368	1484	1592	1656	1738

Global & Regional Gigafactory Capacity Forecast 2022-2030 (GWh)

Transformation for a Sustainable Future

Massive incoming volumes of lithium-ion batteries from electric vehicles (EV) and other devices, fast changing regulations and growing concerns over the decarbonisation of activities, drive the need to build large-scale operations and create circular and efficient business models to deal with the entire batteries life cycle.

SELF-SUFFICIENCY

Securing supply of strategic materials

End-of-life Li-ion batteries are a real deposit of strategic metals such as lithium, cobalt, and nickel, which are critical for the energy transition. Battery producers will need to reduce raw material supply risks by ensuring proper access to sufficient quantities of high-quality metals.

Challenges in the Automotive Industry

RAW MATERIAL SUPPLY

- Semi-conductor shortage causes temporary plant closures
- Need to create new partnerships to secure the supply chain (batteries, raw material, recycling…)

INCREASING COMPETITION

- New entrants are arriving on the market, making it even more competitive
- Necessity to innovate for the future to meet versatile user needs

OPTIMIZE PRODUCTION & REDUCE COSTS

- Minimize the cost per vehicle produced
- Optimise the organisation and processes to maximize uptime

TECHNOLOGICAL SHIFT

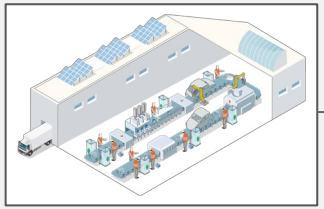
- Transition from fossil fuel to electrical vehicles
- Integrate new technologies in cars => “mobile phone on wheels”
- New user behaviour

COMPLIANCE & SUSTAINABILITY

- Comply with increasingly stringent regulations
- Integrate more recycled material
- Decarbonize plants and reduce environmental footprint

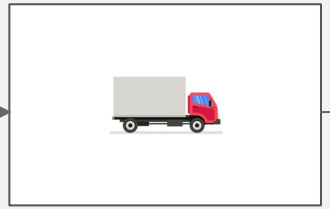
* Connected Automated Share Electrify

Promote Sustainable Manufacturing
Along The Whole Automotive Value Chain

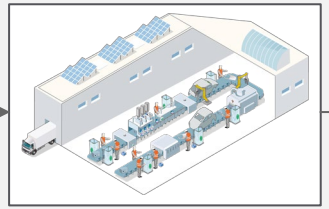


PARTS SUPPLIER

> **Secondary raw materials supply**
> **Eco-design** of packaging
> **Sustainable manufacturing** services for plants through water, waste, recycling and energy solutions.

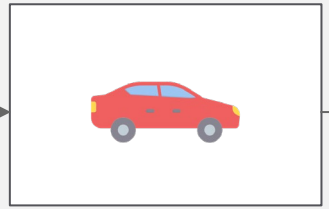


PARTS DELIVERY



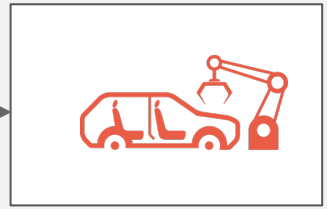
PRODUCTION

> **Sustainable manufacturing** services for plants through water, waste, energy solutions
> **Audit** and consultancy on specific waste, water, decarbonation issues
> **Improving scope 3** thanks to our work with suppliers.



USE

> **Dedicated services** to garages and workshops



END OF LIFE

> Materials **recycling,** including plastics and batteries
> Oil & solvent **recovery**

Re-integrated in the value chain

Securing the Raw Materials in a Energy Transition and Decarbonisation Environment

Securing supply of strategic materials

End-of-life Li-ion batteries are a real deposit of strategic metals such as lithium, cobalt, and nickel, which are critical for the energy transition. Battery producers will need to reduce raw material supply risks by ensuring proper access to sufficient quantities of high-quality metals.

DID YOU KNOW?

In 2035, recovered cobalt, lithium and nickel could make up 30%, 16% and 21% respectively of metals required for new battery manufacturing – and this proportion is expected to keep increasing significantly over time.

[Source: Bloomberg]


Black mass


Lithium


Cobalt


Nickel

INCREASINGLY STRINGENT LEGISLATION REGARDING BATTERY END-OF-LIFE

Regulations on the management of EV batteries at the end of their life are evolving quickly with the aim of supporting recycling operations and the incorporation of recycled materials into new batteries.

European legislation has taken the lead on the subject with a new regulation proposal for the mandatory inclusion of recycled metals in the production of new batteries:

- → 2025 mandatory declaration of recycled content
- → 2031 **16%** for cobalt, **6%** for lithium and nickel
- → 2036 **26%** for cobalt, **12%** for lithium and **15%** for nickel

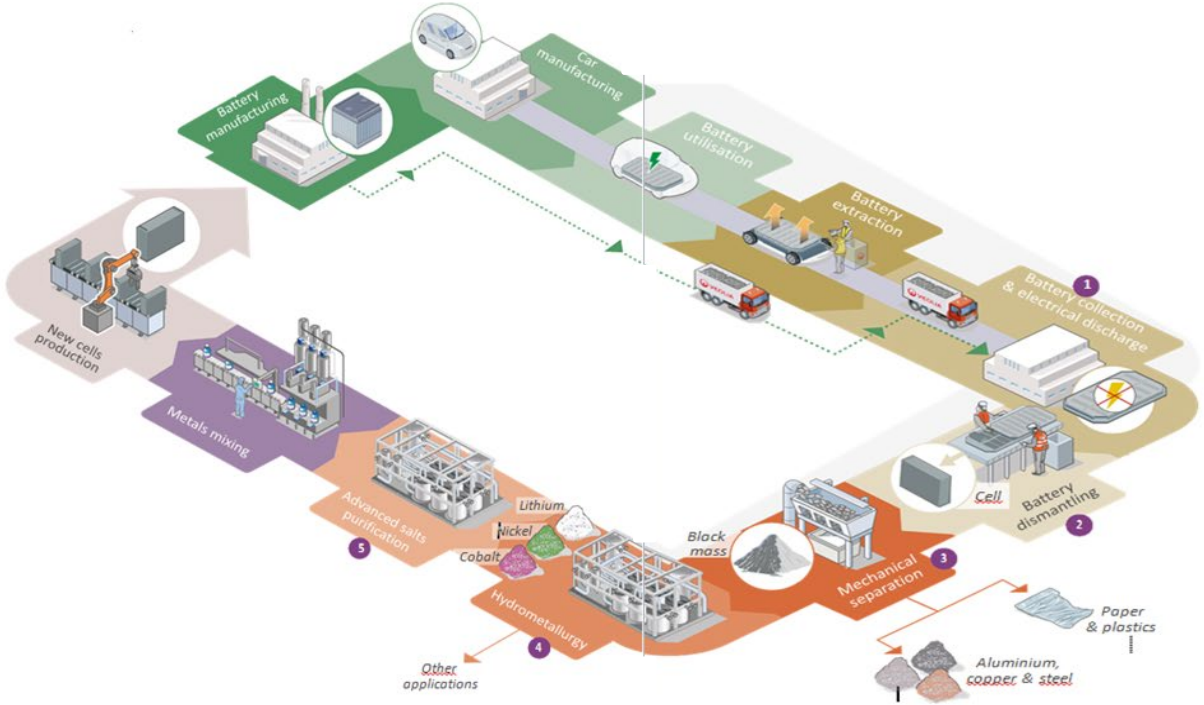
Those contents can seem pretty low but are in fact extremely ambitious. In order to achieve this proportion of inclusion while produced volumes are rising, a strong redirection of recycling by-products to new battery production will be necessary.

Hence, the European institutions also aim at controlling the efficiency of the recycling process, and thus the recovery of material, with new mandatory targets:

- → 2027 **90%** for cobalt, copper and nickel, **50%** for lithium
- → 2031 **95%** for cobalt, copper and nickel, **80%** for lithium

Final figures for the regulations adopted by the European Parliament on June 14, 2023

Battery Recycling Process – Africa is well positioned to provide materials to the global market



1) ELECTRICAL DISCHARGE
Batteries are systematically discharged and secured to be handled without danger through the whole process.

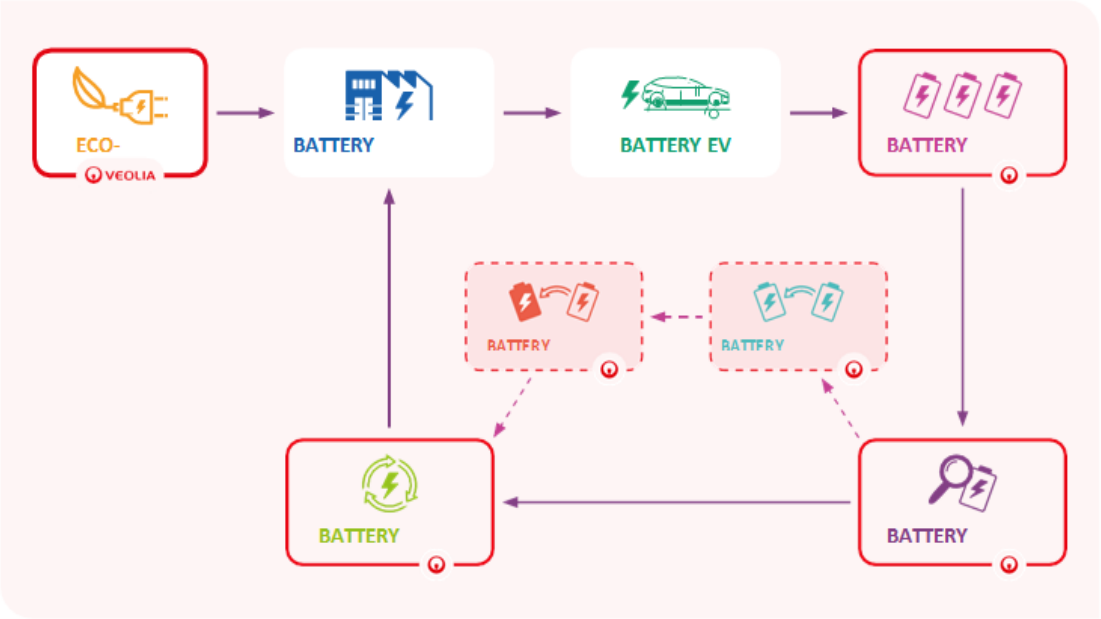
2) DISMANTLING
Battery packs are deconstructed to module or cell level by trained operators.

3) MECHANICAL SEPARATION
Battery cells are shredded in wet conditions to avoid any fire or explosion risk.

4) CHEMICAL PURIFICATION
Veolia has developed an inhouse hydrometallurgical process and does not apply pyrometallurgy which requires large amounts of energy and does not deliver high levels of purification.

5) ADVANCED SALTS PURIFICATION
The process is able to treat black mass with a wide range of composition and to obtain different levels of final product purity tailored to the client's needs.

A New Circular Economy ?



Eco-design

The need for eco-design of EV batteries to facilitate their reuse and their recycling is paramount.

Battery second life

Solutions need to be developed for battery second-life activities in electrical network flexibility, storage for renewables integration and EV charging stations.

Battery recycling

Reputable, compliant businesses continue to expand on the safe recycling of Li-ion battery technologies thanks to its efficient internal recycling processes.

END

DID YOU KNOW?

Electric vehicles use around six times more minerals than conventional vehicles

[Source: IEA]

The value lying in batteries

typical composition of NMC batteries

30%
4+1 high value materials

- Lithium 1-2%
- Cobalt 1-6%
- Nickel 2-10%
- Copper 9%
- Graphite

40%

- Aluminium 35%
- Manganese

30%
Other components

- Plastics 10%
- Steel 5%
- Electronics 5%
- Volatile components 10%