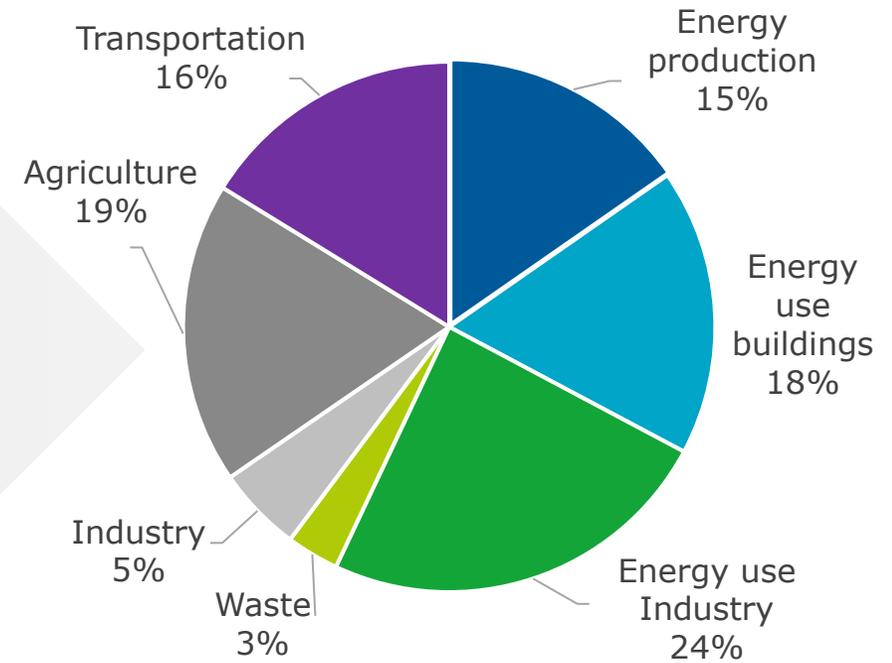
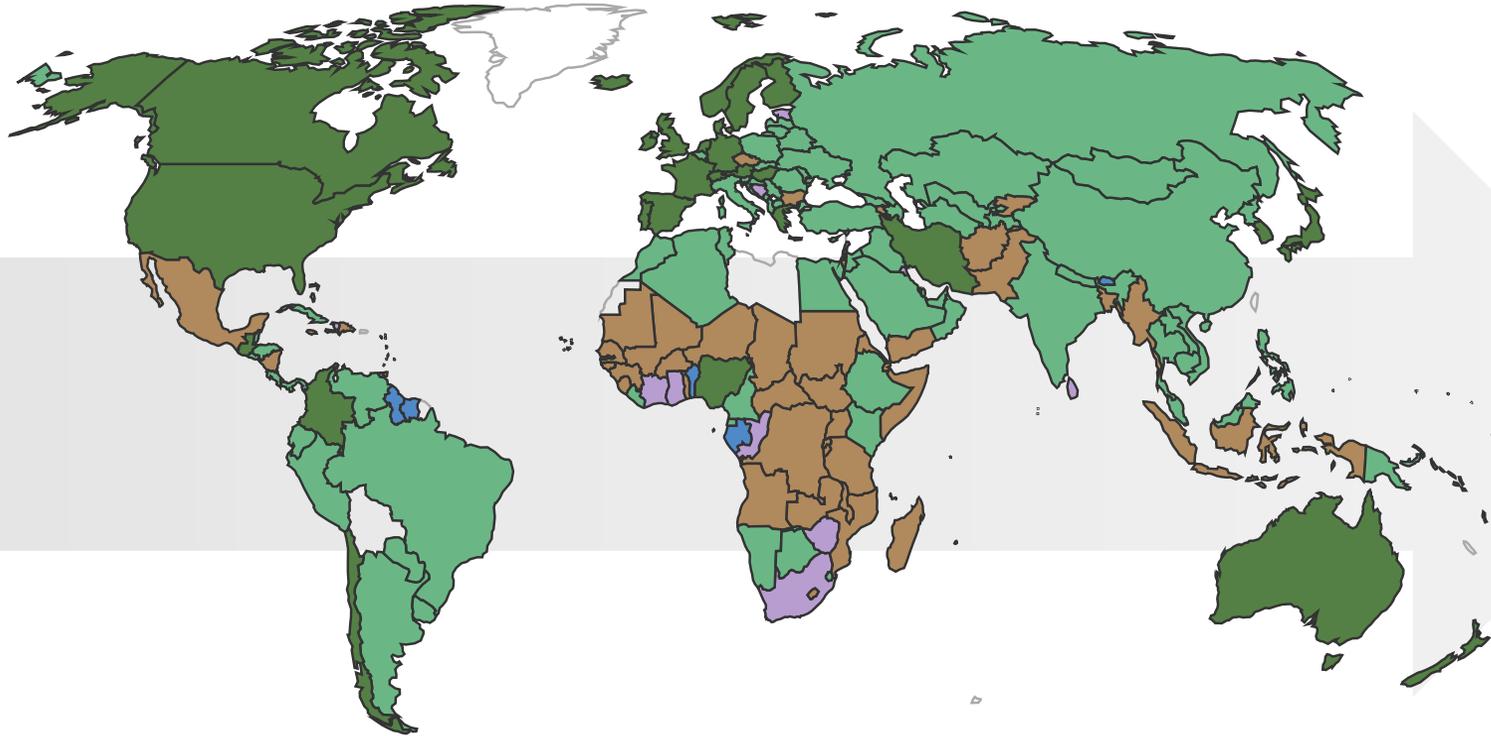


FROM DEPENDENCY TO INDEPENDENCY

Innovating towards
a resilient, sustainable
& circular battery industry

WE ARE COMMITTED TO NET ZERO



■ Achieved (self-declared)
 ■ Pledged
 ■ In Law
 ■ In Policy Document
 ■ Proposed
 No data

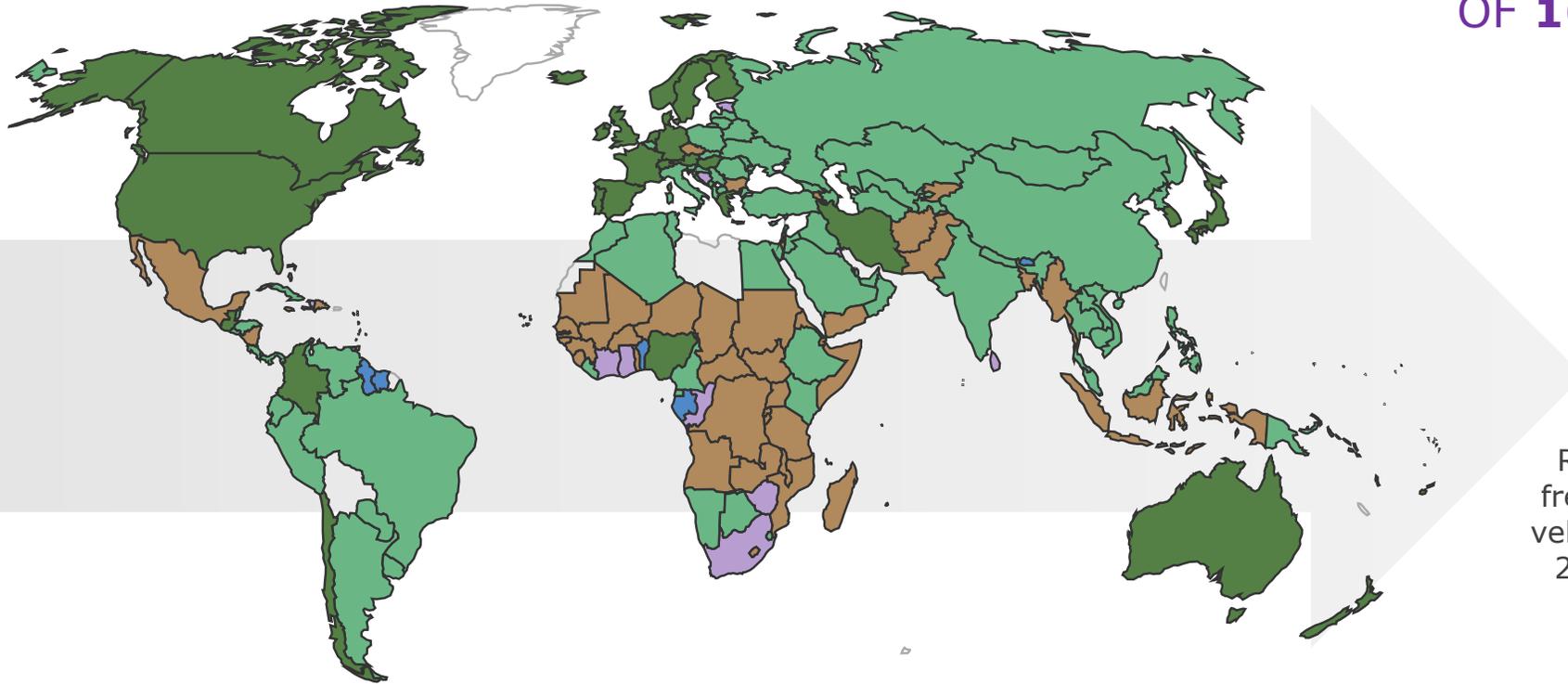
Net-Zero Emissions Commitments

Energy and Climate Intelligence Unit, Data-Driven EnviroLab, NewClimate Institute, Oxford Net Zero - Net Zero Tracker
[OurWorldinData.org/co2-and-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-greenhouse-gas-emissions) | [CC BY](https://creativecommons.org/licenses/by/4.0/)

Share of GHG Emissions

Hannah Ritchie (2020) - "Sector by sector: where do global greenhouse gas emissions come from?" Published online at OurWorldinData.org. Retrieved from: <https://archive.ourworldindata.org/20251125-173858/ghg-emissions-by-sector.html> [Online Resource] (archived on November 25, 2025).

WE ARE COMMITTED TO NET ZERO

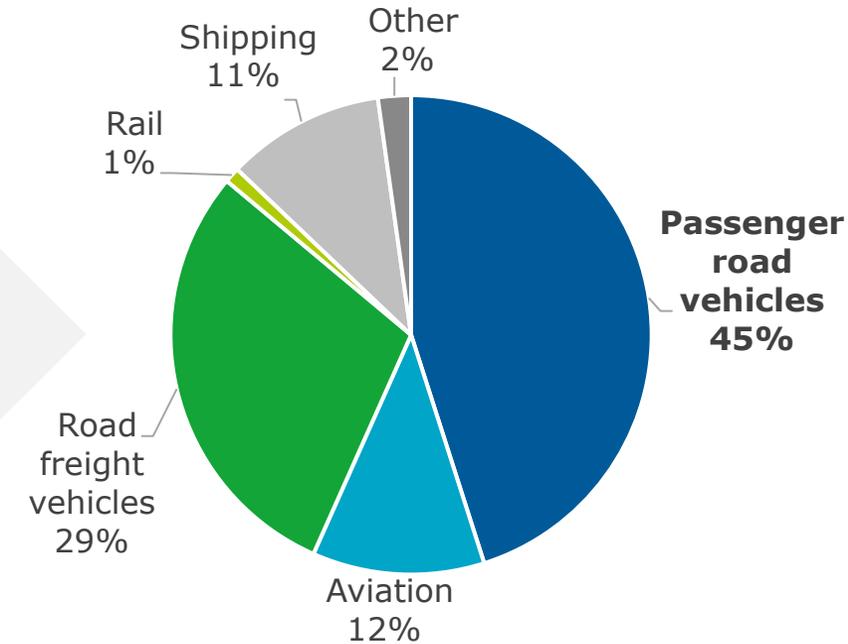


■ Achieved (self-declared)
 ■ Pledged
 ■ In Law
 ■ In Policy Document
 ■ Proposed
 ■ No data

Net-Zero Emissions Commitments

Energy and Climate Intelligence Unit, Data-Driven EnviroLab, NewClimate Institute, Oxford Net Zero - Net Zero Tracker
[OurWorldinData.org/co2-and-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-greenhouse-gas-emissions) | [CC BY](https://creativecommons.org/licenses/by/4.0/)

OF **16%** TRANSPORTATION



Share of GHG Emissions

Hannah Ritchie (2020) - "Sector by sector: where do global greenhouse gas emissions come from?" Published online at OurWorldinData.org. Retrieved from: <https://archive.ourworldindata.org/20251125-173858/ghg-emissions-by-sector.html> [Online Resource] (archived on November 25, 2025).



Mercedes-Benz



...GM is committed to providing 100 percent of its US facilities with electricity from renewable energy by 2030, and all global facilities by 2040...



...According to Audi, the upstream supply chain is where roughly one quarter of CO2 emissions will be generated by 2025, ... focusing on 16 critical raw materials— with cobalt for batteries at the top of the list...



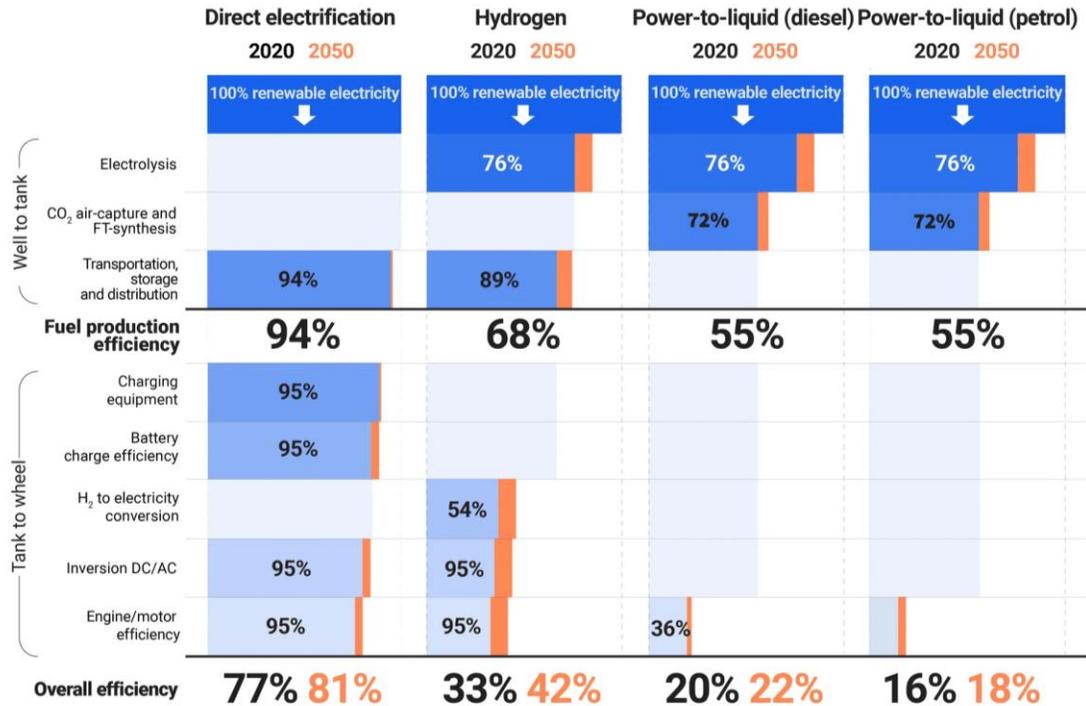
...from 2039 at the latest, only production materials which are CO2 neutral in all value creation stages will be allowed through the factory gates of Mercedes-Benz...



“Without additional measures, the increasing electrification would lead to a strong rise of CO2 emissions in the supply chain. We are initiating the trend reversal.”
“To achieve real change, ... we set ourselves substantial targets based on comprehensive emission values. All values are normed to CO2 equivalents.”

Automotive OEMs target **net-zero-CO2 between 2030-2040**. Supplier are forced to support target.

EV: A REASONABLE CHOICE



100kWh of (Renewable) Electricity 
based on 2025 Efficiencies

Expected Range:

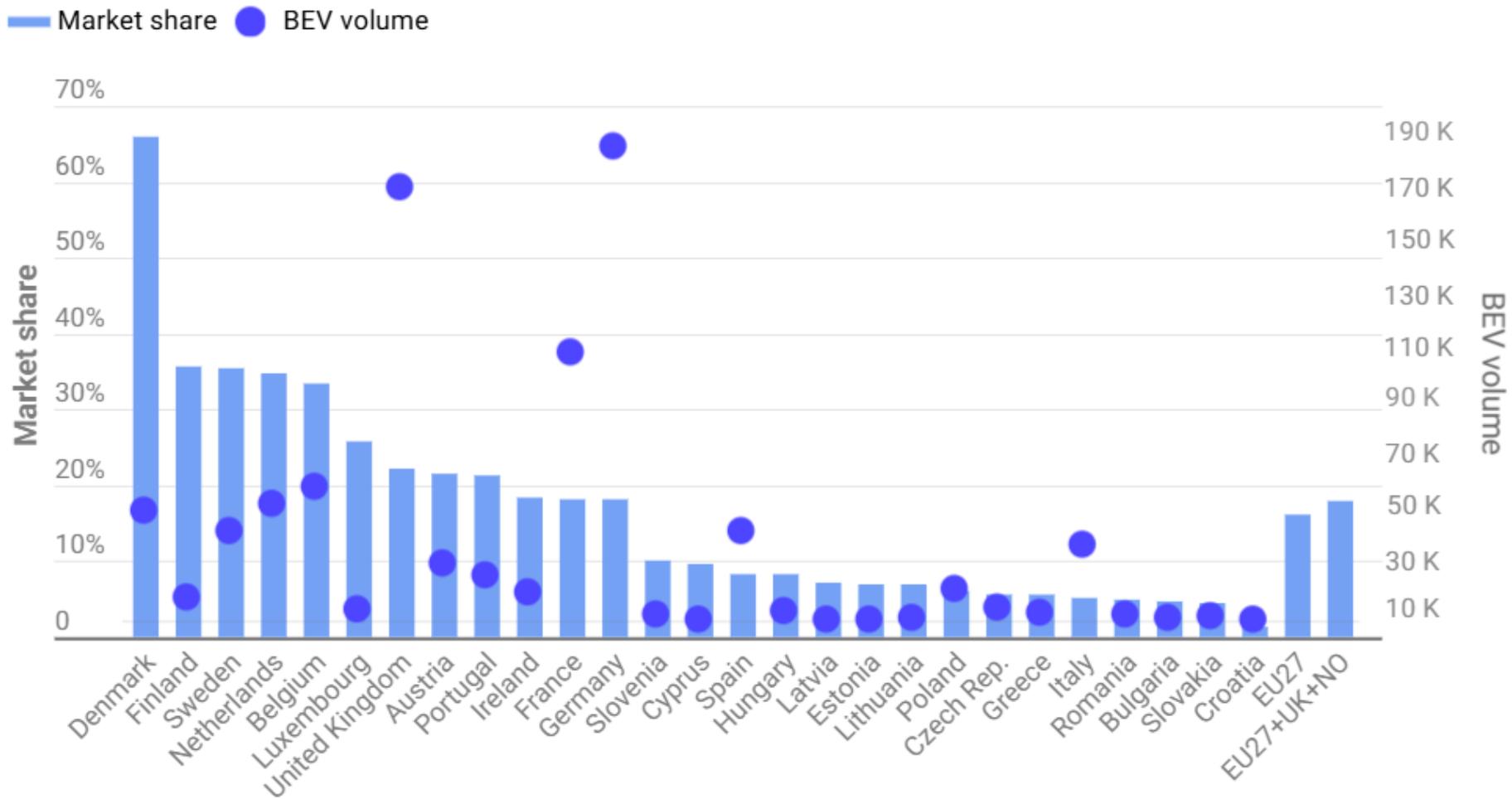
EV: 495 km

H₂: 193 km

Power-to-Liquid: 84 km

EV, H₂ & eFuels - Efficiency Comparison

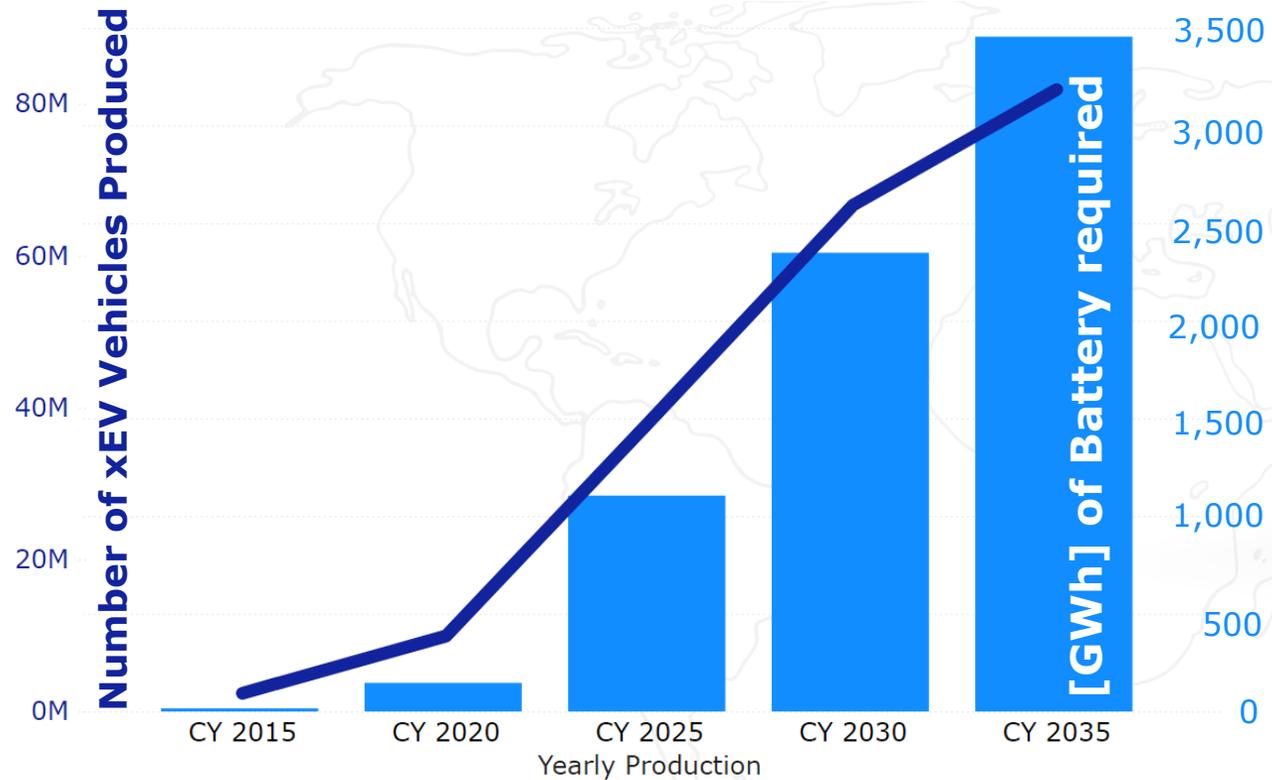
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EV Market Share Q1-Q3 2025

Source: ACEA (2025) Registrations Data.

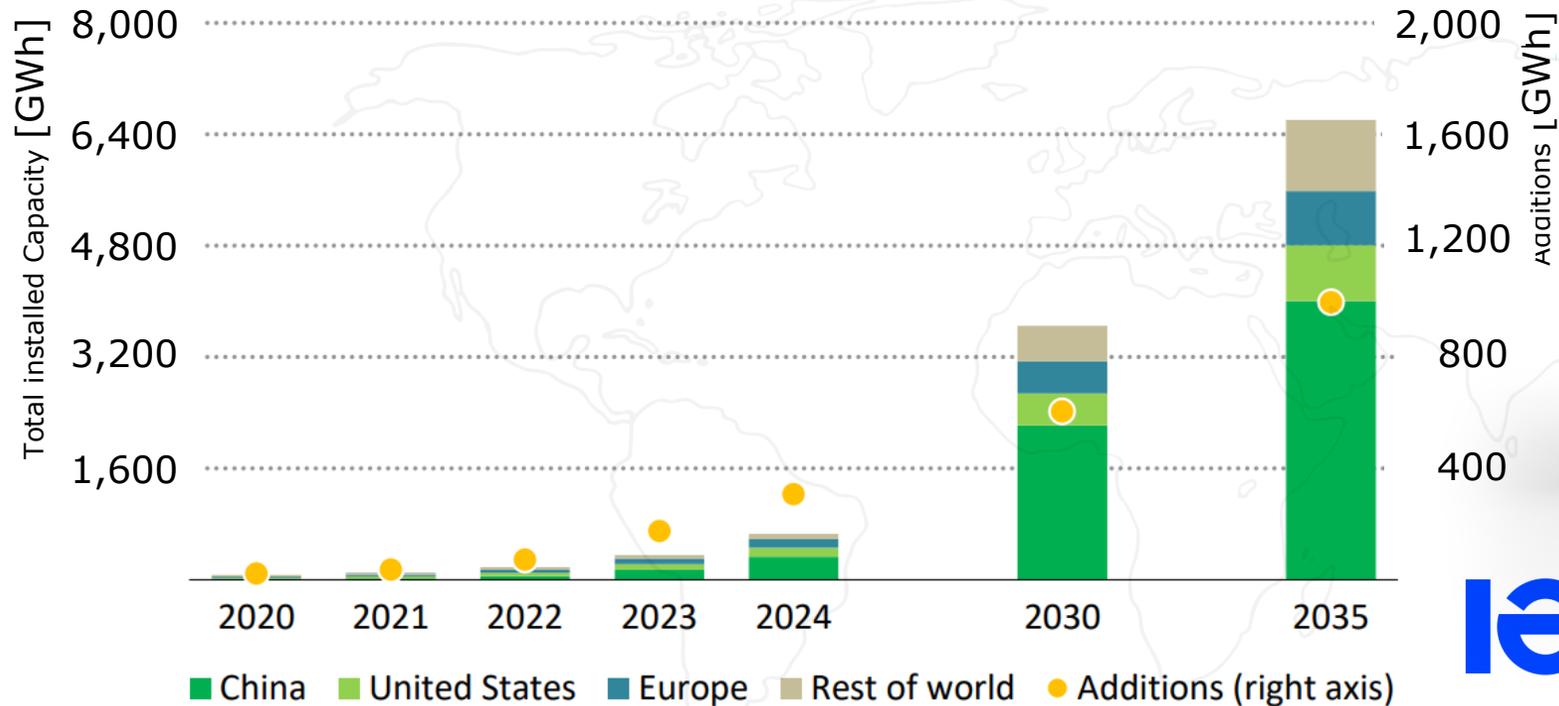
GLOBAL DEMAND FORECAST TO 2035



xEV Production Forecast

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GLOBAL DEMAND FORECAST TO 2035



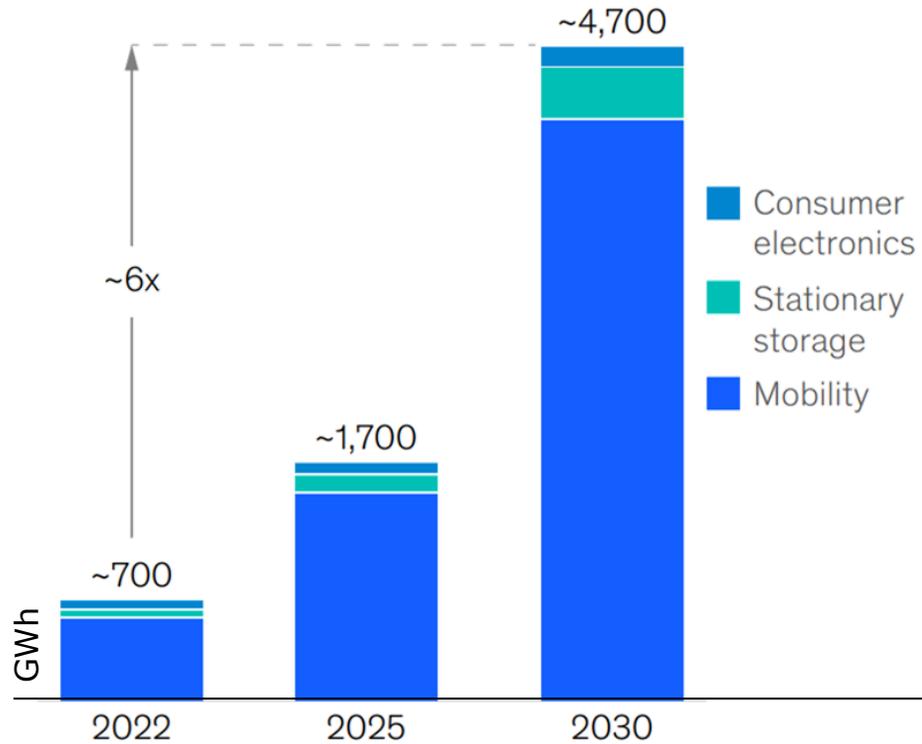
IEA. CC BY 4.0.

Global Installed Battery Storage Capacity Prediction

STEPS Scenario 2020 – 2035: International Energy Agency | World Energy Outlook 2025

2022

Prediction for 2030 in 2022: ~4.7 TWh



McKinsey & Company Prediction

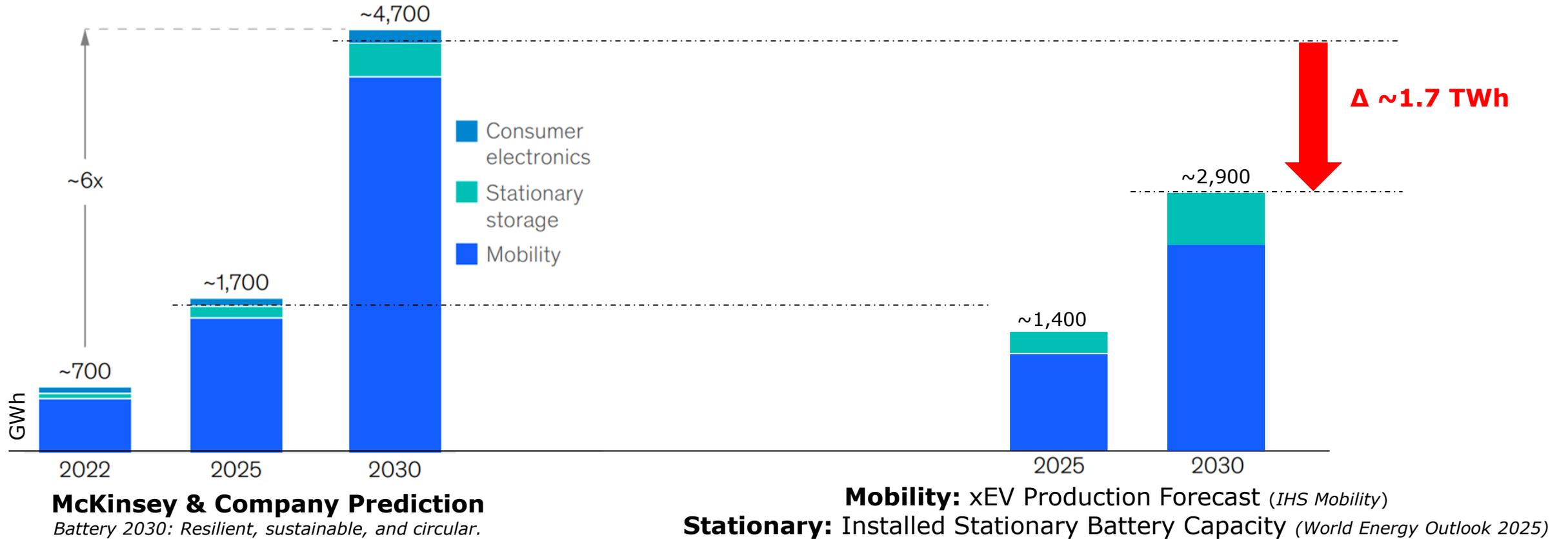
Battery 2030: Resilient, sustainable, and circular.

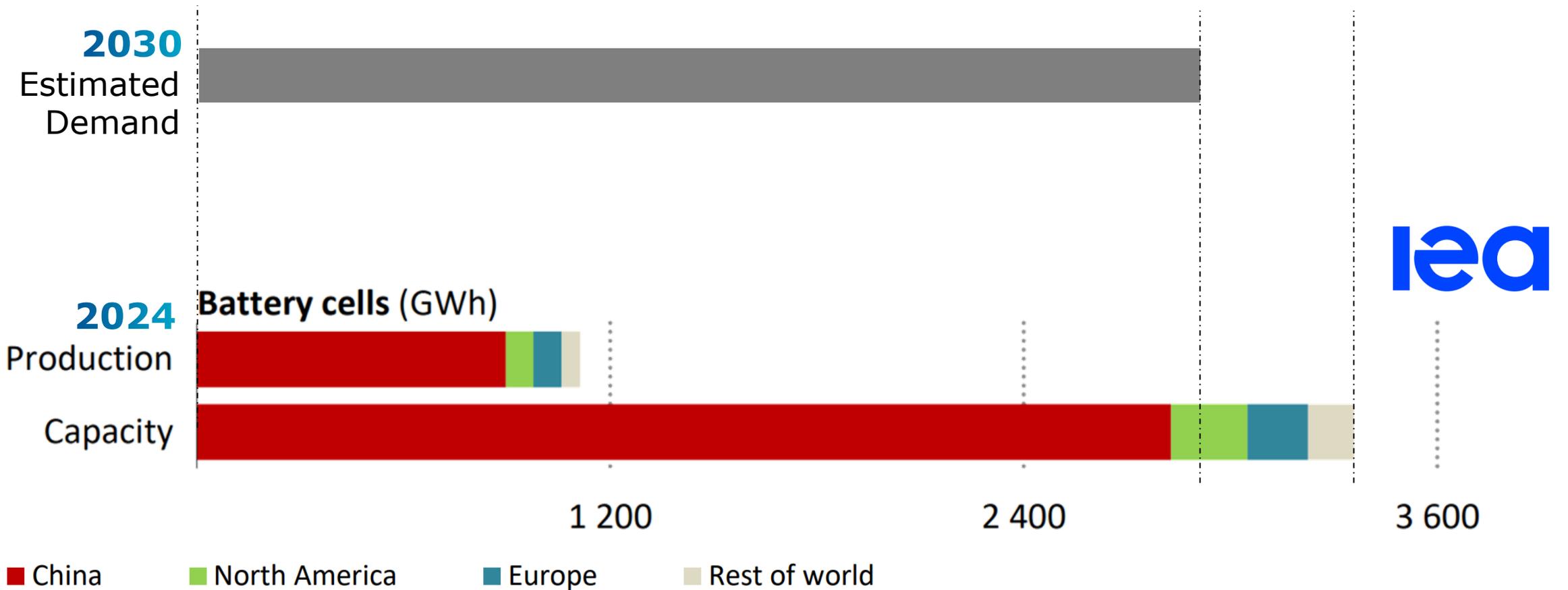
2022

2025

Prediction for 2030 in 2022: ~4.7 TWh

Total Demand Prediction for 2030 in 2025: ~2.9 TWh



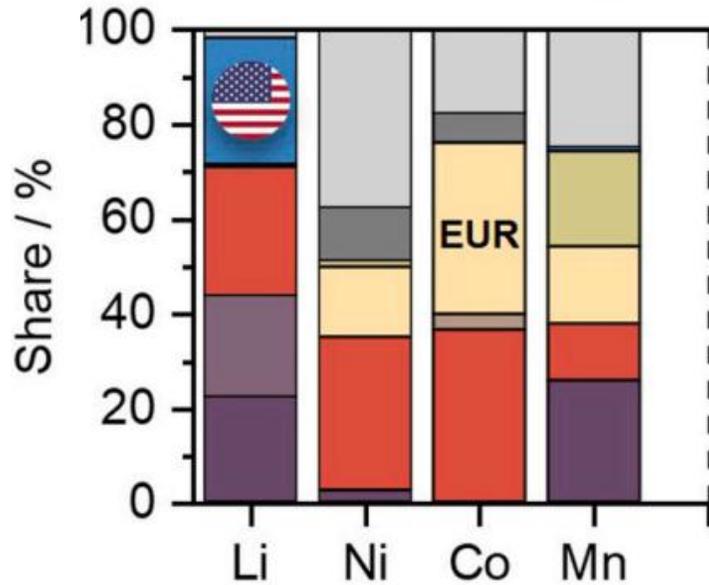


Global Manufacturing Capacity and actual Production

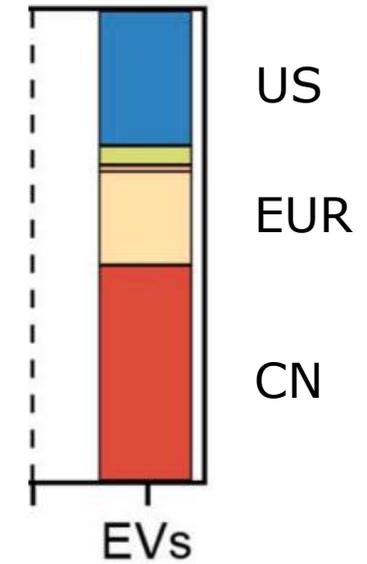
Figure 1.31: International Energy Agency | World Energy Outlook 2025



Mining



Vehicle



Ownership Distribution of the LIB Supply Chain

Journal of Power Sources Advances Volume 32, April 2025; China's hold on the lithium-ion battery supply chain: Prospects for competitive growth and sovereign control



Mining



Refining



CAM

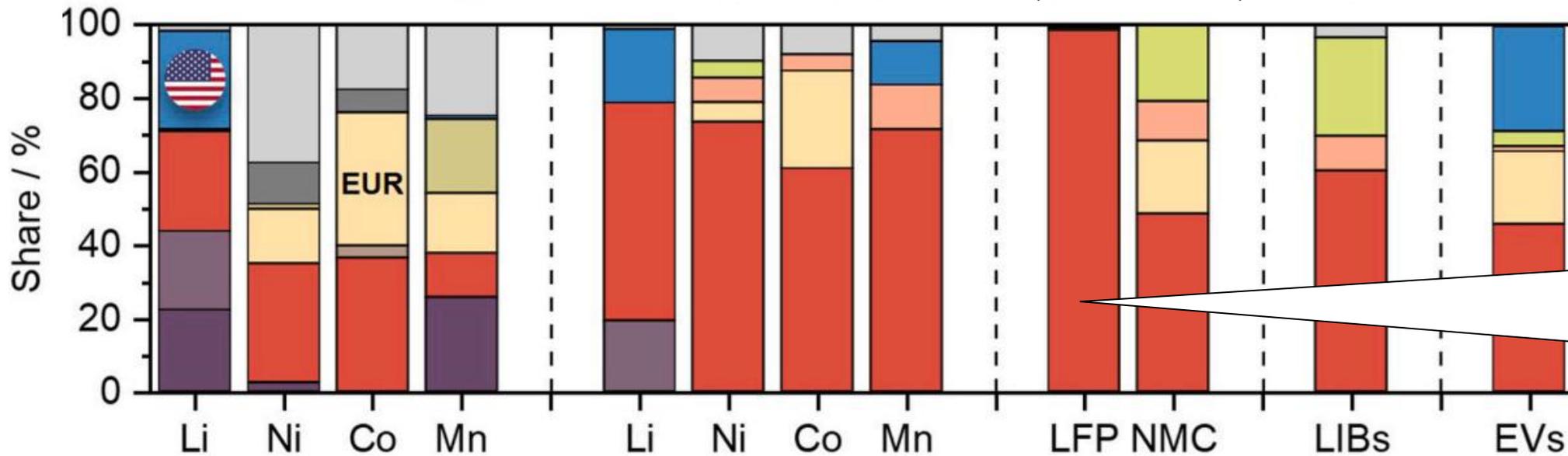
(Cathode Active Material)



Battery



Vehicle



98% of LFP CAM in Chinese Hands

Ownership Distribution of the LIB Supply Chain

Journal of Power Sources Advances Volume 32, April 2025; China's hold on the lithium-ion battery supply chain: Prospects for competitive growth and sovereign control

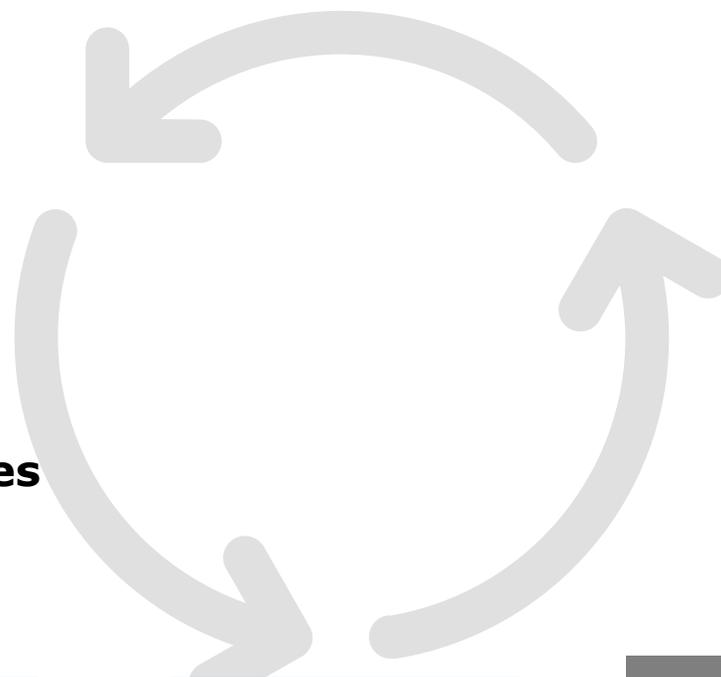
RECYCLING - FUTURE: CLOSING THE LOOP LONG TERM



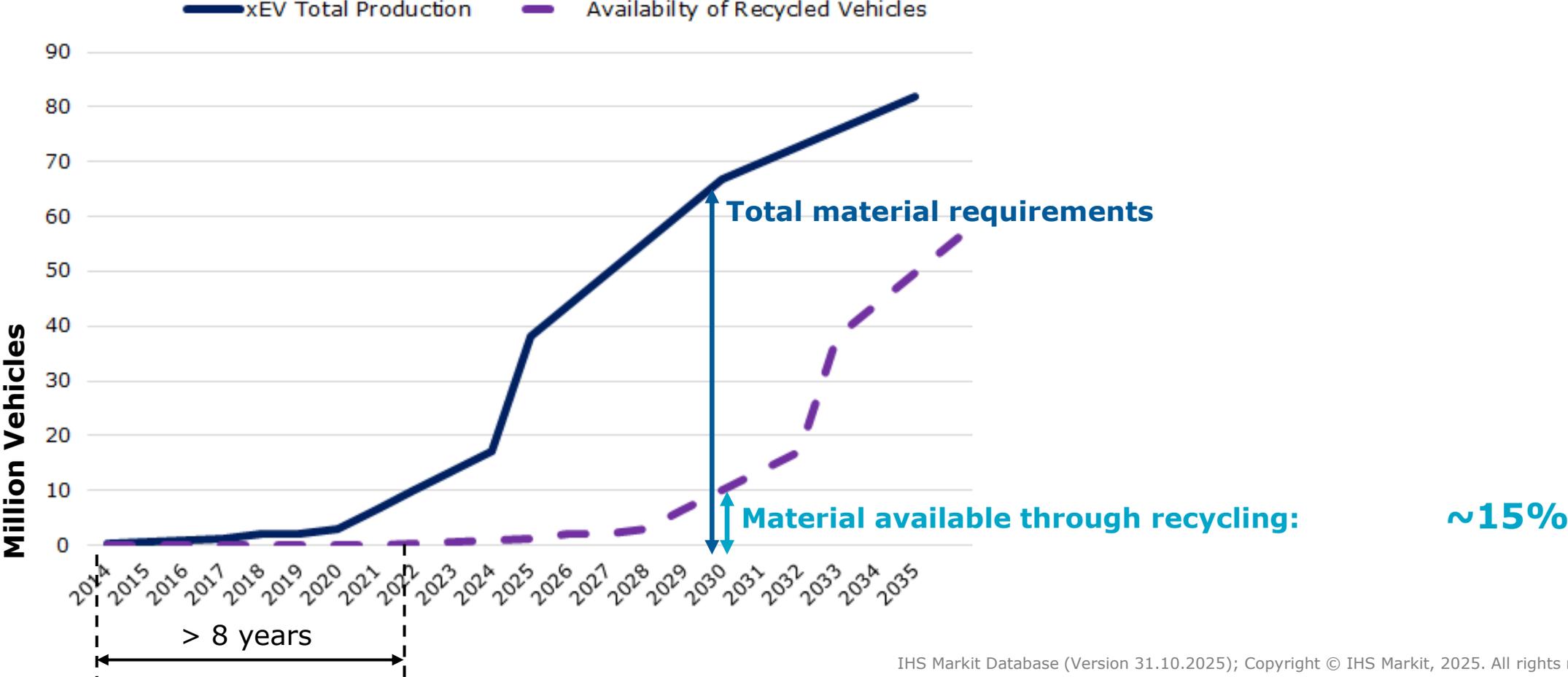
	2031	2036
Lithium	6%	12%
Nickel	6%	15%
Cobalt	16%	26%

**Minimum incorporation levels
of recycled metals in new batteries**

EU Critical Raw Materials Act



WE CANNOT WAIT FOR RECYCLING: A RESILIENT SUPPLY CHAIN IS KEY



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The consequences of global oversupply:

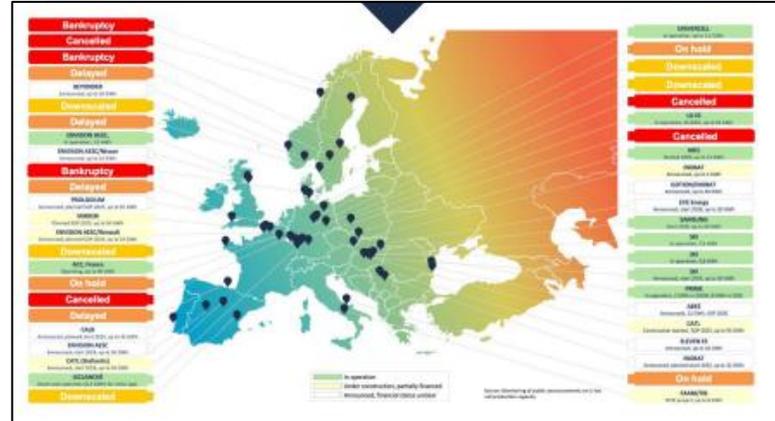
Battery (cell) prices keep falling

Batter prices forecast to continue to fall
Global: Average battery pack prices (US\$/kWh)



Source: Goldman Sachs, 2024

Cell Factories (in Europe) have adopted their plans



Source: A Battery Deal for Europe, 2025

Consolidation (in China) is expected

TRouble IN THE CHINESE BATTERY VALUE CHAIN CONSOLIDATION IS UNDERWAY

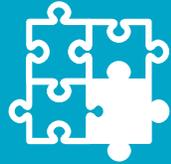
Company	Product	Market Cap ¹ (Mio. EUR)	profit margin			Status
			2022	2023	2024	
天齐锂业 Tianqi Lithium	Lithium	5,870	59,64%	18,02%	-60,51%	Investment in Australia stopped
赣锋锂业 Ganfeng Lithium	Lithium	7,060	49,02%	15,00%	-10,97%	Liquidity crunch
杉杉股份 Shaanshan	Active Material	2,170	12,40%	4,01%	-1,97%	Court-led restructuring 03/2025
欣旺达 Easpring	NMC CAM	2,400	10,62%	12,72%	6,23%	Self-managed restructuring
宁德时代 Dyanonic	LFP CAM	980	10,55%	-9,64%	-17,57%	Liquidity from ICL joint venture in Spain
洛铂 Lopal	LFP CAM	1,030	5,35%	-14,13%	-8,28%	Liquidity obtained from SPO in Hong Kong
天齐锂业 Tinci	Electrolyte	4,040	25,61%	12,27%	3,87%	Self-managed restructuring
SEM CORP SEM CORP	Separator	3,270	31,77%	20,98%	-5,47%	Assessment of restructuring needs
SVOLT SVOLT	Battery Cells	n. a.	-22,60%	n. a.	n. a.	Failed IPO, EU factories cancelled
法拉第未来 Farasis	Battery Cells	2,000	-8,00%	-11,36%	-2,84%	118 million euro bailout from Guangzhou 04/2025
CALB CALB	Battery Cells	3,600	3,39%	1,09%	2,13%	High debt ratio 0.95 (EUR 9.32 billion)
三星电机 Samwoda	Battery Cells	4,120	2,05%	2,25%	2,62%	International expansion
华友钴业 Wuwei Lead	Equipment	4,110	16,64%	10,67%	2,41%	Decline in profits due to project cancellations
力神集团 Lyric Rabot	Equipment	660	6,80%	-4,38%	-43,83%	Negotiations with banks regarding debt restructuring
海目星 Hymson Laser	Equipment	860	9,27%	6,70%	-3,60%	Decline in profits due to project delays

Source: Dr. Stefan Wolf (VDI), 2025

We must make the most out of it: ***Escape by Innovation***



**MEASURE &
IMPROVE**



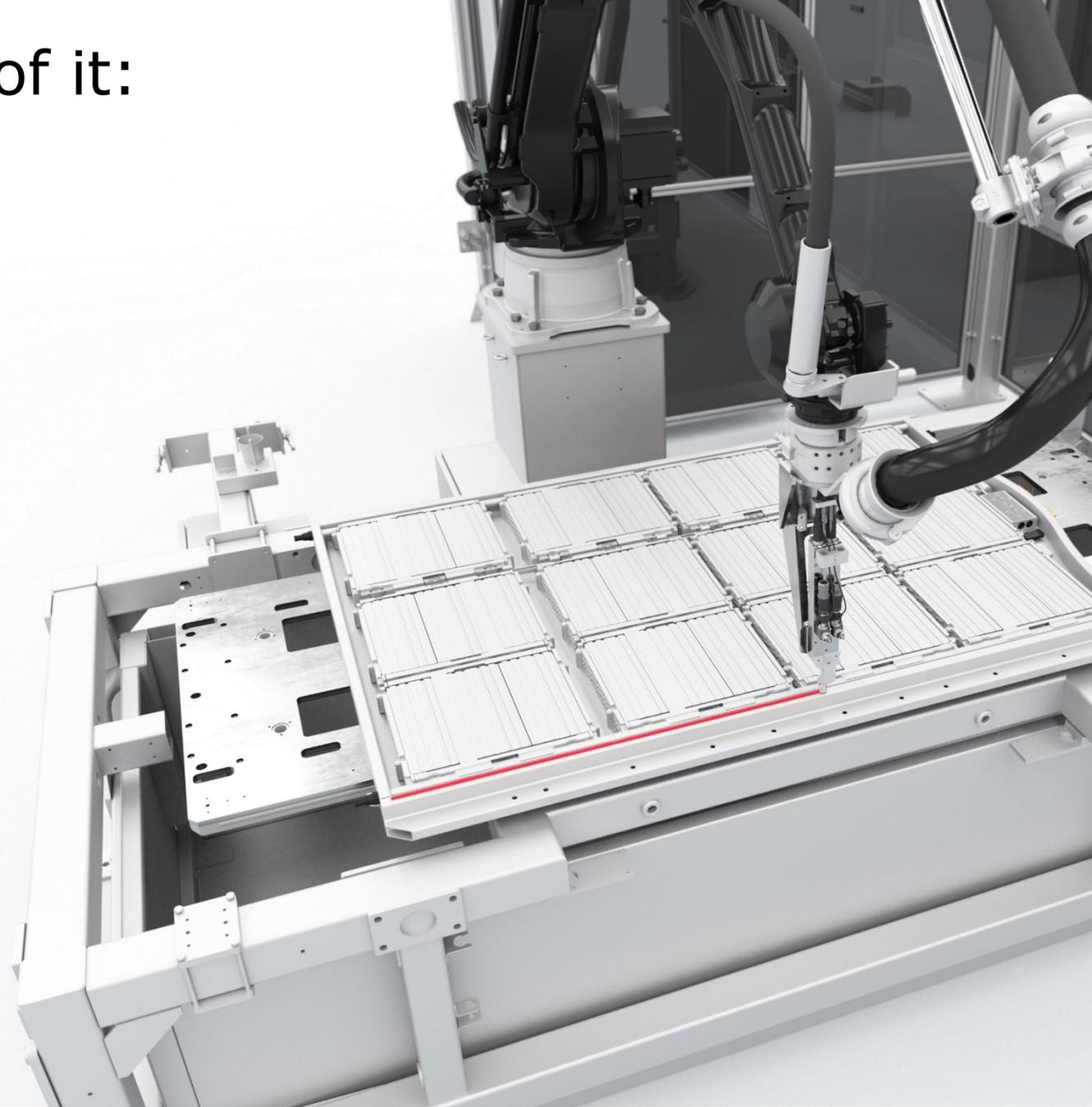
**MAXIMIZE
SYSTEM EFFICIENCY**



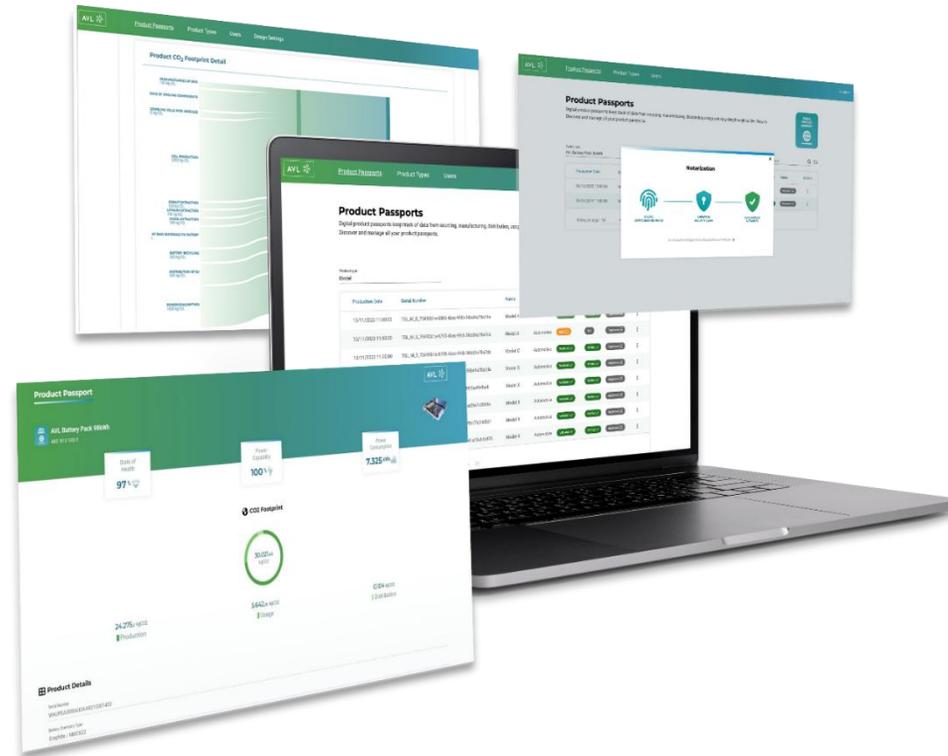
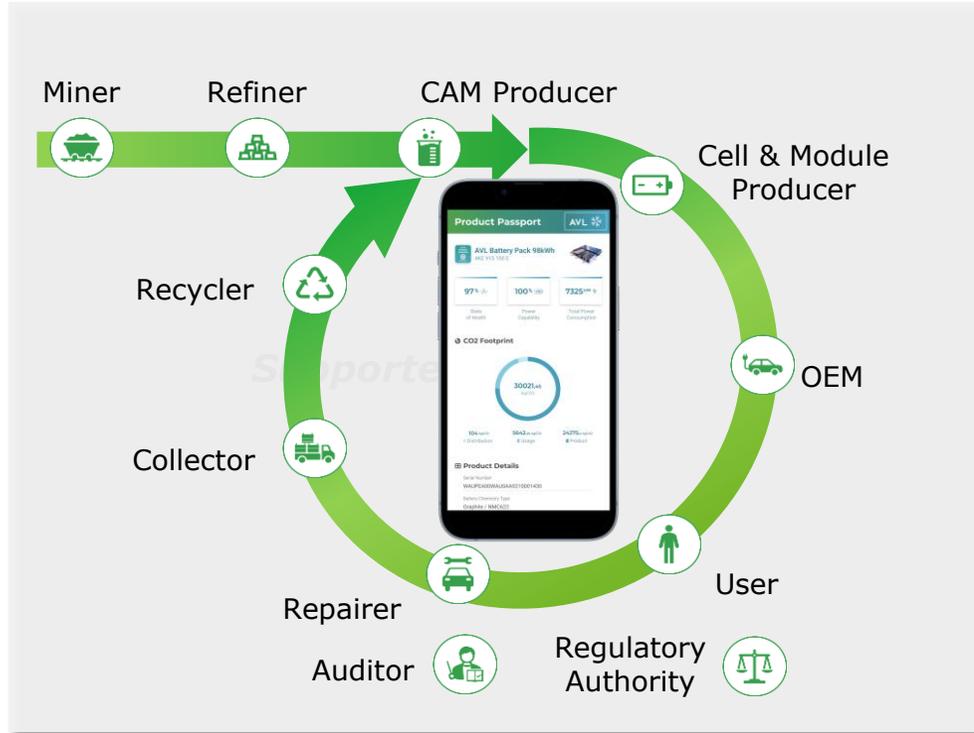
**DECREASE
TIME 2 MARKET**



COOPERATION



DIGITAL BATTERY PASSPORT



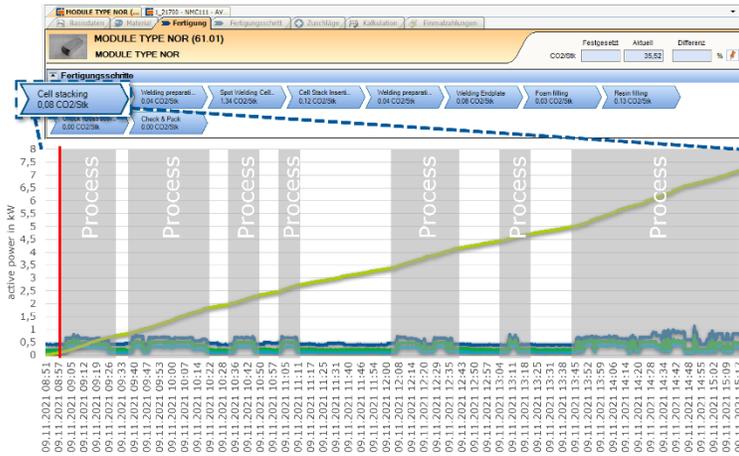
Supported by:



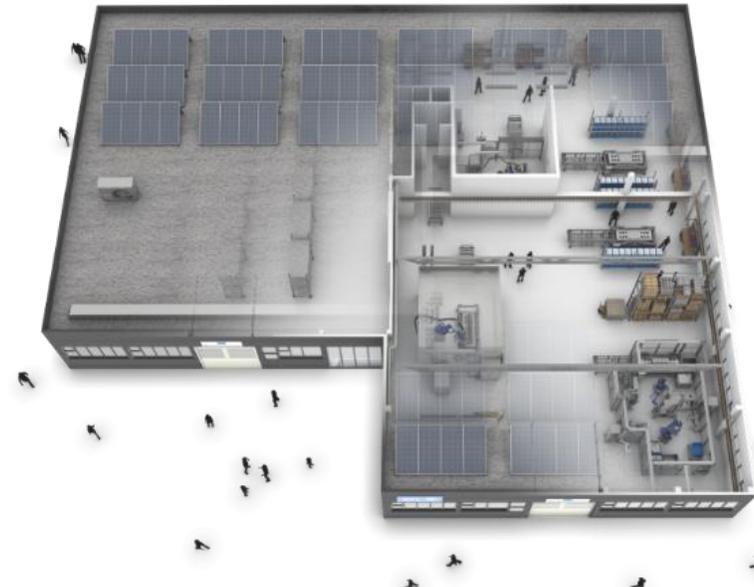
BATTERY INNOVATION CENTER



MEASURE &
IMPROVE



Energy
measurement
and conversion
to CO2 values



Battery
Process
Emission
Optimization

Supported by:



CO2 OPTIMIZATION



Reduction of CO₂ footprints by design measures

Variant	Cost [€]	CF [kg CO _{2e}]	Weight [kg]
Steel	70 ▲	66 ●	18 ◆
Aluminum	117 ▲	85 ●	7 ◆
SMC*	147 ▲	67 ●	10 ◆



By making suitable design decisions early in the development process and selecting the right materials, substantial CO₂ emission reductions can be achieved.

Supported by:



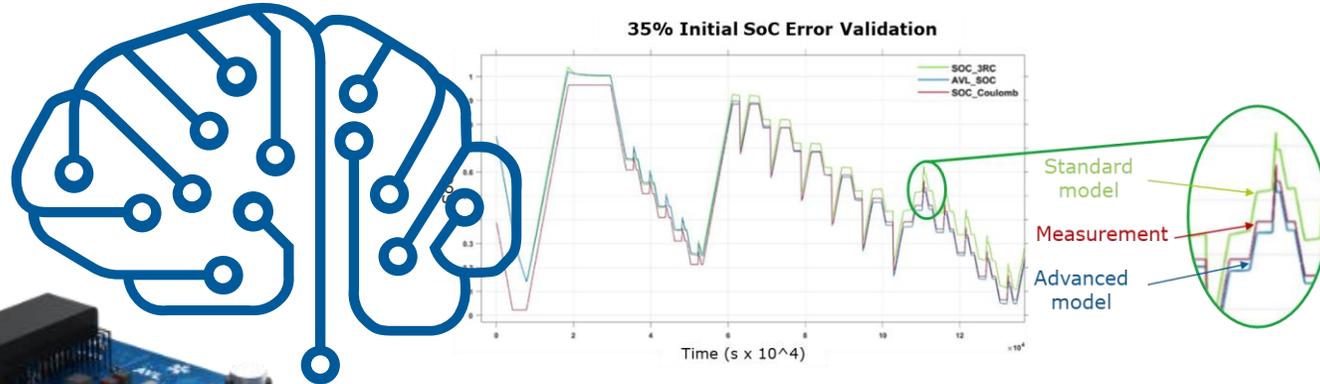
**With AVL
development
methods**

up to

30%

CO₂ reduction in the
product life-cycle

SoX FUNCTION DEV.



Advanced LFP
Core Functions

± 2%

Accuracy for SoC*

± 3%

Accuracy for SoH

*Between +10°C to 45°C

Supported by:



BEV DRIVING EFFICIENCY



94%
EDU Efficiency

9,7kWh / 100km

- Highly optimized E-Motor Designs
- Primary + Booster EM Architecture
- AVL SiC Dual Inverter
- Single Stage Transmission
- In-Depth Component Efficiency Modelling and Simulation

Supported by:



DIGITAL PRODUCT DEVELOPMENT



AVL Battery Composer™

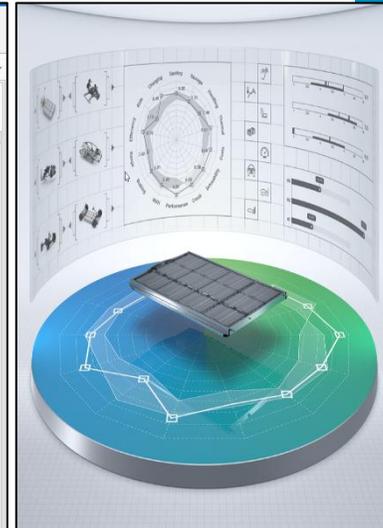
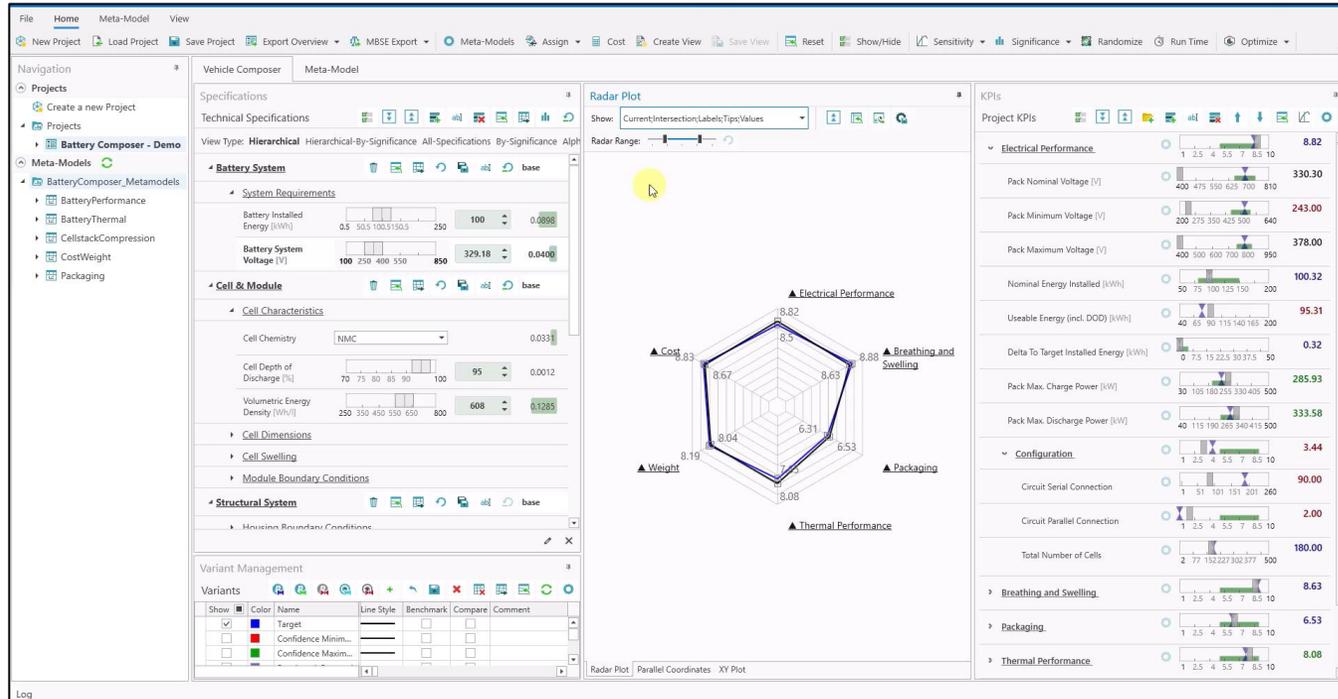
VIRTUALIZATION TOOLS

INDUSTRY KNOWLEDGE

BATTERY EXPERIENCE

Reduce Battery System Development

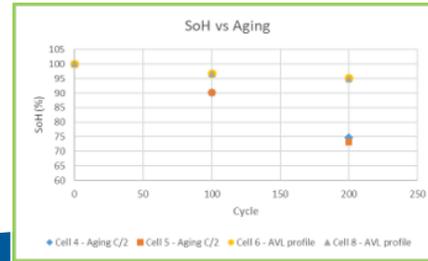
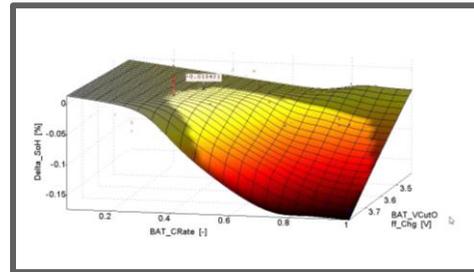
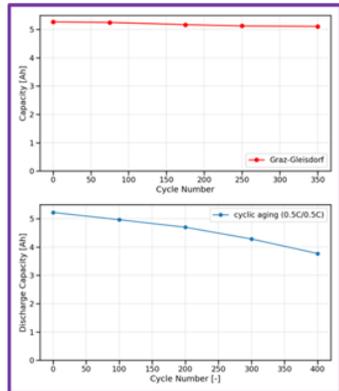
< 2 yrs



Supported by:



DIGITAL & HARDWARE PRODUCT VALIDATION



Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	Log 7	Log 8	Log 9	Log 10	Log 11	Log 12
Parameter test											
...



Supported by:



IPCEI Microelectronics and Communication Technologies





Universities
>100
Cooperations

EU-Projects
>200
50x Coordinator
IPCEI

ERTRAC
EU Road
Transport
Advisory
Council

Christian
Doppler
Labs

Platforms
EARPA

IV
WKÖ
A3PS

Associations
EUCAR
CLEPA

BMIMI
FTI-Strategy
FFG BP & TP
KLIEN

EU
Partnerships
2Zero
Clean Hydrogen
Key Digital Techn.
BEPA
EFFRA
CCAM

Centres of
Competence
ESBS-Austria, ViF,
SAL, AlpLab,
Silicon Alps,
ACStyria



Even if battery demand is lower than expected **we must act now** to **build a resilient European supply chain** and a **European recycling economy**, to be ready for the future.

Innovation on cell, system and application level helps to **make the most** out of “our” battery active material.

Time 2 Market is key: Develop and utilize innovative methodologies to speed up in **making industrialized innovation available** for the end-customer.

For innovation **we must cooperate** to deliver the ideal solution (e.g. with European R&D landscape).



AVL

