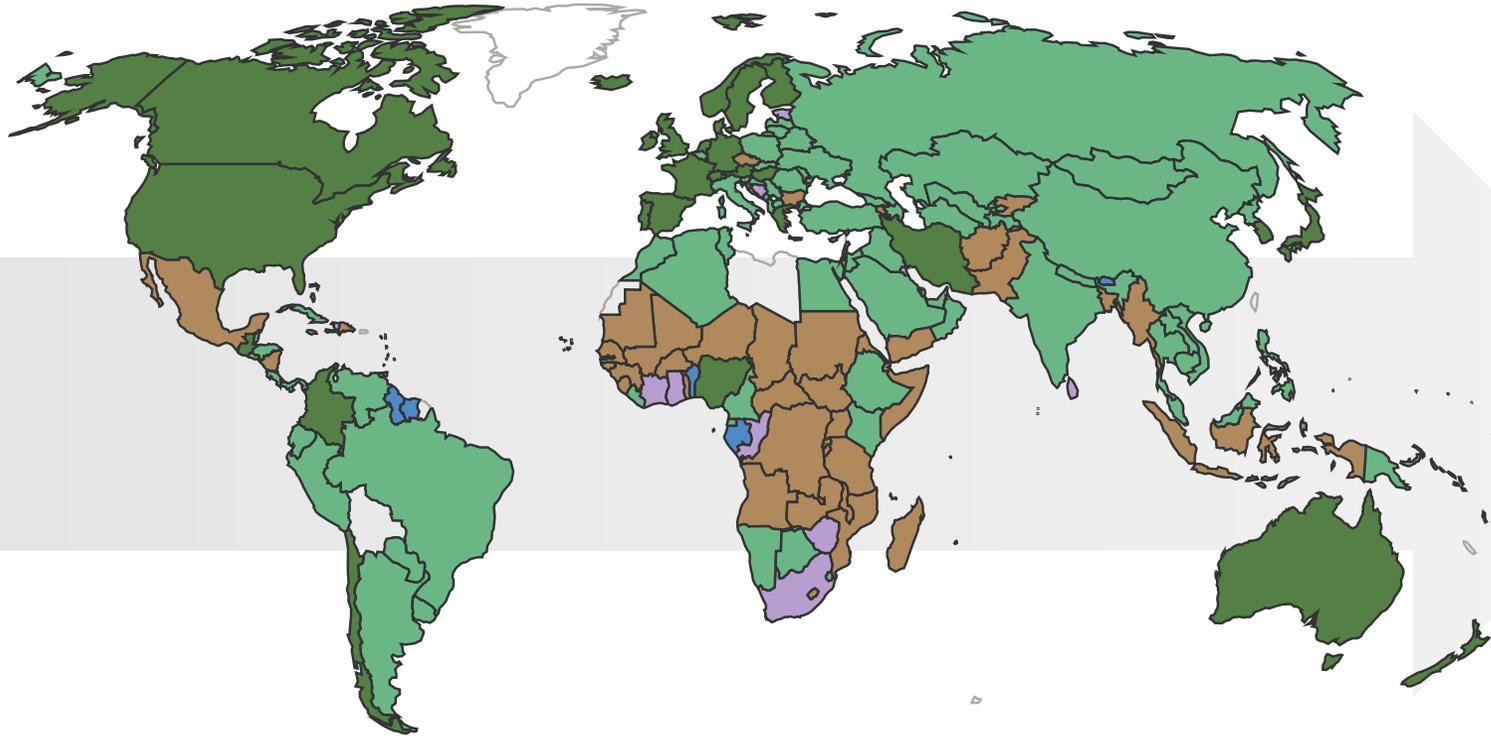


# FROM DEPENDENCY TO INDEPENDENCY

Innovating towards  
a resilient, sustainable  
& circular battery industry

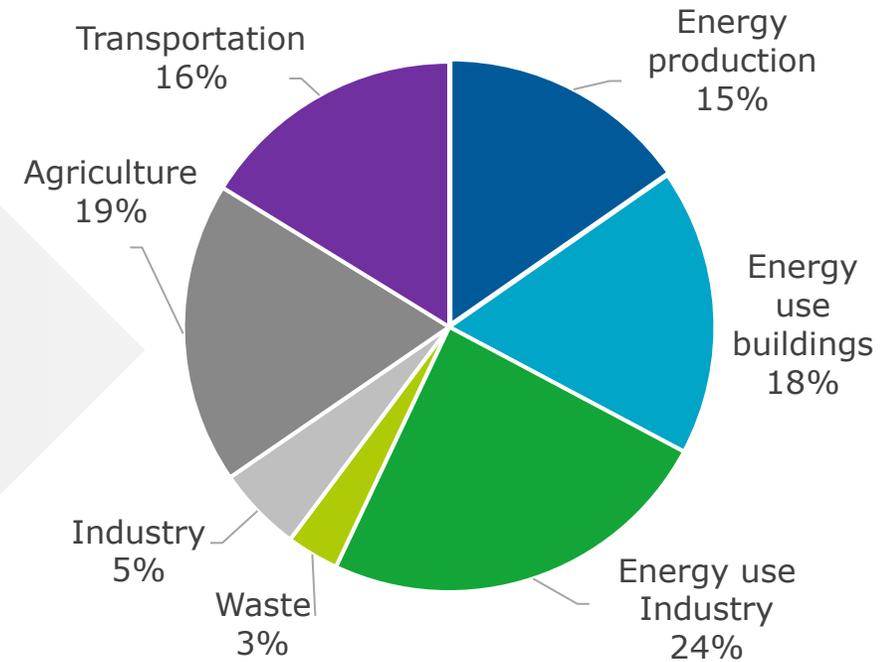
# WE ARE COMMITTED TO NET ZERO



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

## Net-Zero Emissions Commitments

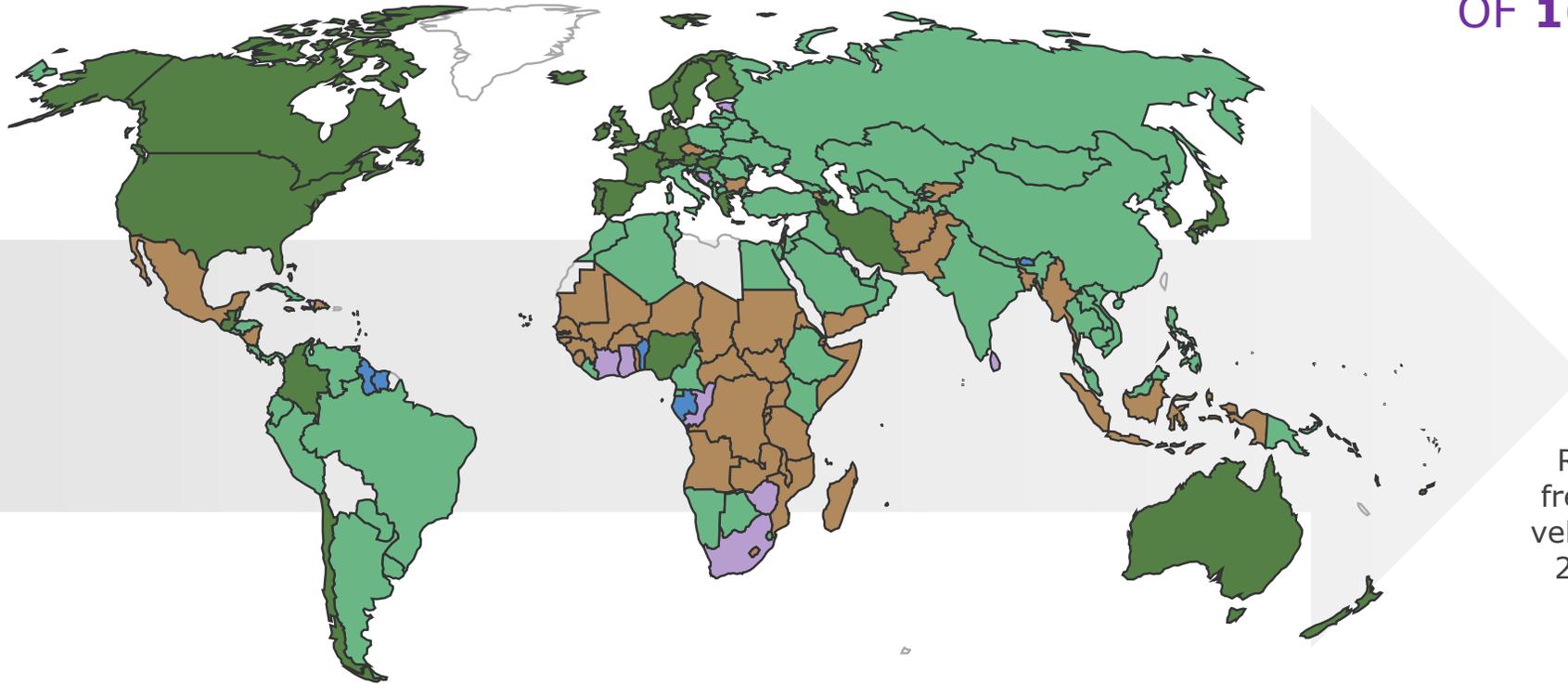
Energy and Climate Intelligence Unit, Data-Driven EnviroLab, NewClimate Institute, Oxford Net Zero - Net Zero Tracker  
[OurWorldinData.org/co2-and-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-greenhouse-gas-emissions) | [CC BY](https://creativecommons.org/licenses/by/4.0/)



## 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

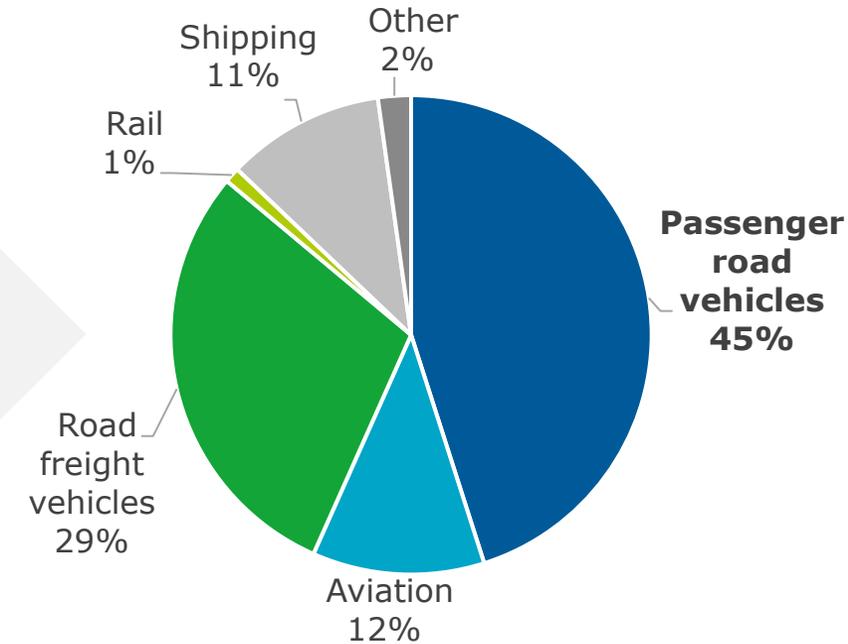


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## Net-Zero Emissions Commitments

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).



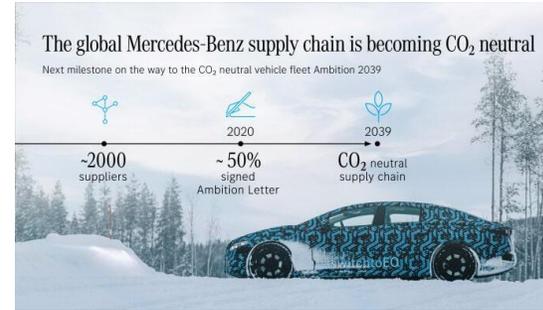
Mercedes-Benz



...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...



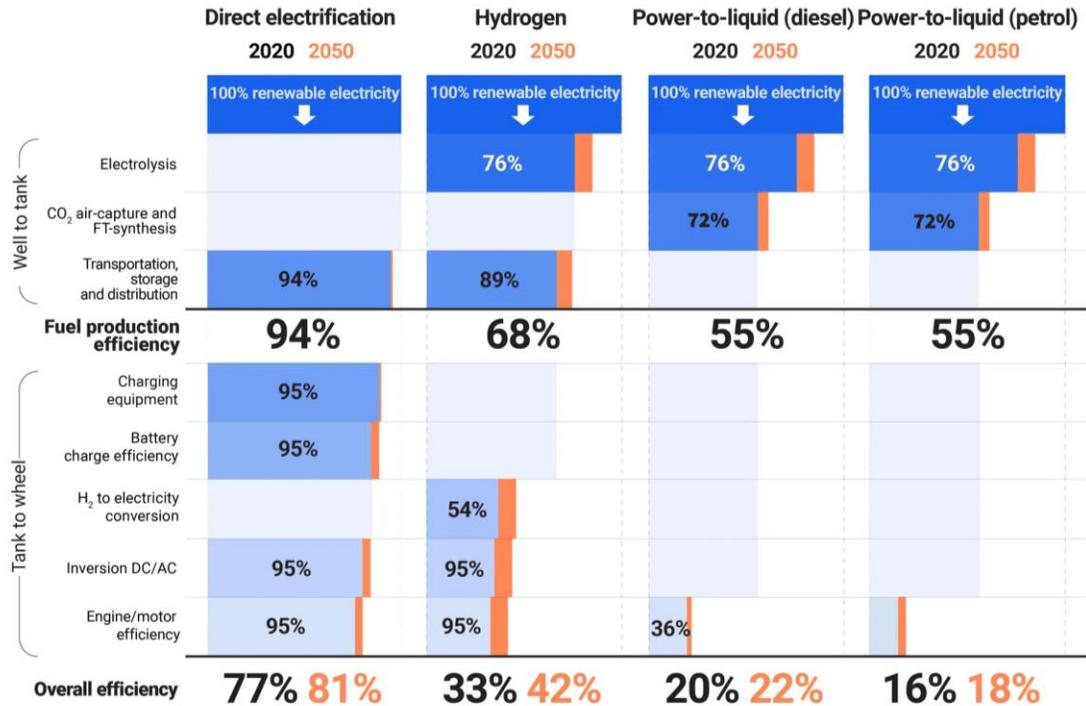
...from 2039 at the latest, only production materials which are CO2 neutral in all value creation stages will be allowed through the factory gates of Mercedes-Benz...



“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:

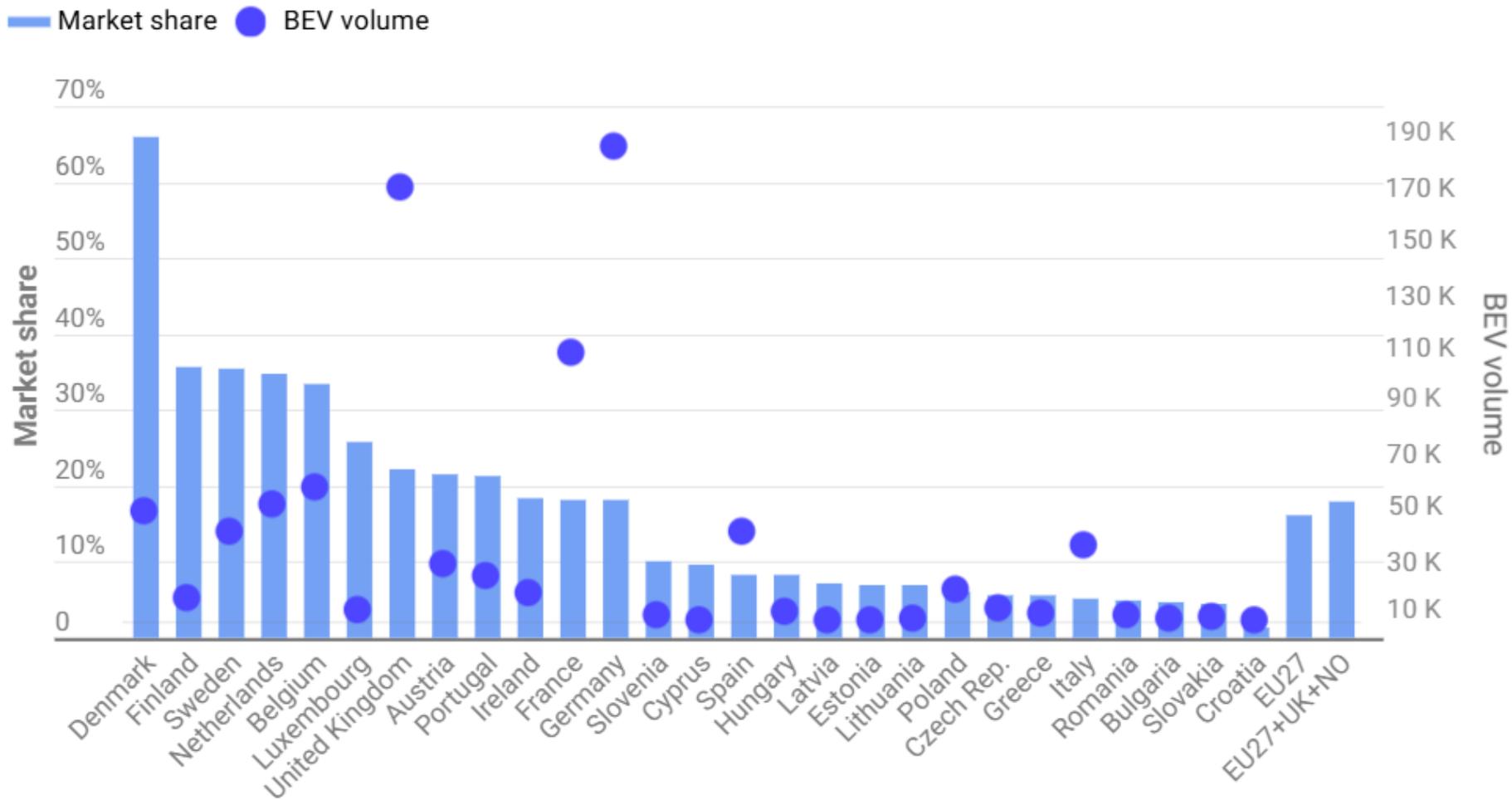
**EV: 495 km**

**H<sub>2</sub>: 193 km**

**Power-to-Liquid: 84 km**

## EV, H<sub>2</sub> & eFuels - Efficiency Comparison

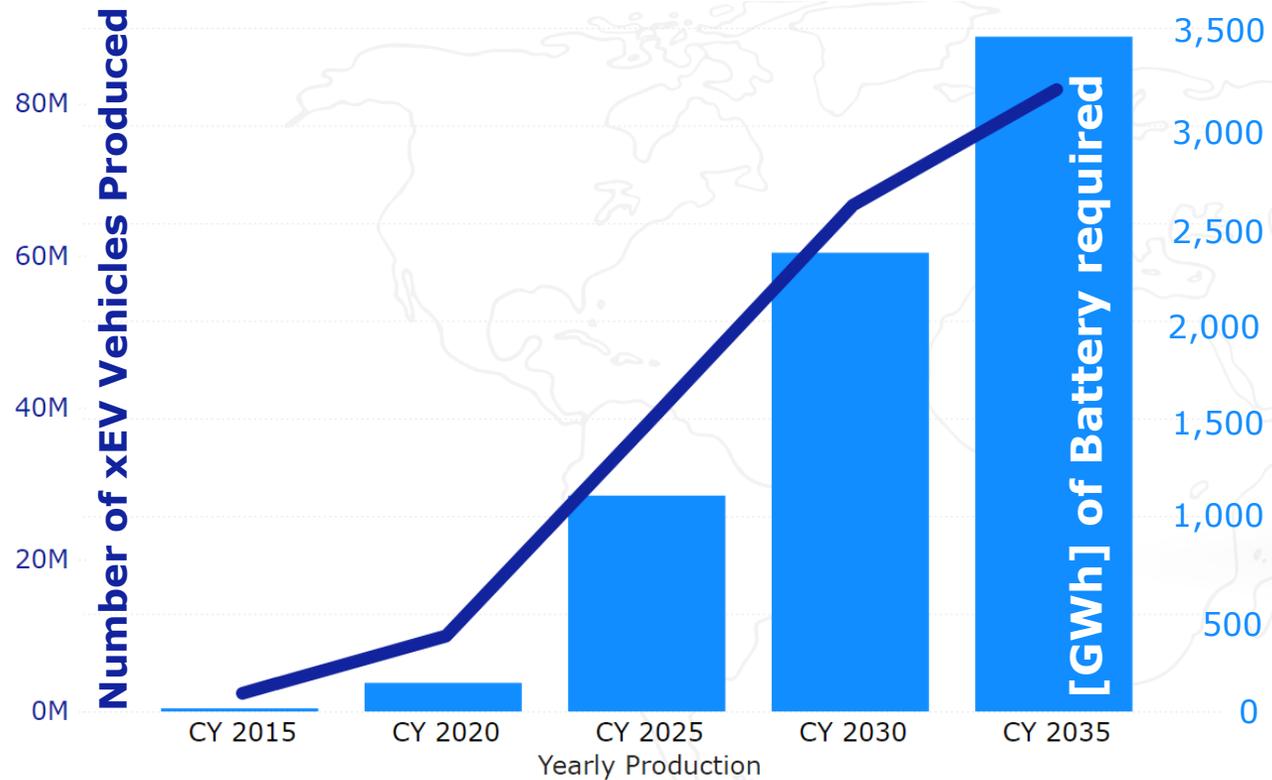
IHS Markit Database (Version 31.10.2025); Copyright © IHS Markit, 2025. All rights reserved.



# EV Market Share Q1-Q3 2025

Source: ACEA (2025) Registrations Data.

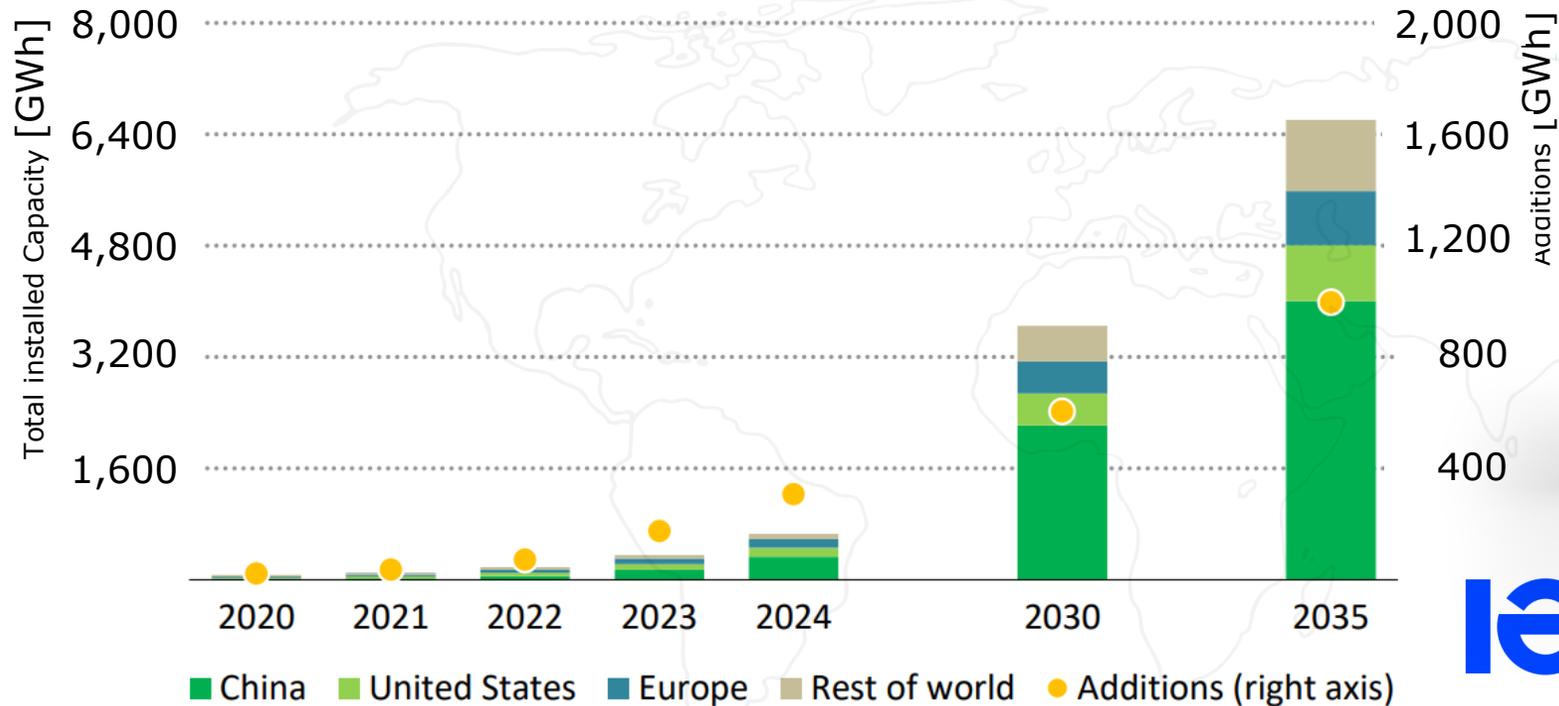
# GLOBAL DEMAND FORECAST TO 2035



## xEV Production Forecast

IHS Markit Database (Version 31.10.2025); Copyright © IHS Markit, 2025. All rights reserved.

# GLOBAL DEMAND FORECAST TO 2035



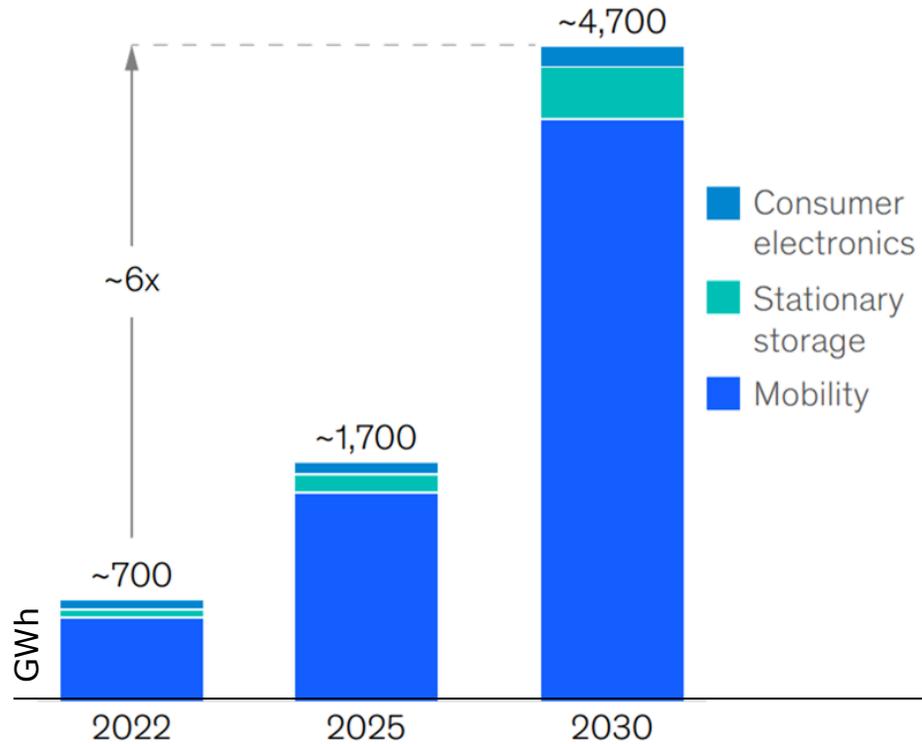
IEA. CC BY 4.0.

## 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

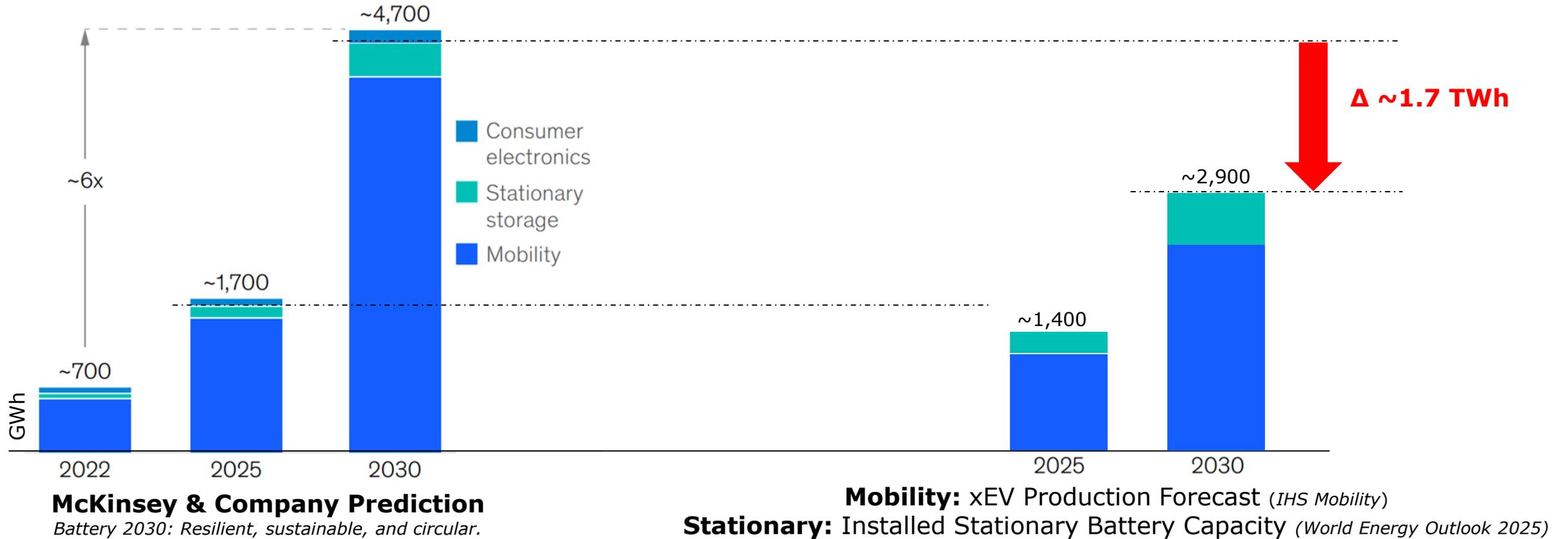
*Battery 2030: Resilient, sustainable, and circular.*

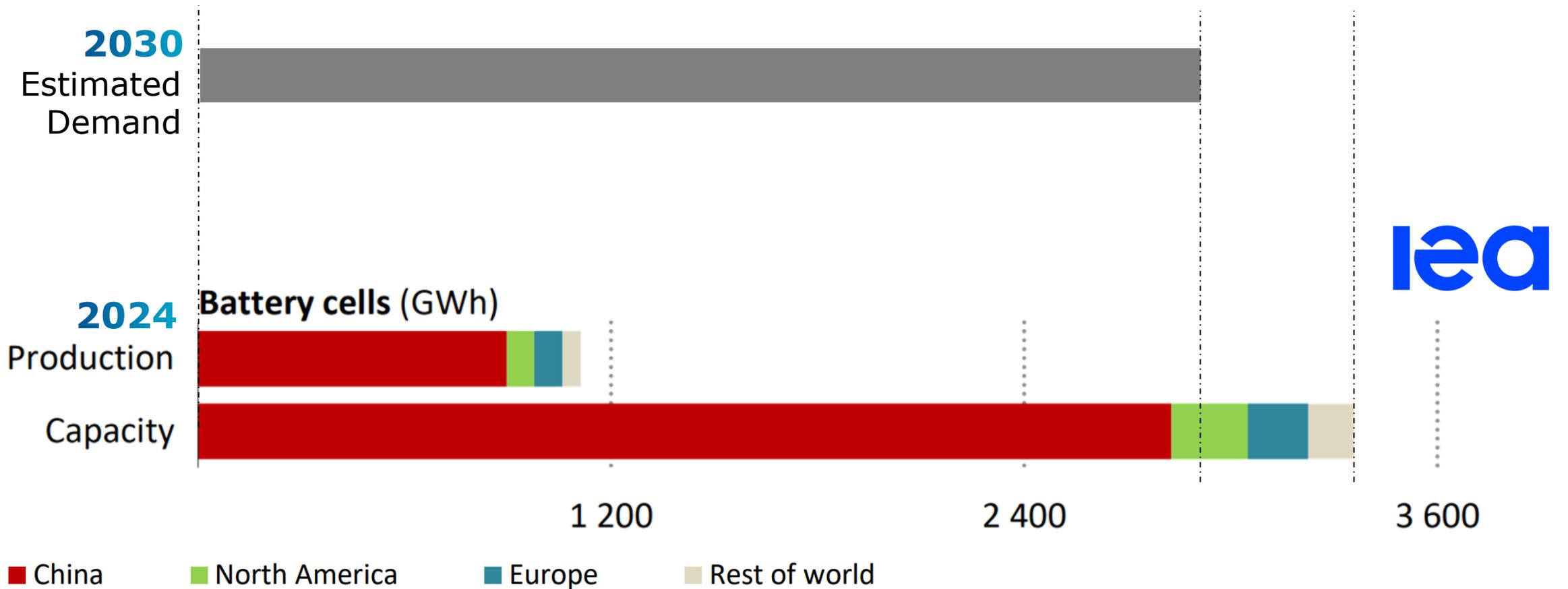
# 2022

# 2025

Prediction for 2030 in 2022: ~4.7 TWh

Total Demand Prediction for 2030 in 2025: ~2.9 TWh



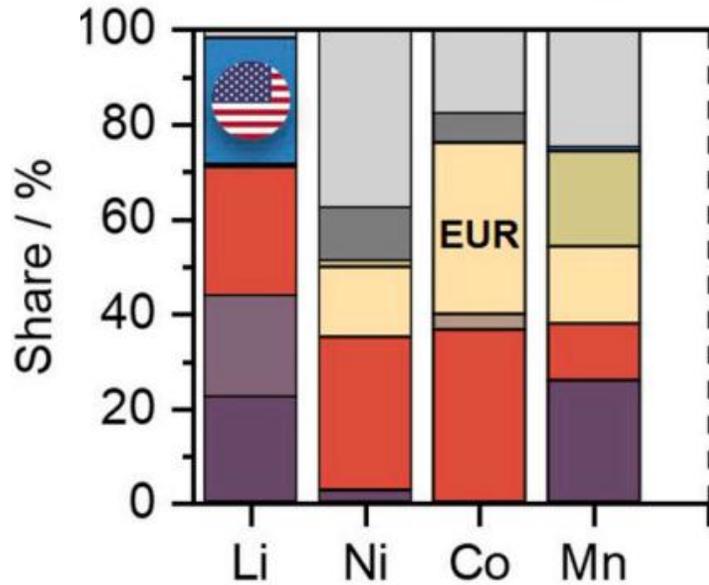


# Global Manufacturing Capacity and actual Production

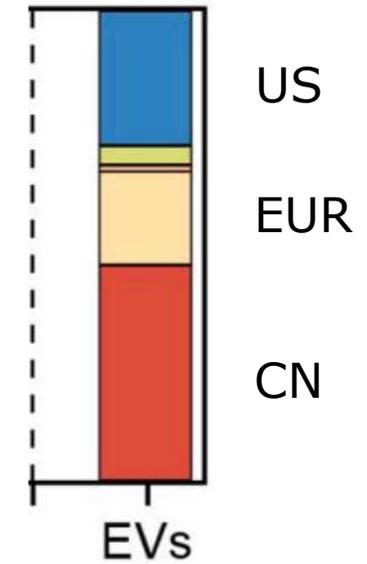
Figure 1.31: International Energy Agency | World Energy Outlook 2025



## 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**

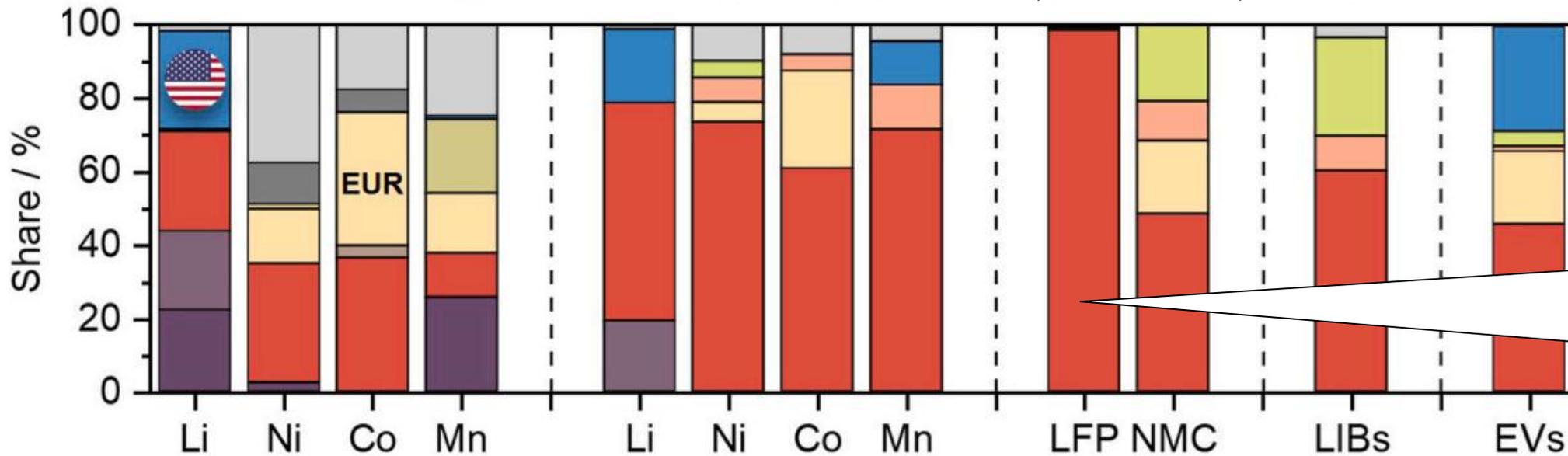
(Cathode Active Material)



**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

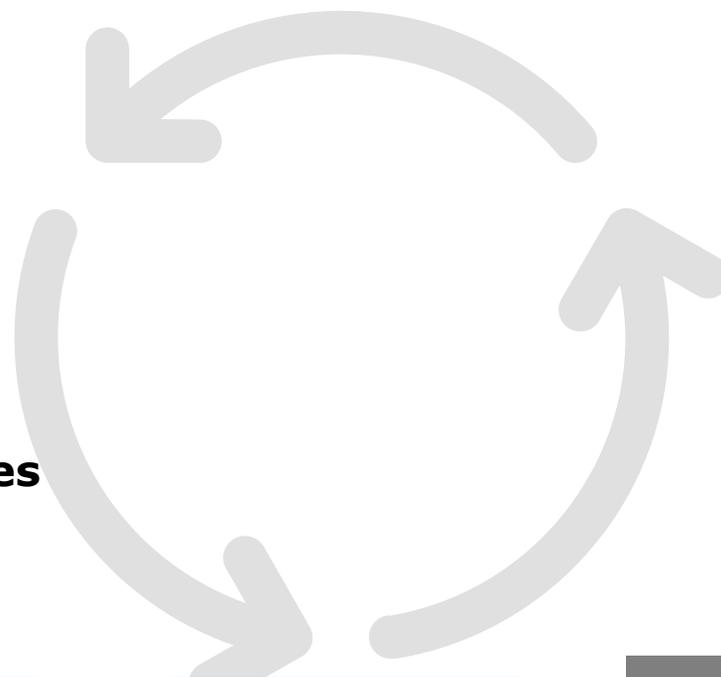
# RECYCLING - FUTURE: CLOSING THE LOOP LONG TERM



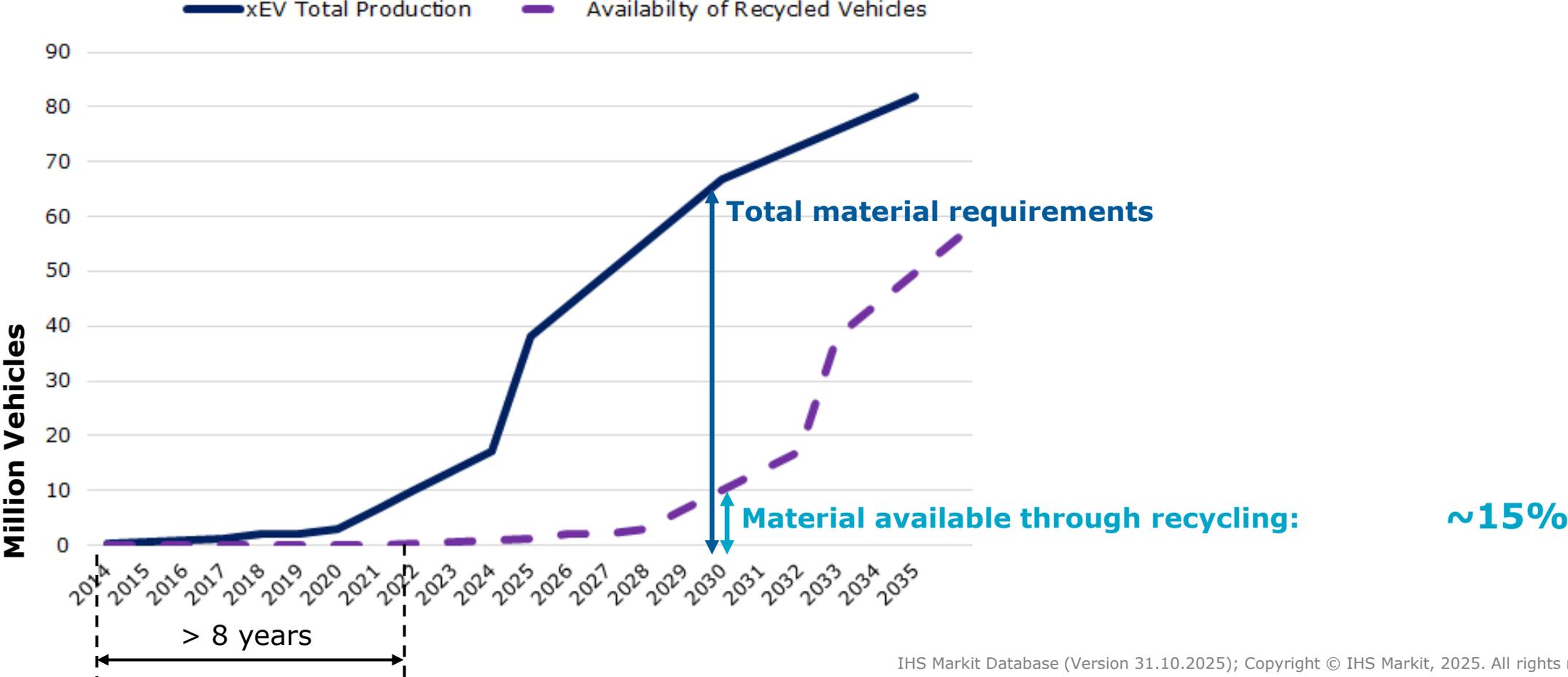
	2031	2036
Lithium	6%	12%
Nickel	6%	15%
Cobalt	16%	26%

**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



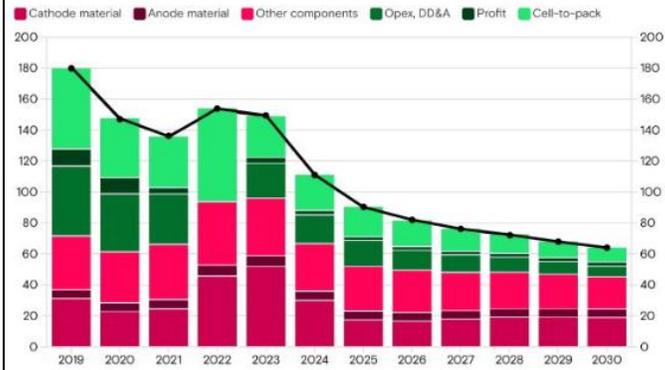
IHS Markit Database (Version 31.10.2025); Copyright © IHS Markit, 2025. All rights reserved.



# The consequences of global oversupply:

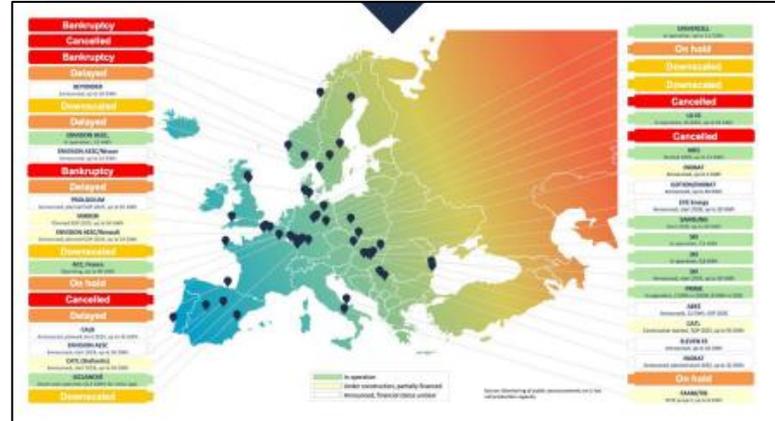
## Battery (cell) prices keep falling

**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

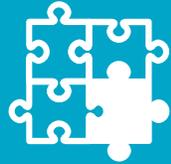
Company	Product	Market Cap <sup>1</sup> (Mio. EUR)	profit margin			Status	
			2022	2023	2024		
天齐锂业	Tianqi Lithium	Lithium	5,870	59,64%	18,02%	-60,51%	Investment in Australia stopped
赣锋锂业	Ganfeng Lithium	Lithium	7,060	49,02%	15,00%	-10,97%	Liquidity crunch
杉杉股份	Shaanshan	Active Material	2,170	12,40%	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	Dynanonic	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	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	Sanwoda	Battery Cells	4,120	2,05%	2,25%	2,62%	International expansion
华友	Wuwei Lead	Equipment	4,110	16,64%	10,67%	2,41%	Decline in profits due to project cancellations
力神	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**



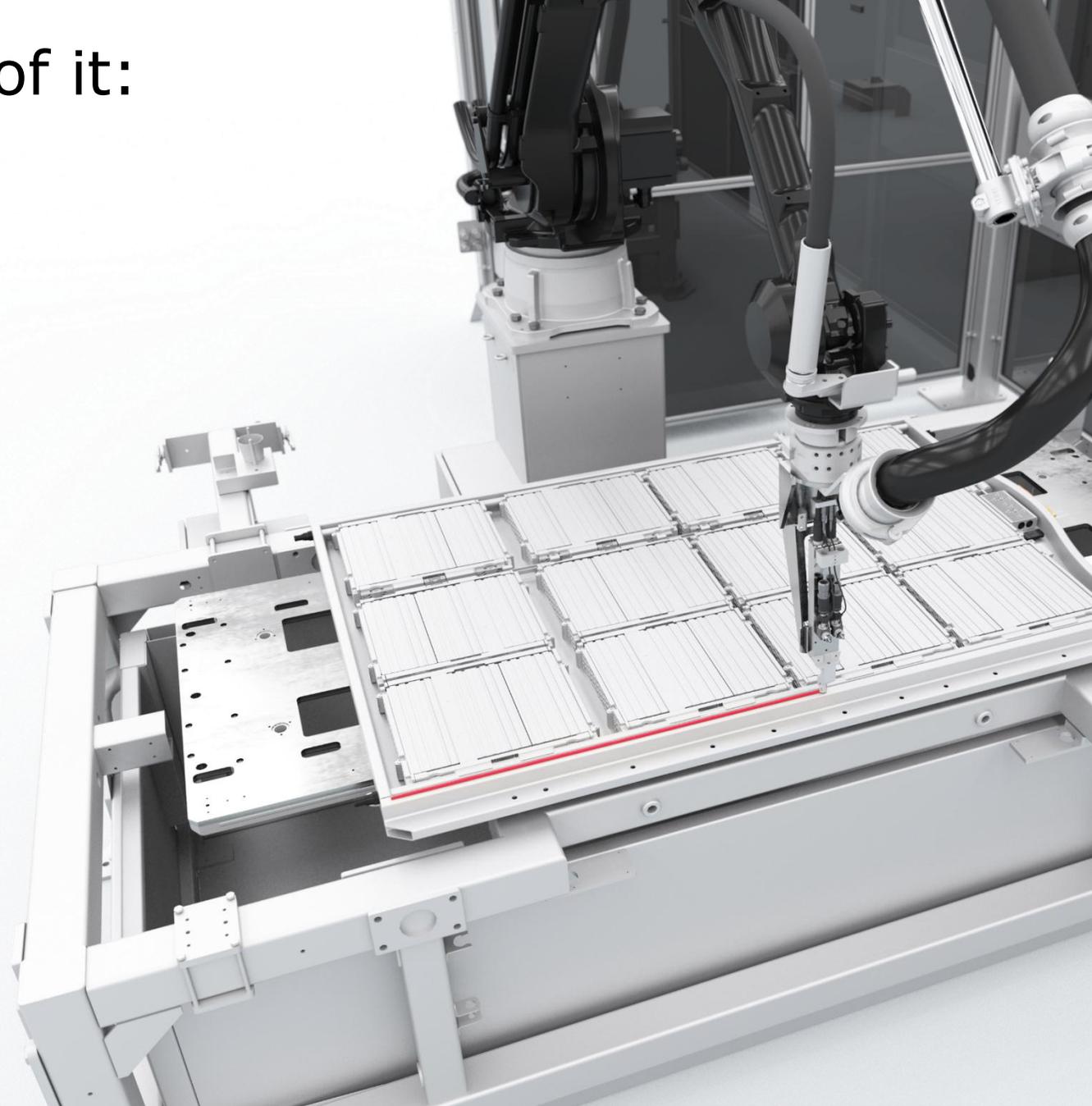
**MAXIMIZE  
SYSTEM EFFICIENCY**



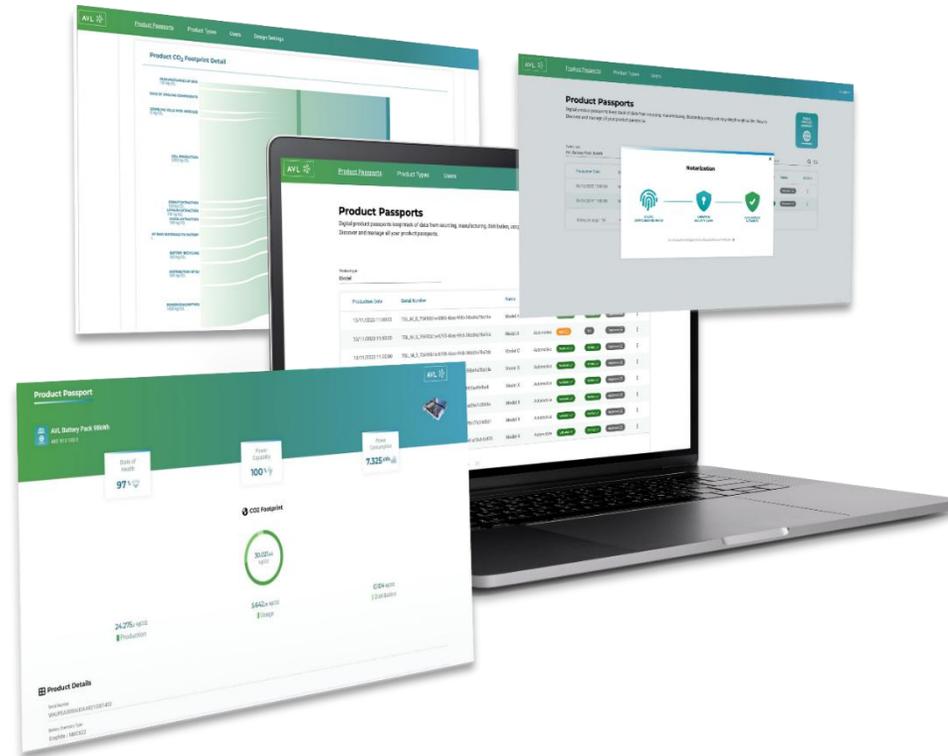
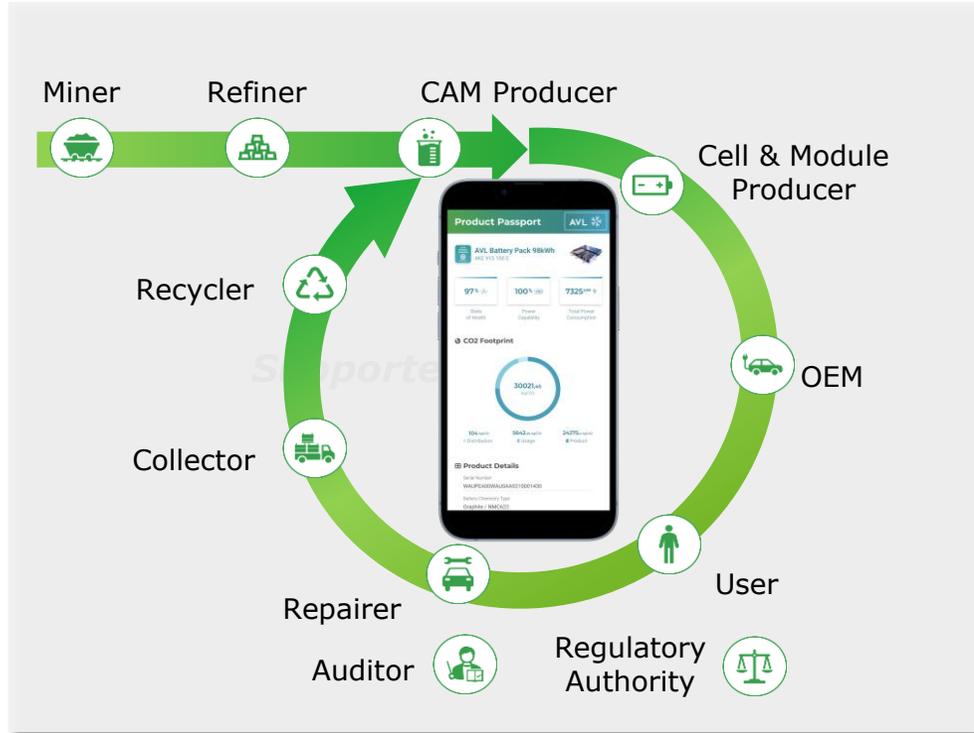
**DECREASE  
TIME 2 MARKET**



**COOPERATION**



# DIGITAL BATTERY PASSPORT



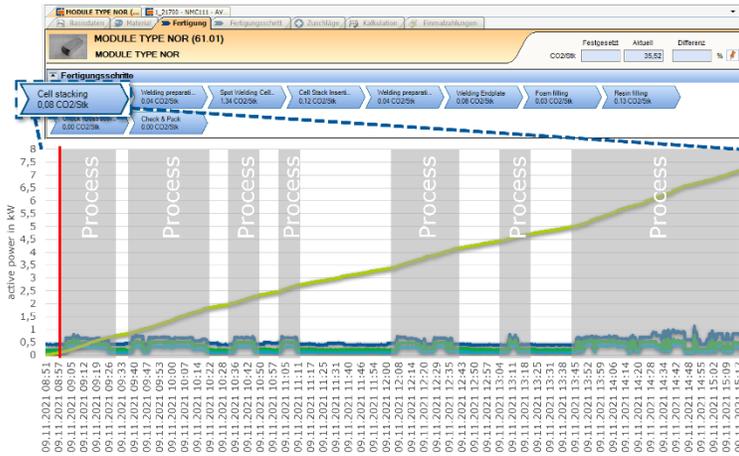
**Supported by:**



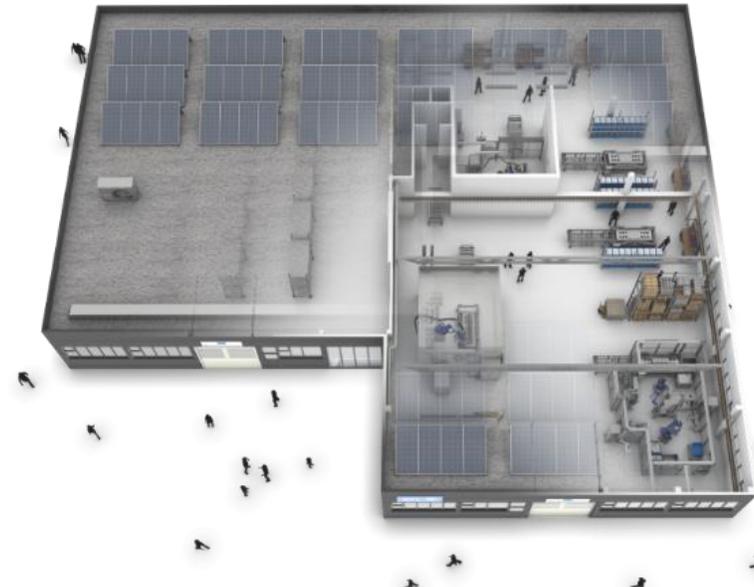
# BATTERY INNOVATION CENTER



MEASURE &  
IMPROVE



Energy  
measurement  
and conversion  
to CO2 values



Battery  
Process  
Emission  
Optimization

Supported by:



# CO2 OPTIMIZATION



## Reduction of CO<sub>2</sub> footprints by design measures

Variant	Cost [€]	CF [kg CO <sub>2e</sub> ]	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 CO<sub>2</sub> emission reductions can be achieved.

With AVL development methods

up to

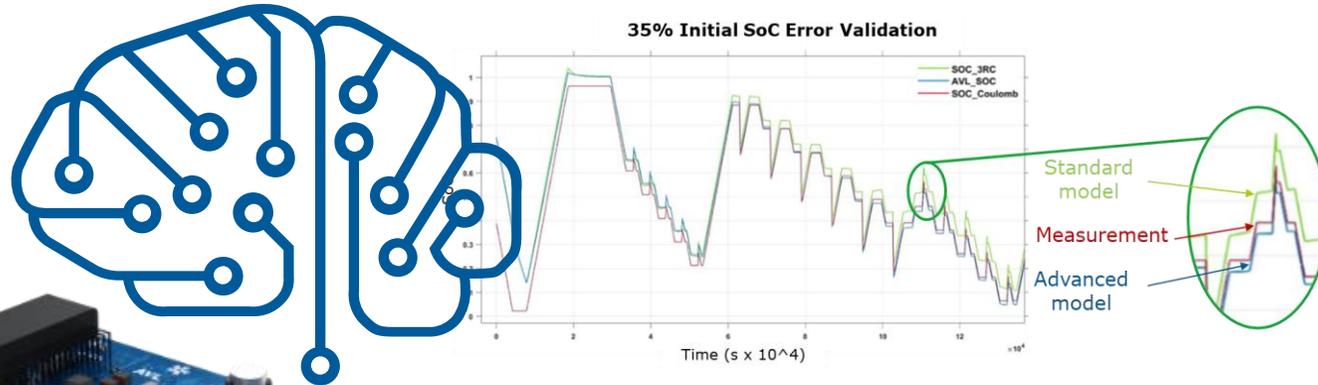
**30%**

**CO<sub>2</sub> reduction** in the product life-cycle

**Supported by:**



# 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™**

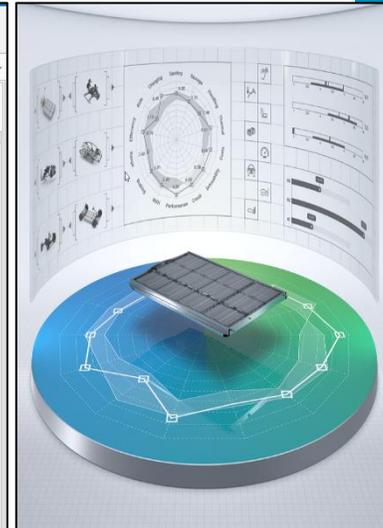
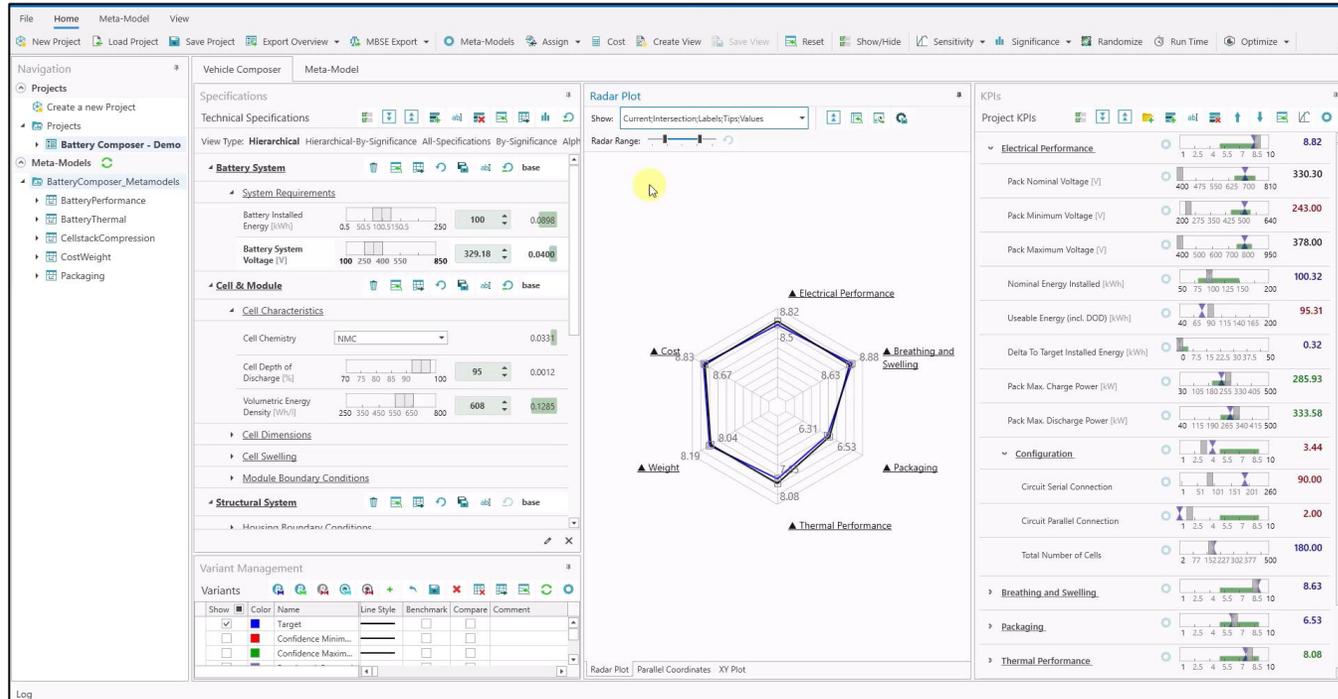
**VIRTUALIZATION TOOLS**

**INDUSTRY KNOWLEDGE**

**BATTERY EXPERIENCE**

**Reduce Battery System Development**

**< 2 yrs**

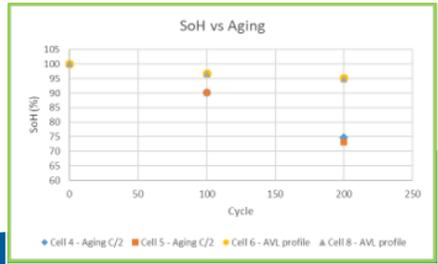
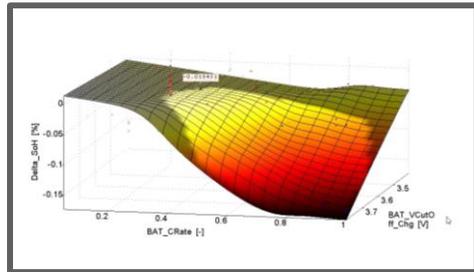
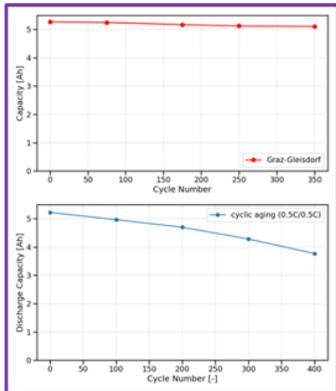


**Supported by:**



# DIGITAL & HARDWARE PRODUCT VALIDATION

  
 DECREASE  
 TIME 2 MARKET



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

