



We create chemistry

BASF Battery Materials

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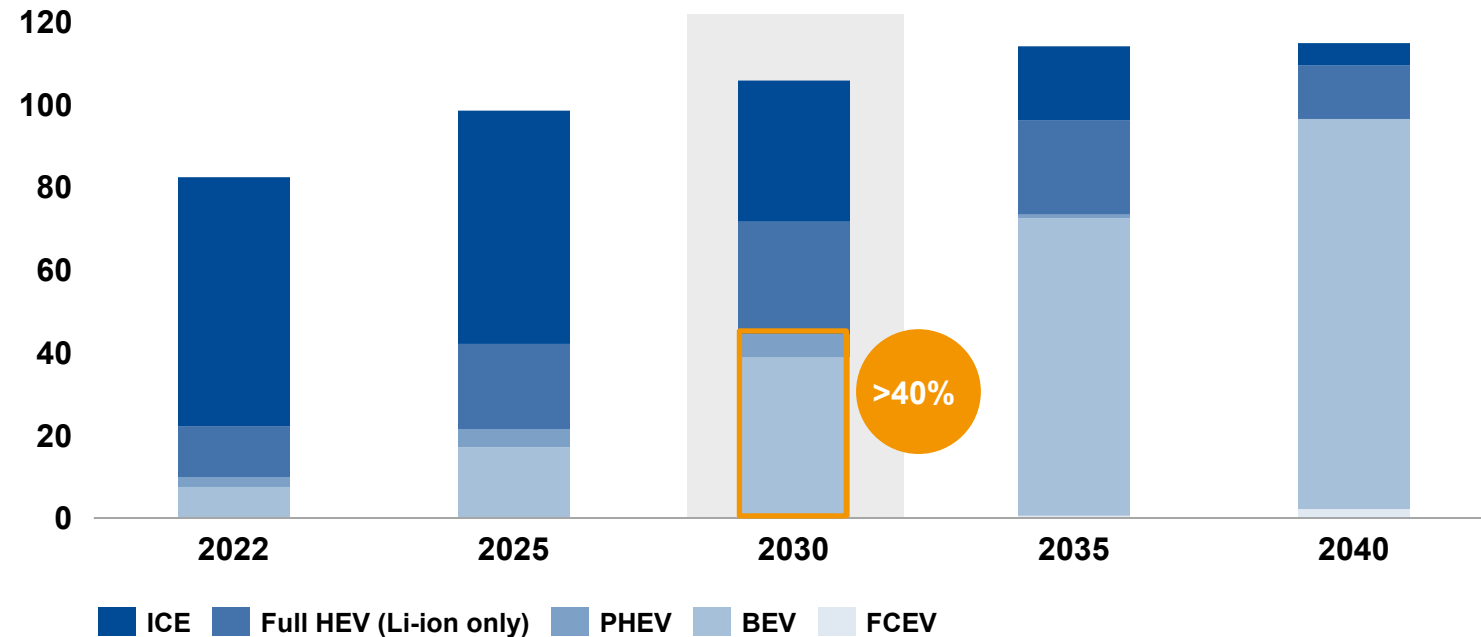
Cautionary note regarding forward-looking statements

This presentation contains forward-looking statements. These statements are based on current estimates and projections of the Board of Executive Directors and currently available information. Forward-looking statements are not guarantees of the future developments and results outlined therein. These are dependent on a number of factors; they involve various risks and uncertainties; and they are based on assumptions that may not prove to be accurate. Such risk factors include those discussed in Opportunities and Risks on pages 151 to 160 of the BASF Report 2021. BASF does not assume any obligation to update the forward-looking statements contained in this presentation above and beyond the legal requirements.

The automotive industry is in the middle of a major transformation towards electromobility

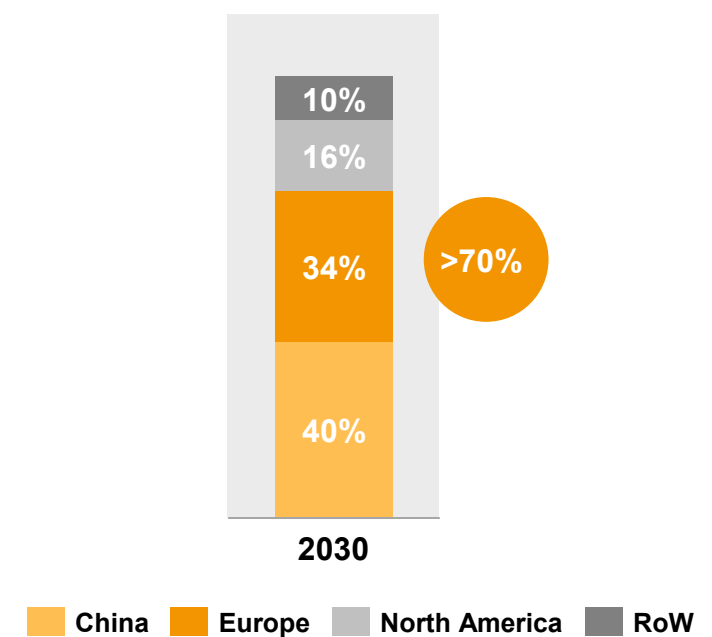
Powertrain development

Light-duty vehicle production volume [million units]



Regional BEV split

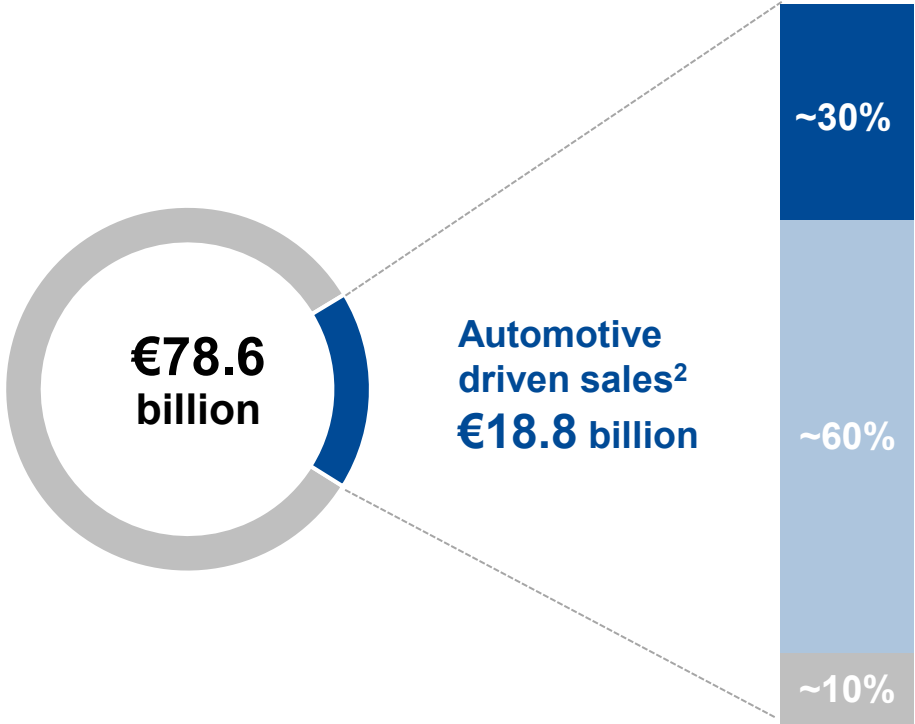
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By 2030, we expect that >40% of all new cars will be BEVs and PHEVs with China and Europe representing >70% of global demand

BASF is the largest chemicals supplier to the automotive industry with a proven track record to outgrow the market

BASF Group sales 2021



Industry structure¹

OEM

Supplier

- Tier-1
- Tier-2
- Tier-3+

Aftermarket

BASF products

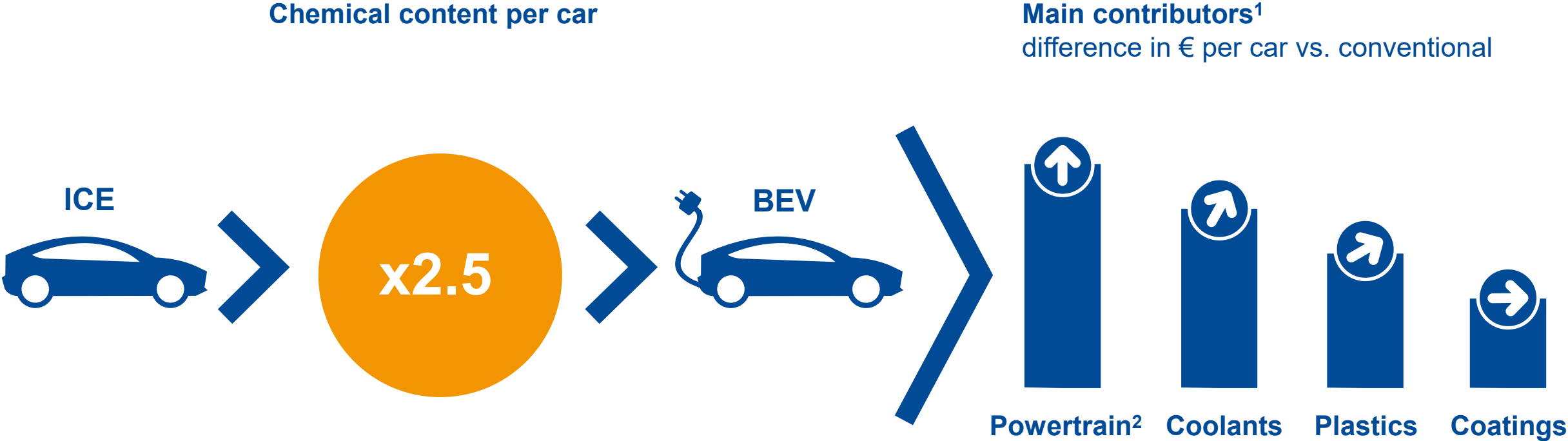
- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ Coatings ▪ Coolants and brake fluids ▪ Plastics for OEMs with own processing | <ul style="list-style-type: none"> ▪ Fuel additives and lubricants ▪ Cellasto ▪ Battery materials |
| <ul style="list-style-type: none"> ▪ Plastics ▪ Catalysts ▪ Coatings for car parts | <ul style="list-style-type: none"> ▪ Battery materials ▪ Solvents ▪ ... |
| <ul style="list-style-type: none"> ▪ Refinish coatings ▪ Coolants and brake fluids | <ul style="list-style-type: none"> ▪ Fuel additives and lubricants |

More than 20% of BASF's 2021 sales are linked to the automotive industry

¹ Based on business model, not real supply chain

² Includes precious metals

The chemical content per car is higher in a BEV compared to ICE, with CAM as the single largest growth opportunity

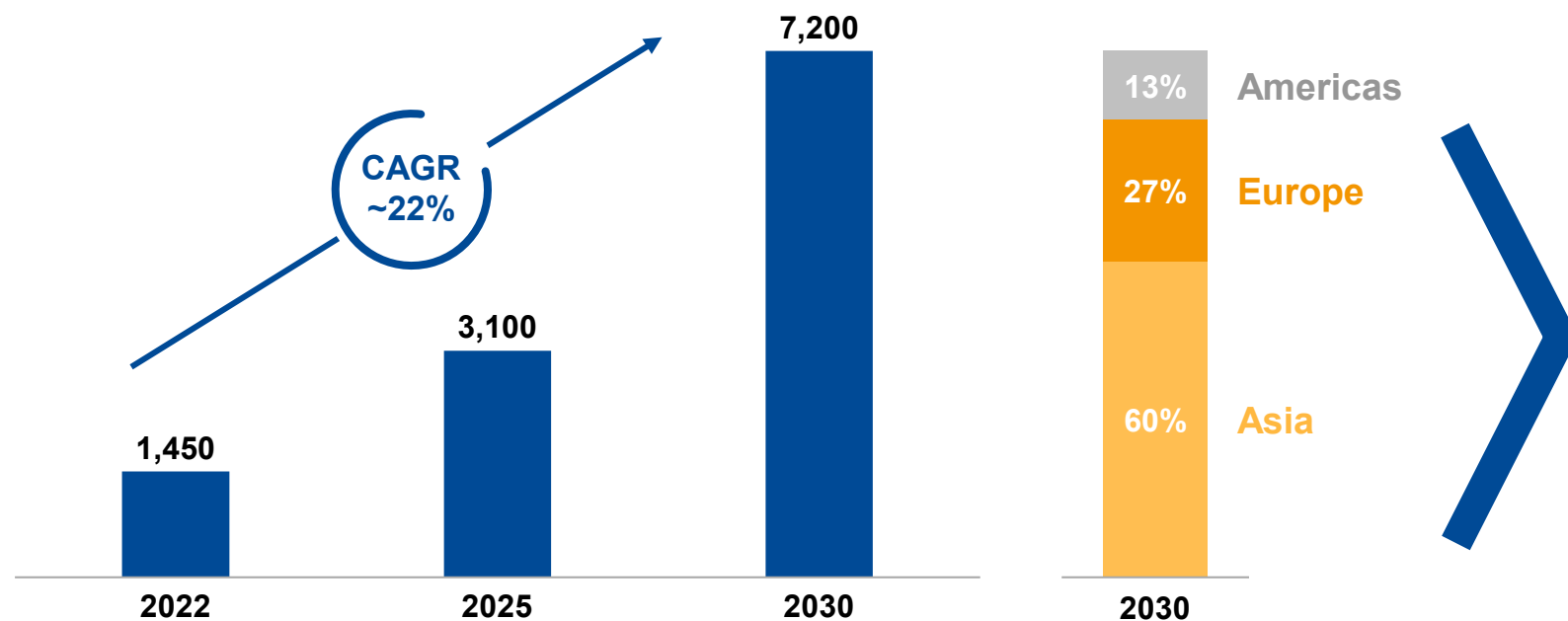


The cathode active material (CAM) as key component of any battery cell more than doubles the chemical content which can be found in today's average ICE vehicle

¹ Only representative for relative change in projected sales
² Emission catalyst vs. cathode active material (both incl. metals)

The market for CAM will grow by ~22% per year and reach a total size of 7,200 kt by 2030

Global CAM market forecast¹
kt



Rapid growth of global EV demand ...



... accelerates the need for global CAM capacity investments and ...



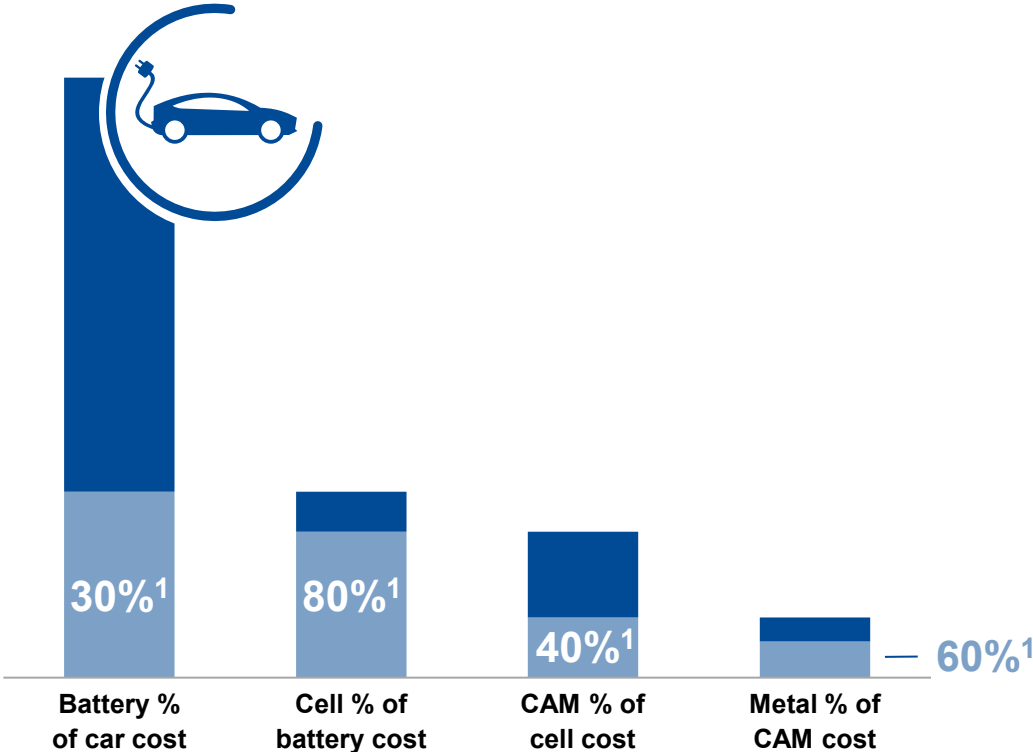
... drives demand for base metals (i.e., Ni, Co, Li)



CAM market size expected to reach €150–200 billion by 2030, driven by battery performance, safety and cost aspects – which are all key parameters for BEVs

¹ All applications (e-mobility, energy storage systems, consumer electronics) and all cathode chemistries; market size can vary significantly due to volatility in metal prices; status as of September 2022

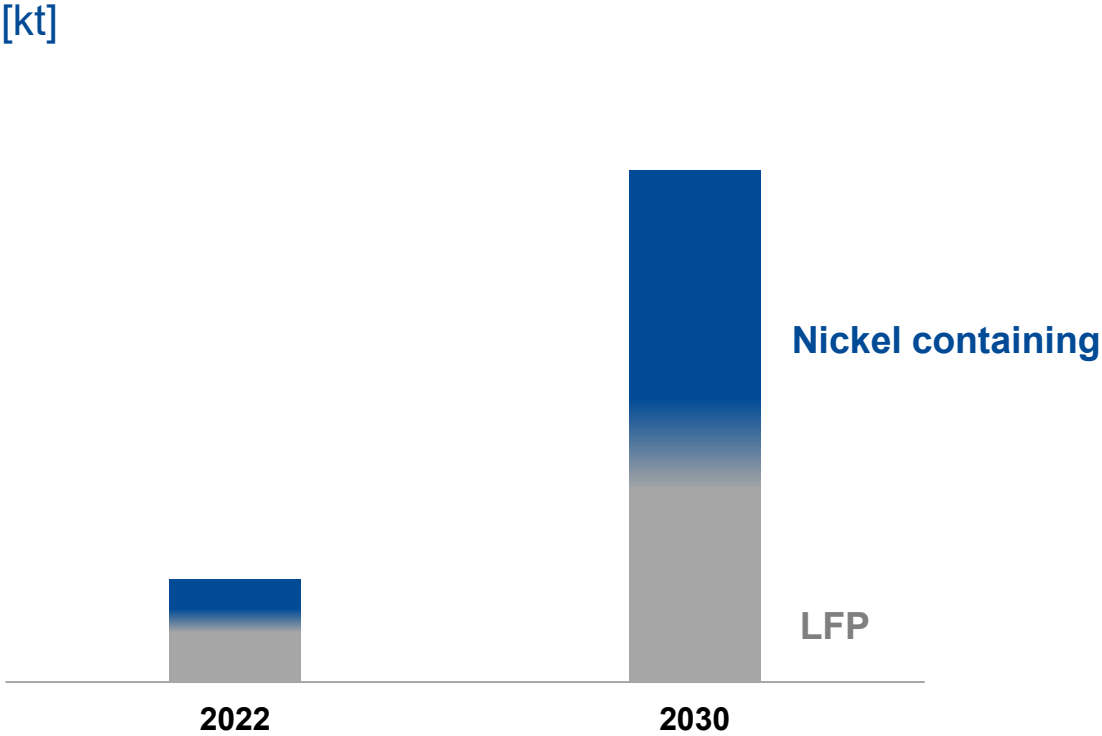
Within the electrified powertrain, CAM allows for the greatest level of differentiation and holds the largest material value



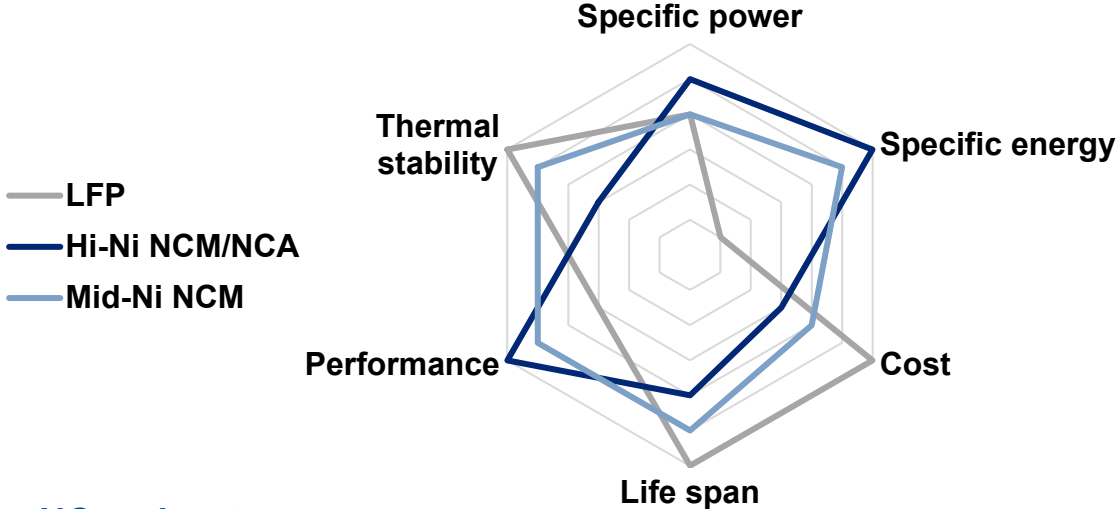
CAM performance parameters, total system cost and sustainability aspects will determine the material choice of cell producers and OEMs

Among the CAM options, high-Ni NCM is the superior chemistry and will lead the EV market going forward

CAM chemistry-mix volume forecast in BEVs



Cathode-type performance in BEVs¹



NCx advantages




- Energy density/driving range
- Possibility for future performance/cost improvements
- Recyclability

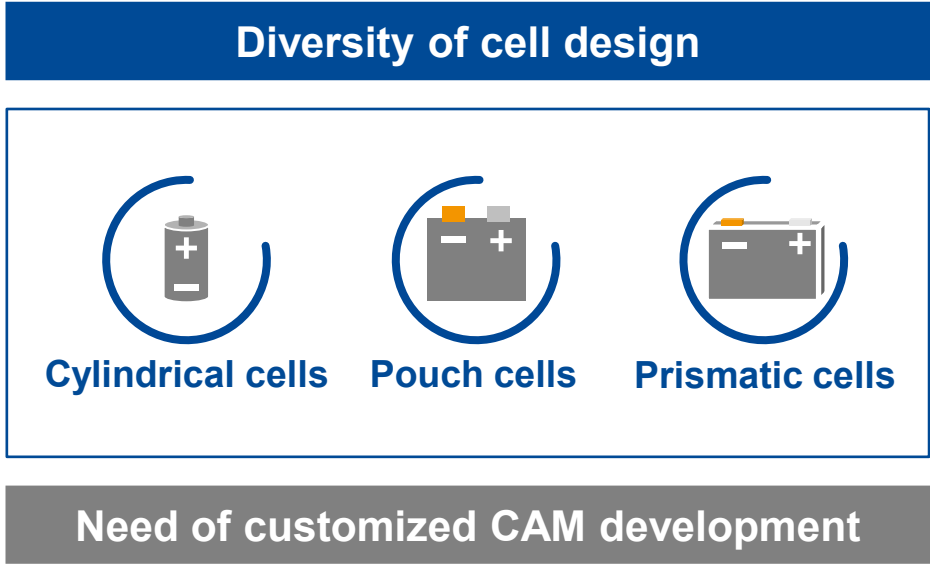
NCM variants have the highest energy density today and a potential cost-improved position in the future, making them the leading CAM option in 2030 for EVs



¹ Source: BASF internal

PCAM and CAM are high-performance materials customized for the specific requirements of each individual customer's battery system

Diversity of CAM and application area for e-mobility		
Li/Mn-rich, LFP CAM	Mid Ni CAM (60–85% Ni)	High Ni CAM (>85% Ni)
Low range Entry segment	Long range Luxury segment	High performance and mass sensitive
		

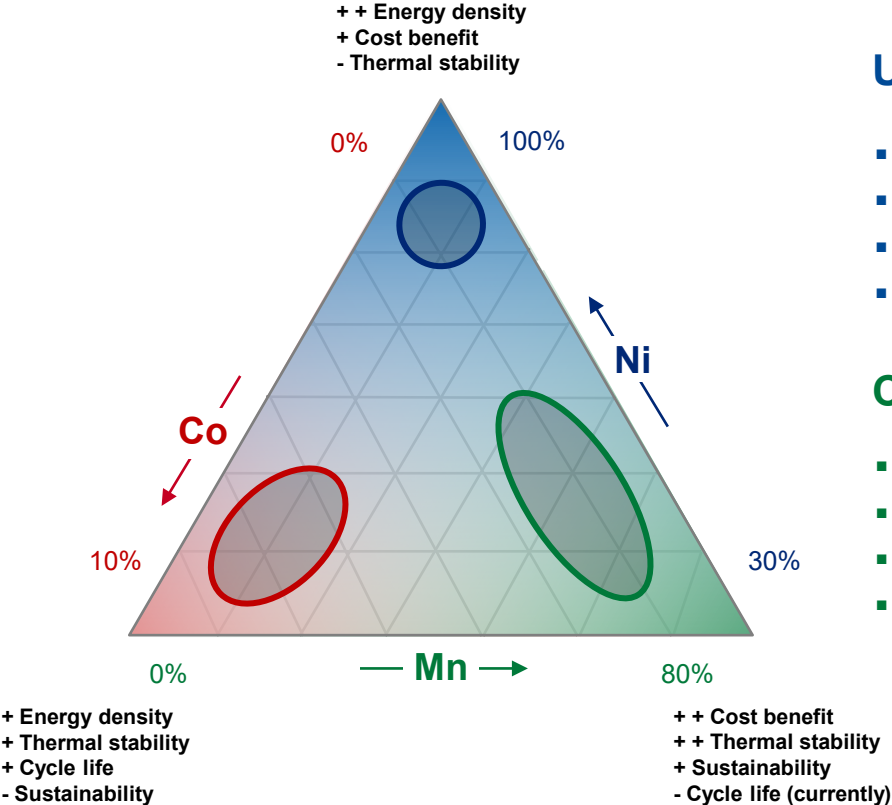


Close R&D collaboration with cell producers and OEMs as well as broad technology and IP portfolio are essential

Product innovation enables the broadest CAM portfolio in the industry, and we continue to add new solutions

HED™ products

- High energy density NCA and NCM cathode materials
- Ni content ranging from 60% to >90%
- Already used in xEV applications today



Ultra-high Ni

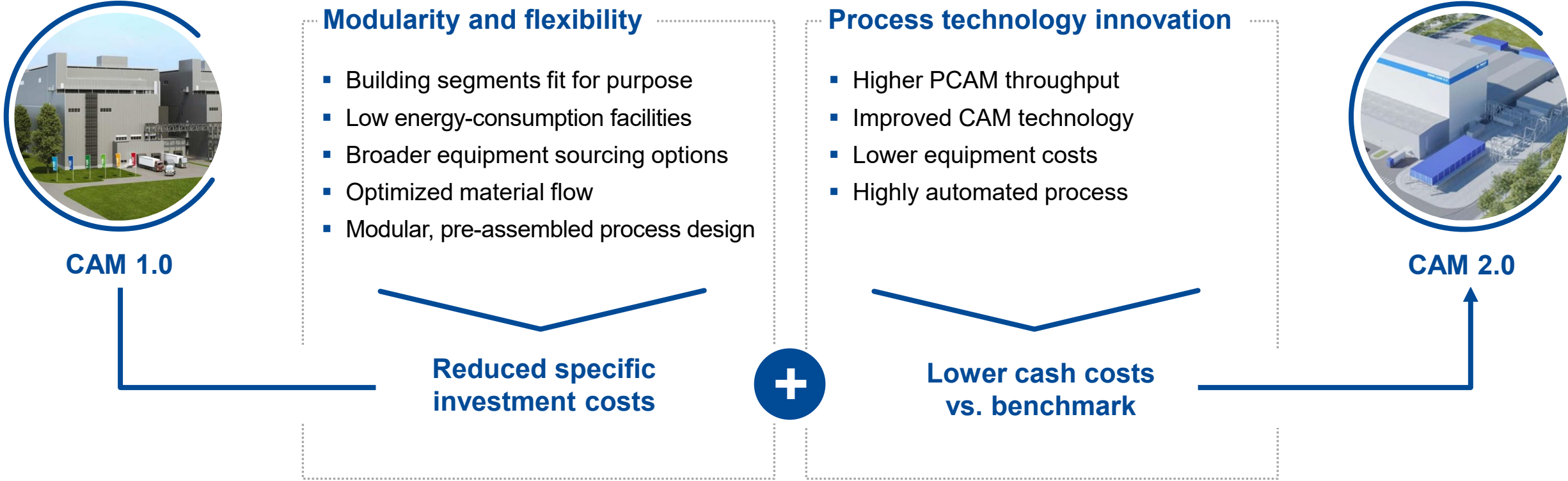
- Ultra-high Ni CAM, ≥220 Ah/kg
- Ni >90%, Co <5%
- Up to stabilized LNO
- Pushing boundaries for high-performance applications

Co-free CAM

- Ni-rich NMx
- Over-lithiated Mn-rich, e.g., NCM-307
- Focus on lower cost and improved safety
- Candidate for mass market entry due to price advantage

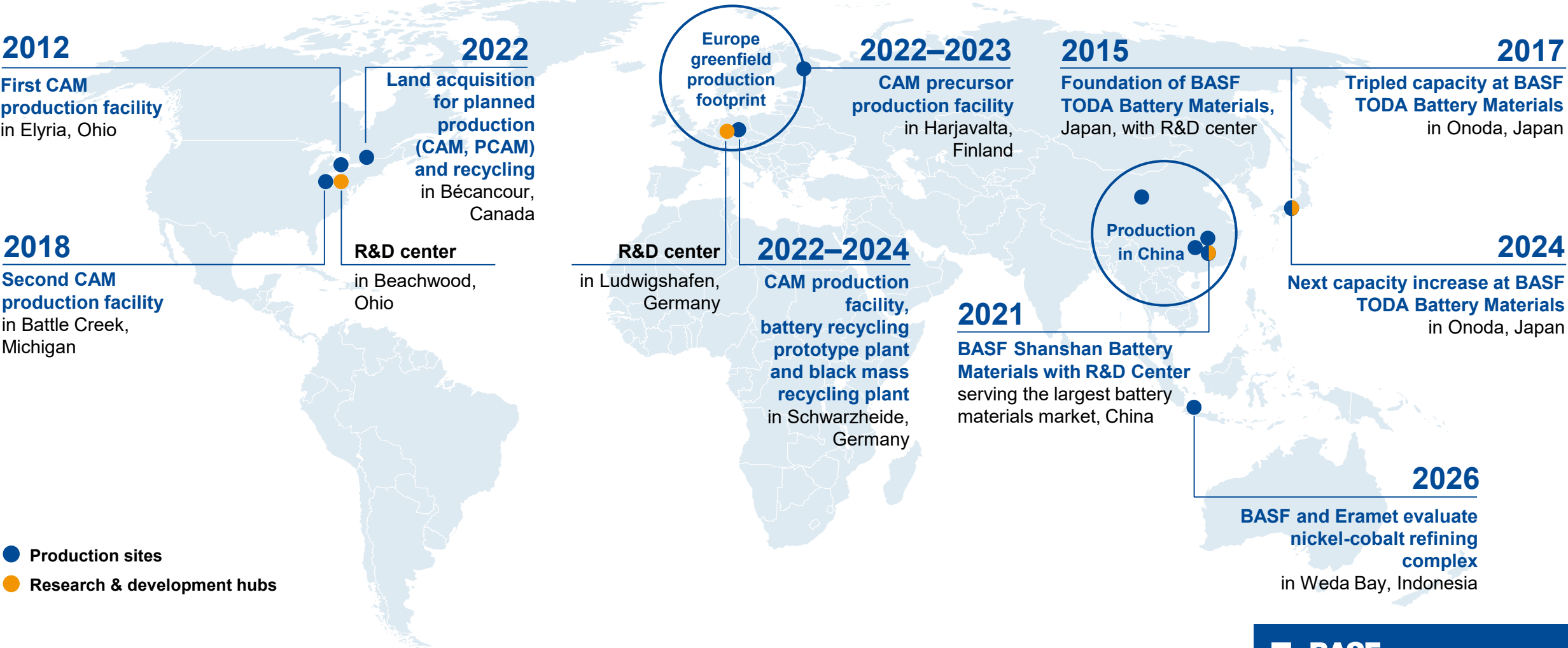
Our technology toolbox offers customized solutions for all cell formats and provides a basis for innovations beyond classical lithium-ion batteries

BASF strategies for modularization and process innovation will further drive down the cost of PCAM and CAM production



We bundle BASF's broad technology and engineering expertise to significantly drive down operating costs and future capital expenditures

BASF has production assets and R&D hubs in close proximity to the most important BEV markets in every region



We establish close customer collaborations and strategic partnerships



Joint News Release

September 16, 2021

BASF and CATL have signed a framework agreement to accelerate the achievement of global carbon neutrality goals

- The cooperation is focused on cathode active materials and battery recycling
- The partnership supports both companies' commitment to global carbon neutrality and CATL's localization strategy in Europe

BASF SE (BASF) and Contemporary Amperex Technology Co. Limited (CATL) announced a strategic partnership on battery materials solutions, including cathode active materials (CAM) and battery recycling. The collaboration aims at developing a sustainable battery value chain, in support of CATL's localization in Europe and contributes to achieving both companies' global carbon neutrality goals.

CATL is a global leader in innovative new energy technologies. It is committed to providing premier solutions as well as services for new energy applications worldwide. CATL has launched its project to build up its first European factory in Germany to localize lithium-ion battery production. With this, it is accelerating the development of a local supply chain for European customers and consumers.

As the largest chemical supplier to the automotive industry, BASF has established a strong position in the CAM market including a global manufacturing and R&D footprint, and a broad portfolio of mid- to high-nickel, manganese-rich, cobalt-free CAM in Europe. BASF is introducing CAM production with an industry-leading carbon footprint through its advanced process technology, a secured local raw materials supply chain, a favorable

CATL
 Agreement on **strategic partnership** signed for collaboration on **CAM and battery recycling**



News Release

September 16, 2021

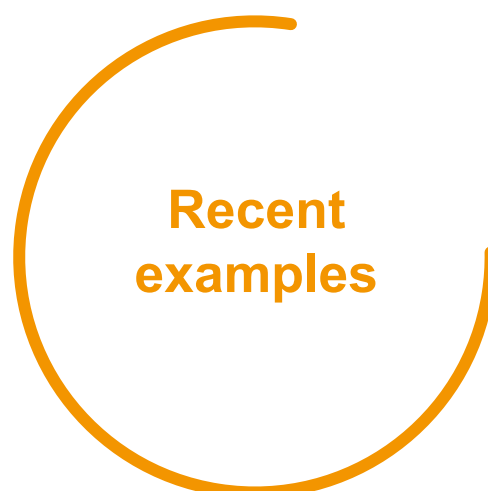
BASF and Porsche partner to develop high-performing lithium-ion battery for electric vehicles

- BASF to exclusively supply high-energy HED™ cathode active materials for Porsche's high-performance vehicles
- BASF to recycle production waste from cell manufacturing at Cellforce Group to close the loop

BASF has been selected by Cellforce Group, a joint venture between Porsche and Customcells, as the exclusive cell development partner for its next-generation lithium-ion battery. As part of the collaboration, BASF will provide high-energy HED™ NCM cathode active materials to contribute to high-performance battery cells for fast charging and high energy density. Cellforce Group, based in Tübingen, Germany, will produce the high-performing battery. Its battery production plant is expected to start operations in 2024 with an initial capacity of at least 100 MWh per year, powering 1,000 mid-range and high-performance vehicles.

As a global leading supplier of high-performance cathode active materials with a strong R&D network, BASF is ideally positioned to work with partners to contribute to a circular economy. With its production plants for precursor cathode active materials in Hagerhals, Finland, and for cathode active materials in Schwarzhof, Germany, BASF will be able to provide battery materials with an outstanding

Porsche
 Exclusive development and supply contract with Cellforce Group, a joint venture by Porsche and Customcells, signed



Consumer electronics
 Through the formation of **BASF Shanshan Battery Materials**, we supply an extensive list of companies active in **consumer electronics** like Apple and LG



Joint News Release

May 20, 2021

BASF and Shanshan to form a joint venture serving the largest battery materials market, China

- BASF gains access to Chinese CAM market, expanding its global footprint with an integrated, unique cathode active materials supply chain
- Shanshan benefits from BASF's global automotive customer network strengthening competitiveness in the Chinese market
- Partnership generates significant technology synergies and tailored solutions for a broad customer base

Ludwigshafen/Germany and Shanghai/China, May 20, 2021 – BASF and Shanshan, a leading lithium-ion battery materials supplier serving both the e-mobility and the consumer electronics (CE) market, have agreed to form a BASF majority-owned joint venture (BASF: 51%, Shanshan: 49%) to produce cathode active materials (CAM) and precursors (PCAM) in China. Closing of the transaction is targeted for later this summer following the approval of the relevant authorities.

BASF will contribute its strength as a leading global CAM supplier to the automotive industry with strong technology and development capabilities, global operations footprint, as well as strategic partnerships for raw materials supply. By forming the intended joint venture in China, BASF further strengthens its position in Asia to build up an integrated, unique global supply chain for customers in China and worldwide, increasing its annual capacity to 160 kilotons by 2022 with further expansions underway.

As one of the leaders in the Chinese CAM market, Hunan Shanshan Energy has

SVOLT
 Strategic cooperation agreement signed for joint work on **CAM**



合作升级！杉杉股份与拜耳能源签署战略合作协议

4月21日，在上海国际金融中心，杉杉股份与拜耳能源签署战略合作协议暨战略合作协议签约仪式，杉杉股份董事长孙志勇、拜耳能源董事长、总裁魏德福出席签约仪式，杉杉股份副总裁、总工程师孙志勇、拜耳能源副总裁王神林代表双方致辞。

拜耳能源《战略合作协议》，双方将进一步深化合作领域，拓宽合作领域，打造从原料到制造的全产业链合作模式，实现产业链上下游的协同发展。

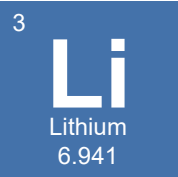
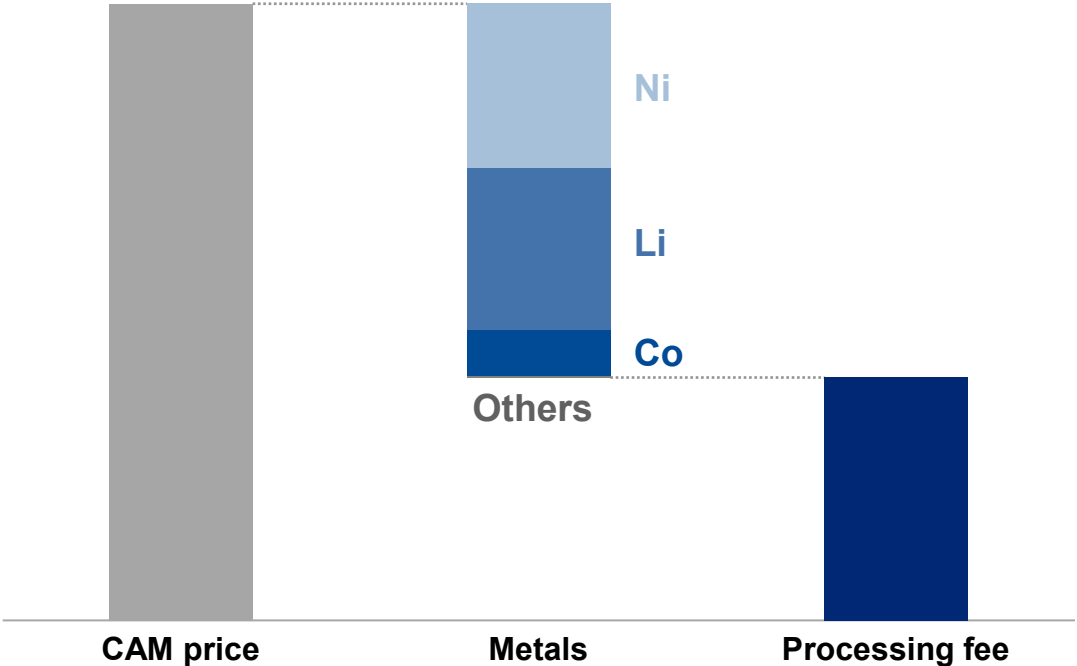
魏德福表示，拜耳能源汽车动力电池业务，拜耳能源及拜耳能源集团，并加大研发投入，提升产能，提升产能从1000Wh提升到2000Wh，提升动力电池性能，提升动力电池生产效率和品质，因此，寻求优质的合作伙伴，携手共赢为拜耳能源动力电池业务发展的关键。

孙志勇表示，杉杉股份是拜耳能源集团供应商之一，双方在正极、负极材料领域建立了紧密的合作，双方在正极、负极材料领域战略合作协议合作将有更深层次探讨，进一步开拓双方在正极材料领域合作空间，提升产能和品质，杉杉股份和拜耳能源达成了战略合作协议，合作范围包括正极、上下产业链供应链及降本增效，提升双方在正极、负极材料领域合作领域和范围。

BASF has several long-term contractual relationships in place as well as upcoming partnerships, securing the profitable utilization of current and future capacities

Base metals make up ~60% of the CAM cost, therefore low cost and reliable sourcing is imperative to achieve competitiveness

Cost break-out of the value chain¹
 €/kg CAM



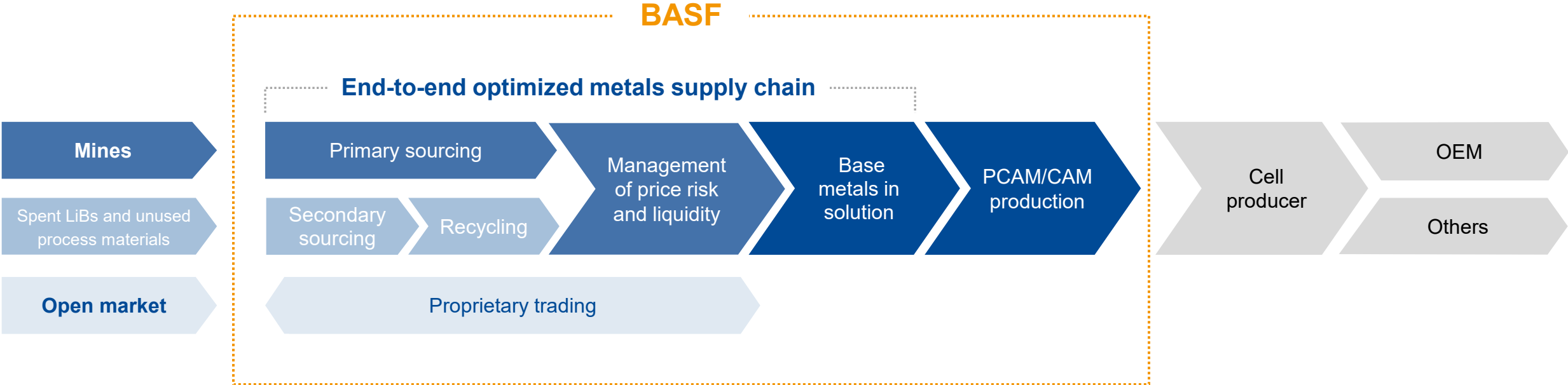
- Class 1 nickel will be short after 2025
- New projects are expensive with lengthy ramp-up times
- Tight market throughout the decade
- Advancements in anode technology key variable
- Cobalt tightening mid-decade
- Reduced demand in batteries from cobalt replacement

Competitive and secure supply of nickel and lithium are key targets

¹ Source: BASF internal, metal prices derived from historical averages

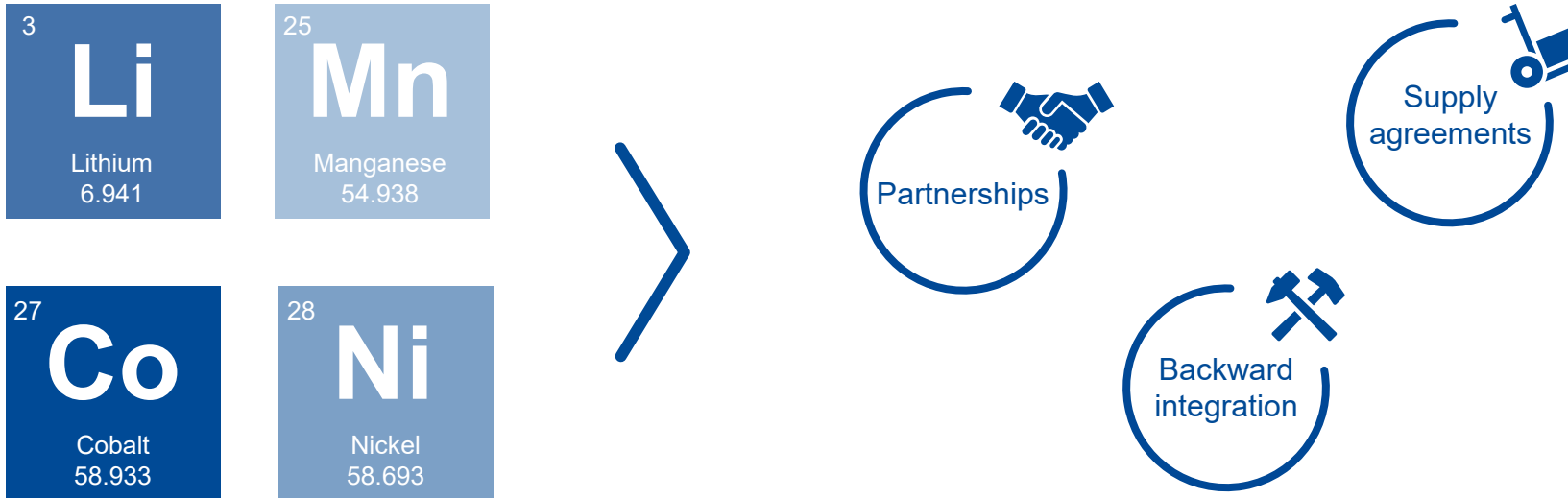
We combine metal sourcing by trading and recycling globally, copying the business model established successfully for PGMs

Optimized base metal management



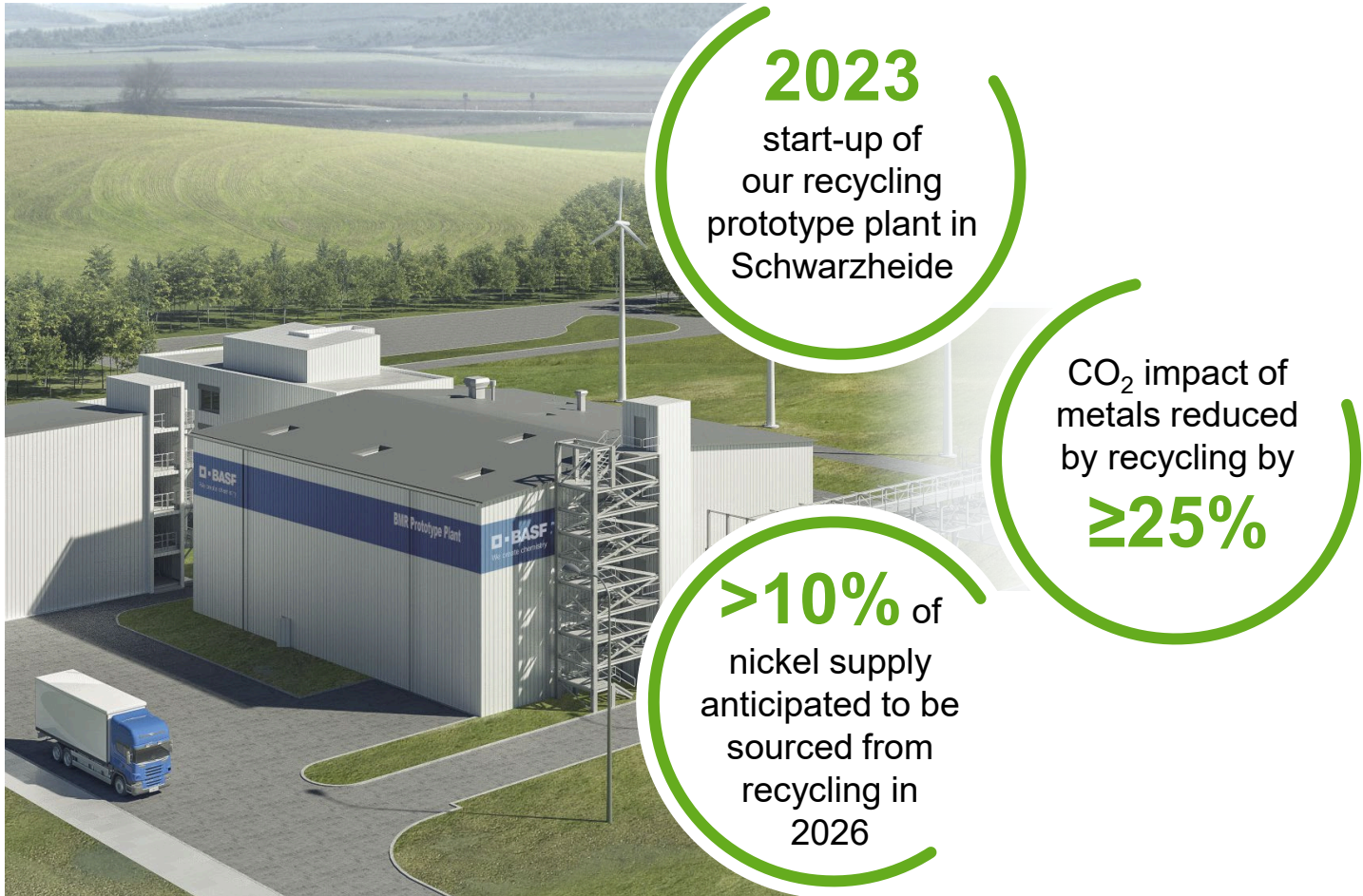
BASF offers a secure and sustainable supply, helping reduce customer risk exposure to volatile metal markets

We establish a secure supply network in close proximity to our production sites across regions



BASF has strategically engaged in partnerships with leading upstream partners, ensuring a long-term secure and responsible supply of base metals

Competitive recycling capabilities will be a key success factor



2023
start-up of
our recycling
prototype plant in
Schwarzheide

CO₂ impact of
metals reduced
by recycling by
≥25%

>10% of
nickel supply
anticipated to be
sourced from
recycling in
2026

We will **close the loop** to offer a **best-in-class CO₂ footprint** while **optimizing our input costs**

- We offer **long-standing expertise** in the recycling industry.
- We form a **strong partnership network** to bundle resources.
- We will utilize end-of-life batteries¹ and **chemically extract battery grade lithium** with a **proprietary BASF process**.
- We will close the loop, **meeting growing demand** of critical metals, with an exceptional CO₂ footprint.

We will apply a proprietary BASF process with leading recovery rates and CO₂ footprint

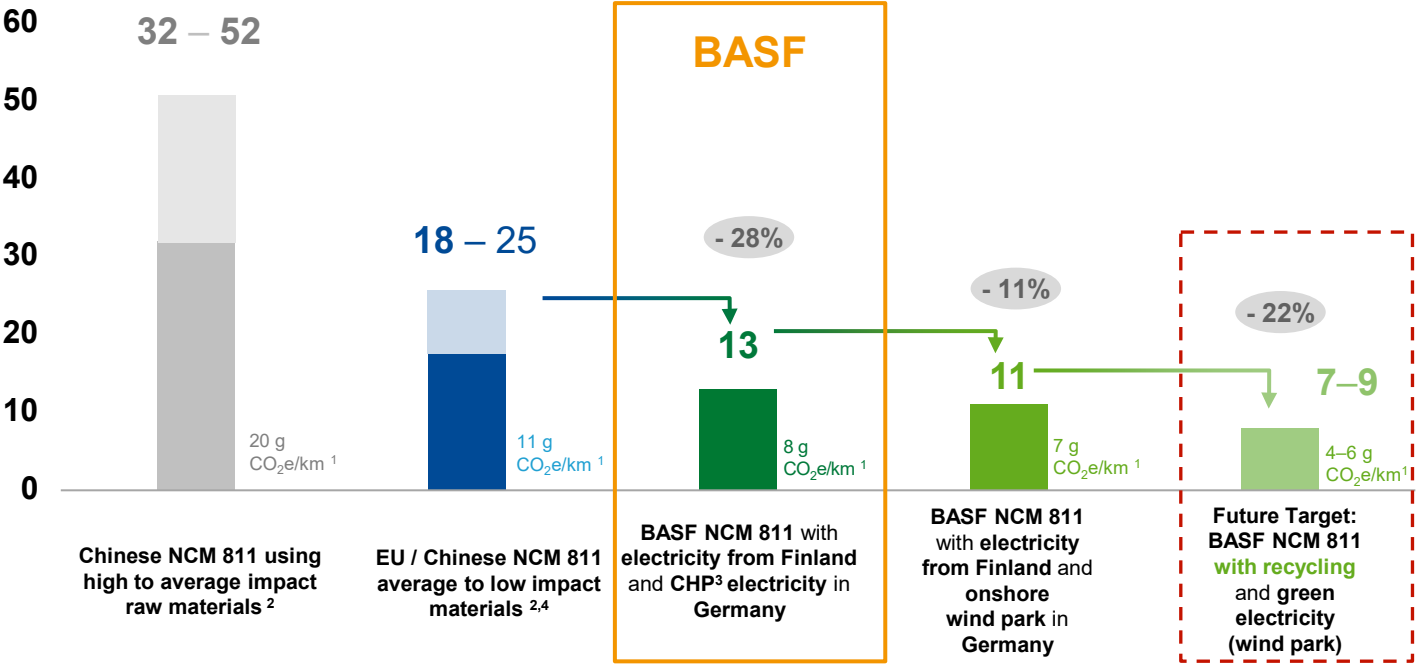
¹ In 2030, 1.5 million metric tons of end-of-life batteries expected globally



BASF offers superior battery CO₂ levels in the industry with recycling being one of the biggest levers

Carbon intensity

in kg Carbon dioxide equivalent (CO₂e) per kg Cathode Active Material



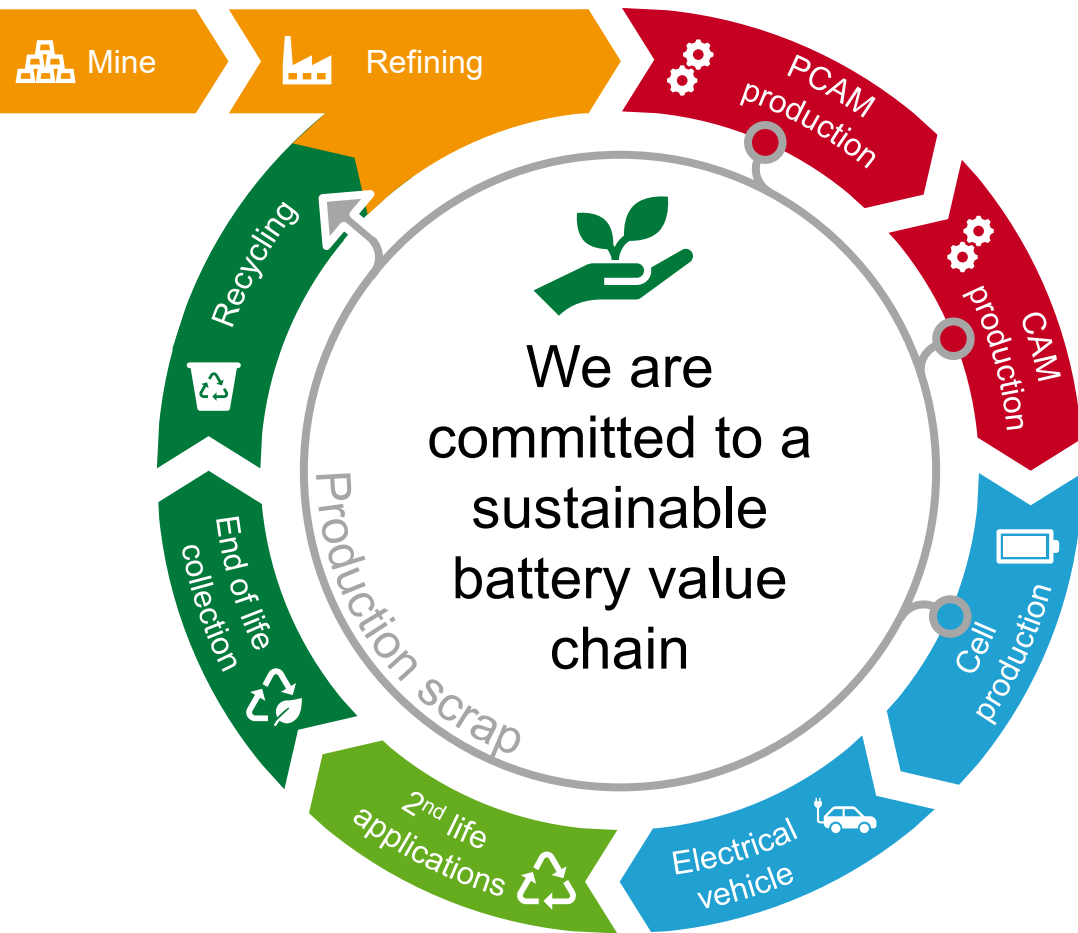
Recycling contributes ~22% of CO₂ reduction



¹ Assumption: 100 kWh = 125kg CAM material per car and a lifetime of 200,000 km
² Minviro white paper on CO₂ impact of battery supply chain (published in 2021)
³ Combined heat and power plant, based on natural gas
⁴ Estimation of range by BASF
 BASF values calculated using proprietary knowledge and datasets from Sphera (not yet third-party verified)
 Cobalt sulfate and nickel sulfate values by primary data from supplier; other data from Sphera
 Green electricity from power purchase agreements (PPAs) or Guarantees of Origin (GoO)



We have established several projects to ensure that the value chain we are building is best-in-class regarding ESG criteria

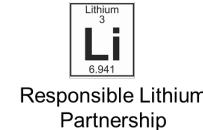


We are **partnering globally** to ensure a **resilient** and **sustainable metal supply chain** for our customers.

Our **global production presence** ensures **customer proximity** and **energy efficient production**, minimizing the CO₂ footprint.

We are investing into **recycling** to **close the loop** and to offer a **best-in-class CO₂ footprint**.

We **engage** holistically, **locally – regionally – globally**.



The Battery Materials business will become a significant earnings contributor to the BASF Group

>€1.5 billion sales
by 2023

>€7 billion sales
by 2030

>10%

market share
targeted

>30%

EBITDA bsi margin
(excl. metals)

~€3.5–4.5 billion

capital expenditure
2022–2030

- Continue to ramp up existing sales of the **CAM portfolio** and **secure further commercial outlets**
- Build on **customer proximity** with our **domestic production footprint** to meet customer needs
- Realize new business opportunities and further cost reductions with **continued product development**
- Utilize our broad knowledge of the industry to **support the ongoing transformation** of the sector



We create chemistry