FutureBridge

REPORT

Electrifying the Future: How is the Li-battery Value Chain Evolving in the US and Europe?

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01 Context and background

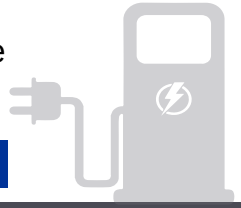
The administrations in the US and EU are working towards achieving self-sufficiency in the battery value chain by implementing several strategies. This effort primarily aims to reduce reliance on battery materials supplied by various countries and regions, particularly China.

Biden-Harris Administration, 2022:
Electric vehicles (EV) to make half of all new vehicles sold in 2030 electric

US

European Commission, 2021:
Batteries are the fastest growing storage technology and will play a key role to meet the EU goal of cutting greenhouse gas emissions by 55% by 2030.

EU



ACTION PLANS LAUNCHED

The **Bipartisan Infrastructure Law, CHIPS** (Creating Helpful Incentives to Produce Semiconductors) **& Science Act**, and **Inflation Reduction Act**

American Battery Materials Initiative for growing the end-to-end battery supply chain; work with stakeholders, allies, and partners to develop more sustainable, secure and resilient supply chains.

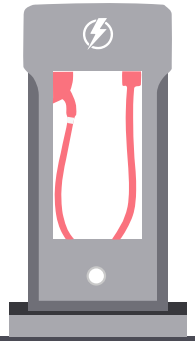
US$
135 bn
Investment for critical minerals sourcing and processing and battery manufacturing

EUR
127 bn
2022, Investment in 111 major battery projects in EU under European Battery Alliance

European Battery Alliance, 2018: A strategic batteries action plan covering the entire process from producer to end-user including Business Investment Platform (2019) to accelerate investment transactions along value chain stakeholders.

Batteries Europe, 2019: A central Innovation Hub for all battery-related research in Europe

Trump’s EV policy reversal: Creating uncertainty for the US market and fostering avenues for EU’s automotive sector



Trump Administration's Bold EV Policy Shift

⚠ **Revocation of Biden's EV Sales Directive:** The administration has revoked President Biden's directive aiming for 50% of all new vehicle sales to be electric by 2030, undermining the framework for future EV adoption.

⚠ **Funding for charging stations is stopped:** Funding for expanding EV charging infrastructure has been halted, stalling crucial efforts to develop a robust network necessary for widespread EV use.

⚠ **EV tax credits are under review:** Federal tax credits for electric vehicles are now under review, introducing uncertainty regarding financial incentives that have made EVs more accessible to consumers.

US

EV/Battery business: Adapting to new policies?

- Despite calls to freeze IRA funding, billions in private investments are flowing. Paccar, an American truck manufacturer, is set to invest at least $600 million in a battery plant for commercial EVs. This highlights the need for domestic battery production to reduce dependence on foreign sources, especially China.
- Automakers want a gradual phase-out of the EV tax credit if the Inflation Reduction Act is repealed.
- CATL, a key battery supplier for Tesla, Ford, and many others faces scrutiny as a “Chinese military company,” which could limit its U.S. operations and create opportunities for domestic manufacturers.

Effect of US policies on EU’s fleet electrification

EU

- Trump's threats of tariffs on imports, including those from Europe, are causing concern for European EV automakers.
- Positive developments in the EU include legislation to speed up the electrification of large company fleets.
- This initiative, part of the Automotive Industrial Action Plan, aims for over 2 million electric vehicles (EVs) by 2030, benefiting European carmakers.

02 Rapid Evolution: The ground-reality

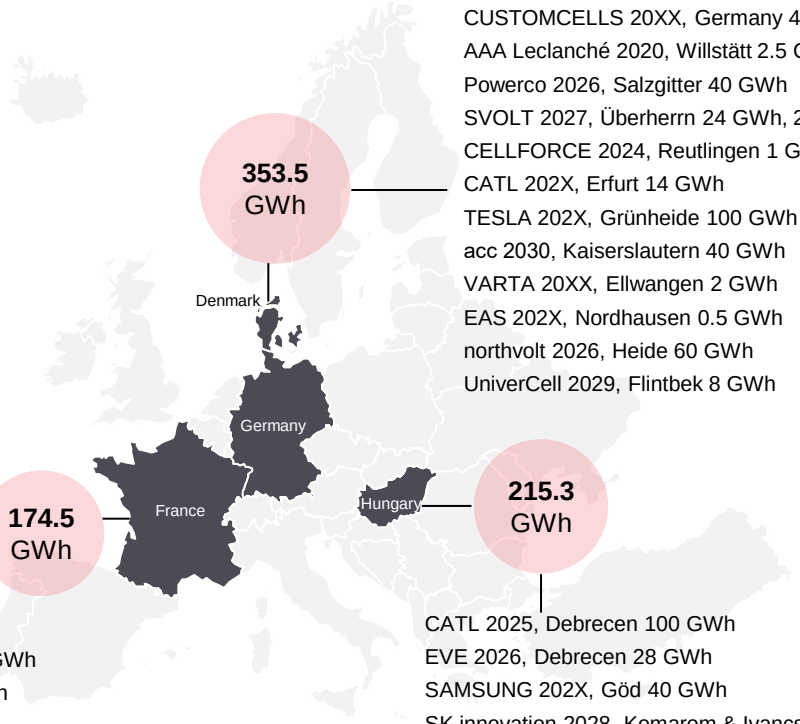
Over 40 battery manufacturers plan to build factories in the EU to meet rising demand, with most either under construction or yet to be built.

>1.5TWh in **EU**, 2030

150 GWh + X (location not specified)

SVOLT 2030, X GWh
inoBat 202X, Europe X GWh
PowerCo 2030, Europe 120 GWh
northvolt 202X, Europe 30 GWh

Other notable geographies include United Kingdom (~145 GWh), Sweden (~110 GWh), Italy (~118 GWh), Poland (~115 GWh) and Spain (~140 GWh)



CUSTOMCELLS 20XX, Germany 43.5 GWh
AAA Leclanché 2020, Willstätt 2.5 GWh
Powerco 2026, Salzgitter 40 GWh
SVOLT 2027, Überherrn 24 GWh, 202X, Lauchhammer 16 GWh
CELLFORCE 2024, Reutlingen 1 GWh
CATL 202X, Erfurt 14 GWh
TESLA 202X, Grünheide 100 GWh
acc 2030, Kaiserslautern 40 GWh
VARTA 20XX, Ellwangen 2 GWh
EAS 202X, Nordhausen 0.5 GWh
northvolt 2026, Heide 60 GWh
UniverCell 2029, Flintbek 8 GWh

TIAMAT 2030, France 5 GWh
acc V 2030, Douvrin 40 GWh
Vernor 2030, Dunkirk 50 GWh
Blue Solutions 20XX, Quimper 1.5 GWh
Envision AESC 2029, Douai 30 GWh
Prologium 20XX, Dunkirk 48 GWh

CATL 2025, Debrecen 100 GWh
EVE 2026, Debrecen 28 GWh
SAMSUNG 202X, Göd 40 GWh
SK innovation 2028, Komarom & Ivancsa 47.3 GWh
SUNWODA 202X, Nyiregyhaza X GWh

Source: Batterynews.com webpage

Currently, the EU's production capacity shows a significant insufficiency in battery materials, with an estimated gap of over 300 GWh projected by 2030. This poses a threat to the emerging battery manufacturing factories in the region.

Player	Status	Product type	Product	Production Capacity	Production Unit
Epsilon (Acquired Johnson Matthey)	LFP Cathode Technology Centre	Cathode Active Material	Lithium iron phosphate	-	-
Freyr	Planned	Cathode active material	Lithium iron phosphate	30,000	MT CAM/yr
IBU Tec	Commercial	Cathode Active Material	Lithium iron phosphate	4,000	MT CAM/yr
Umicore Volkswagen	Planned	Cathode Active Material	NMC and others such as HLM, and NMx	64,000	MT CAM/yr
BASF	Planned	Precursor Cathode active material	–	X,000	MT pCAM/yr
Posco	Planned	Cathode Active Material	Nickel manganese cobalt	X,000	MT CAM/yr
EcoPro & Samsung SDI JV	Planned	Cathode Active Material	Nickel manganese cobalt	X,000	MT CAM/yr
Finnish Minerals Group & Beijing Easpring JV	Planned	Cathode Active Material	–	X,000	MT CAM/yr
Freyr & Aleees JV	Planned	Cathode Active Material	LFP	X,000	MT CAM/yr
Haldor Topsoe	Planned	Cathode Active Material	LNMO	X,000	MT CAM/yr
Huayou Cobalt	Planned	Precursor Cathode Active Material	–	X,000	MT CAM/yr
Orano & XTC JV	Planned	Precursor Cathode Active Material	–	X,000	MT CAM/yr
NORTHVOLT	Planned	Cathode Active Material	–	90,000 tons	CAM + pCAM / yr
BASF	Planned	Cathode Active Material	Nickel manganese cobalt and blends	100,000	MT CAM/yr

288 KT/yr

Source: FutureBridge Analysis

In the US, more than 15 cell manufacturers have plans to build battery factories in various states. Most of these factories are either already commissioned or yet to be commissioned.

>1.6TWh in **NA**, 2030

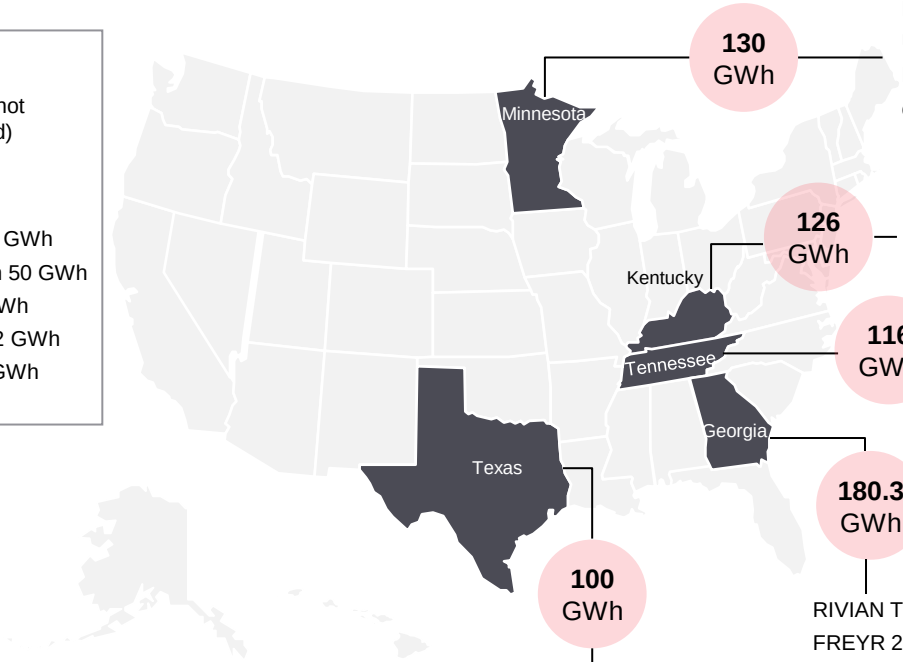
486 GWh + X (location not specified)

SAKUÚ 2028, TBD 60 GWh
CATL 2025, US & Mexico 80 GWh
Statevolt 20XX, Hells Kitchen 50 GWh
northvolt 202X, Europe 30 GWh
STELLANTIS 202X, TBD 202 GWh
Panasonic 202X, 2x TBD X GWh
HYUNDAI 20XX, TBD

ONTARIO

135 GWh

PowerCo 2027, St. Thomas 90 GWh
Stellantis LG 2024, TBD 45 GWh



130 GWh

LG 202X, Holland 25 GWh
Ultim Cells 2024, Lancing 50 GWh
Ford 2026, TBD 35 GWh
one 2027, Belleville 20 GWh

126 GWh

Blue oval SK ON 2026, Gelndale 86 GWh
Envision AESC 2025, Bowling Green 40 GWh

116 GWh

Ultim Cells 2023, Spring Hill 70 GWh
Ford 2025, Stanton 43 GWh
Envision AESC 2021, Smyrna 3 GWh

180.3 GWh

RIVIAN Technologies 2024, Atlanta 50 GWh
FREYR 202X, Coweta County 34 GWh
SK ON 2022 & 2023, Atlanta 31,3 GWh
Hyundai SK ON 2025, Bartow County 35 GWh
Hyundai LG 2025, Bryan County 30 GWh

100 GWh

Tesla 2022, Austin 100 GWh

Source: FutureBridge Analysis

The production capacity and supply of battery materials in the US will be insufficient to cater to these upcoming factories. The estimated gap will be over 400 GWh by 2030.

Player	Status	Product type	Product	Production Capacity	Production Unit
6K, Inc.	Planned	Cathode Active Material	Lithium iron phosphate, Nickel manganese cobalt	10,000	MT CAM/yr
ACT-ion Battery Technologies	Pre-commercial/ start-Up	Cathode active material	lithium-iron-phosphate, lithium-iron-manganese-phosphate, nickel-manganese-cobalt, nickel-cobalt-aluminum, lithium-and manganese-rich	<1	MT CAM/yr
Ascend Elements	Planned	Cathode Active Material	Nickel manganese cobalt	10,000	MT CAM/yr
BASF Canada	Planned	Cathode Active Material	Unknown	100,000	MT CAM/yr
Battery Streak	Pre-commercial/ startup	Cathode active material	nano-titanium-niobium-oxide, nano- nickel-cobalt aluminum, nano-lithium-vanadium-phosphate	<0.1	MT CAM/yr
ICL-IP America Inc.	Planned	Cathode Active Material	Lithium iron phosphate	30,000	MT CAM/yr
LG Chem	Planned	Cathode Active Material	Nickel manganese cobalt	120,000	MT CAM/yr
Mitra Future Technologies	Pre-commercial/startup	Cathode Active Material	Lithium iron phosphate	Unknown	–
Umicore Canada	Planned	Cathode Active Material	Nickel manganese cobalt	35	GWh equivalent
Umicore Canada	Planned	Cathode Active Material	Nickel manganese cobalt aluminum	35	GWh equivalent
Wildcat Discovery Technologies	Planned	Cathode active material	Lithium iron phosphate	15,000	MT CAM/yr
Wildcat Discovery Technologies	Planned	Cathode active material	Lithium manganese iron phosphate	100,000	MT CAM/yr
Wildcat Discovery Technologies	Planned	Cathode active material	Disordered Rocksalt	5,000	MT CAM/yr

390 KT/yr

Source: FutureBridge Analysis

The liquid Li-ion Battery ecosystem will remain common between both regions with a significant number of Chinese and Korean players already in both regions. However, consumer preferences vary in both the regions.

Raw and processed material

- Li, Ni, Co, Mn, Al, Si, Sn, etc.
- Graphite, Copper, Aluminum

Cobalt & Nickel

GLENCORE, NORILSK NICKEL, JINCHUAN金川, VALE

Lithium

ALBEMARLE, FMC, GanfengLithium, galp

Graphite

SRG, CCG

Others

VALE, MOIL, BHP

Cell component manufacturing

- Cathode/ anode active material
- Battery separator
- Electrolyte, Electrode binders
- Cell pack, adhesives, coatings, additives, solvent, etc.

Electrode (Cathode, anode)

umicore, BASF, posco FUTURE M

Anode (Graphite)

HITACHI Inspire the Next, SHOWA DENKO, Nippon Carbon Co., Ltd.

Electrolyte

BASF, enchem, Dongwha Electrolyte

Separator

SK on, KUREHA, SYENSQO, AsahiKASEI

Others (binder, coatings, additives, etc.)

SUMITOMO CHEMICAL, tesa, NEI Corporation, SYENSQO, Henkel, EVONIK

Battery cell and pack manufacturing

- Battery cell manufacturing and battery pack manufacturing for end-use industries

TESLA, VOLKSWAGEN, BYD, SAMSUNG, LG Chem

SONY, TOSHIBA, northvolt, SK on, Naraada, NEC, CATL

End users

- Automotive, consumer electronics, energy storage, others such as space, defense etc.

GE, FLUENCE, res, Invenergy, aggreko, ComEd

Recycling

- Incineration
- Mechanical
- Thermal
- Chemical

fortum, GLENCORE, umicore, RETRIEV TECHNOLOGIES, Li-Cycle, TES

US consumers mainly demand long-range, high-energy density and fast charging

EU consumers mainly demand short-range, high-energy density and fast charging

Chinese and Korean players already present in both regions

Battery safety and cost to be key drivers

Emerging battery chemistries (sulfides, oxides, polymers, etc.) may reshape the material value chain. However, industrial-scale precursor (lithium sulfide) availability and other factors threaten sulfide-based solid-state batteries. Several companies plan to move to other chemistries.

Raw material manufacturers (such as high purity Lithium sulfide, binders, solvent, etc) → **Solid electrolyte** → **CAM (NMC, LCO, S) AAM (Li, Si, LTO)** → **Battery manufactures** → **OEM**

idemitsu, Albemarle, TIANQI LITHIUM, AMG LITHIUM, GanfengLithium

Potential binder chemistry

AGC (?) PTFE

Lithium Sulfide (Li2S) is currently not available on an industrial scale. Est. price USD 1,500–2,000/kg.

idemitsu, Solid Power, SK on, MITSUI KINZOKU, NISSAN (?), Ampcera, SVOLT, AGC, SAMSUNG SDI

Proprietary Electrolyte production technology

BASF We create chemistry, umicore, posco FUTURE M, 瑞翔新材 RESHINE NEW MATERIAL, XTC, 容百科技 RONBAY TECHNOLOGY, BRUNP

Anode: Insufficient capacities for battery grade Li for anode

TOYOTA, BMW, AESC, SVOLT, maxell Within the Future, Biz.maxell for Business (?), Panasonic, CATL, NISSAN (?)

TOYOTA, BMW, Ford Go Further, NISSAN (?), BYD, Mercedes-Benz (?)

QuantumScape (VW invested) is working on Oxide SE. Rumor is VW is now choosing Blue Solutions (polymer SE).

CATL CEO believes ASSBs impractical & unsafe

CATL CEO: solid-state batteries are impractical and unsafe. Big claims ignore the real-world limits of the technology.

QuantamScape* dismiss sulfide SE

"It cannot last many [charging] cycles, maybe 10 cycles, so how can you make it commercially viable?"

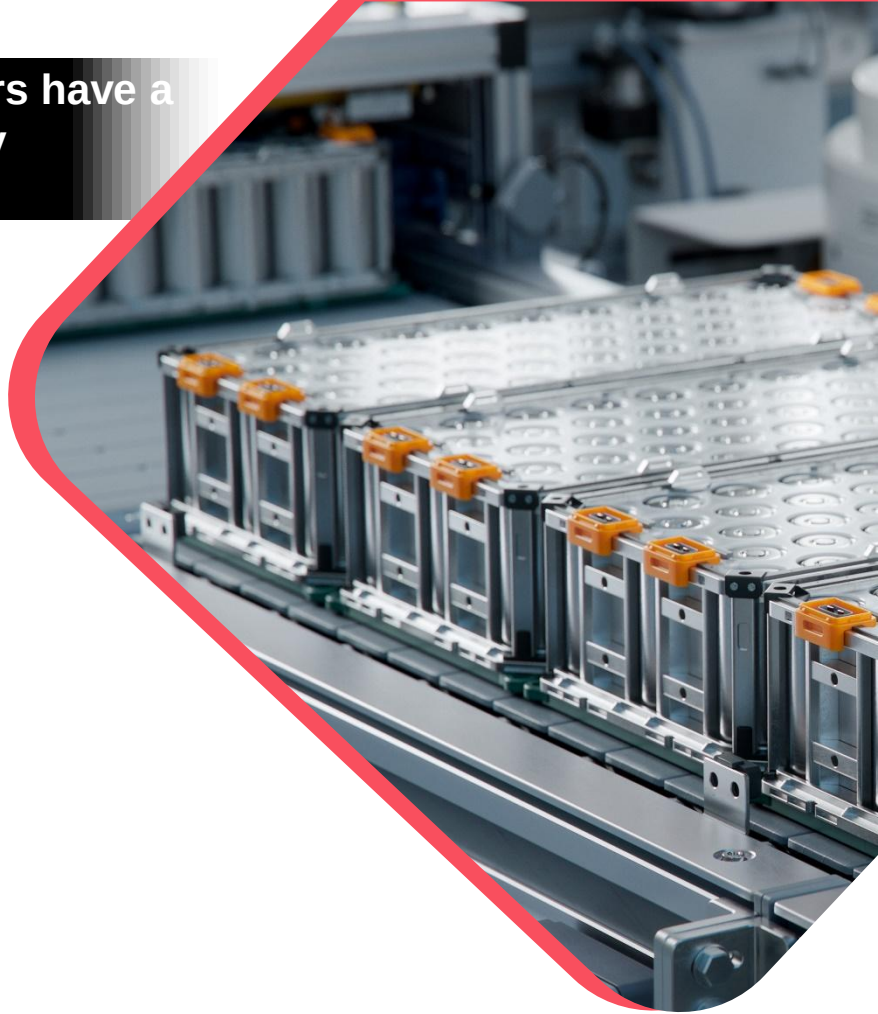
(Source: Financial Times)

(?) *Industry sources suggest that the players are working on this technology, but no confirmation exists*

Source: FutureBridge Analysis

Battery material providers and component makers have a major opportunity, driven by cost and enabled by innovations

Some of the major opportunity areas are as follows:



CAM for HV Batteries

- The surface coating
- Doping innovations
- A different gradient according to the radius of the particle, to minimize side reactions

Electrolyte

- Stable CEI and SEI layers
- Li-salts: LiTDI and LiFSI
- Ionic liquids & additives

Binder

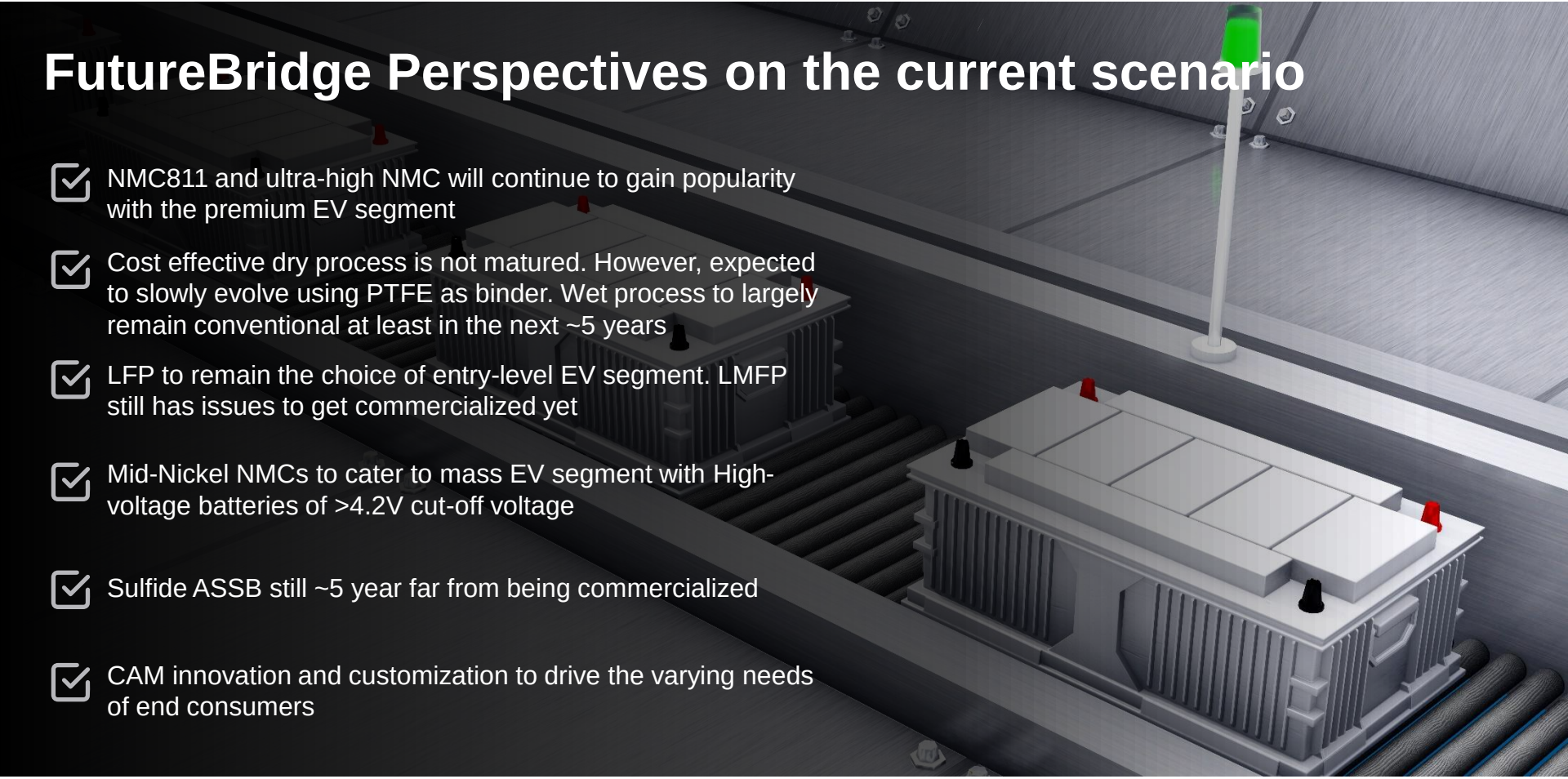
All sulfide solid-state electrolyte binder developments

Decarbonizing the EV manufacturing

NMP-free CAM production

Battery equipment for emerging gigafactories

FutureBridge Perspectives on the current scenario



- NMC811 and ultra-high NMC will continue to gain popularity with the premium EV segment
- Cost effective dry process is not matured. However, expected to slowly evolve using PTFE as binder. Wet process to largely remain conventional at least in the next ~5 years
- LFP to remain the choice of entry-level EV segment. LMFP still has issues to get commercialized yet
- Mid-Nickel NMCs to cater to mass EV segment with High-voltage batteries of >4.2V cut-off voltage
- Sulfide ASSB still ~5 year far from being commercialized
- CAM innovation and customization to drive the varying needs of end consumers

03 Beyond China: Aiming for self-sufficiency

Despite new US production plans, graphite and cobalt shortages are expected to persist, requiring continued imports from China and other countries, thus hindering its self-sufficiency policy.

Player	Status	Product type	Product	Production Capacity	Production Unit
Arcadium Lithium	Planned	Cathode raw materials	Spodumene concentrate	8100	MT contained Li/yr
Canada Nickel Company	Planned	Cathode raw materials	Nickel	38000	MT Ni/yr
Century Lithium	Planned	Cathode raw materials	Lithium carbonate - crude	27400	MT/yr LCE
Cobalt 27 Capital Corporation	Pre-commercial/ startup	Cathode raw materials	Cobalt	2160	MT contained Co/yr
Controlled Thermal Resources	Pre-commercial/ startup	Cathode raw materials	Lithium carbonate - crude	5800	MT contained Li/yr
Corp Lithium Éléments Critiques	Pre-commercial/ startup	Cathode raw materials	Lithium hydroxide	5727	MT contained Li/yr
Fortune Minerals Limited	Planned	Cathode raw materials	Cobalt	685	MT/yr Co
FPX Nickel	Planned	Cathode raw materials	Nickel concentrate	59100	MT contained Ni/yr
Frontier Lithium	Planned	Cathode raw materials	Spodumene concentrate	160000	MT contained Li/yr
Graphite One	Planned	Anode raw materials	Graphite concentrates	57000	MT contained graphite/yr
Hard Creek Nickel Corp	Planned	Cathode raw materials	Nickel concentrate	33000	MT contained Ni/yr
Hard Creek Nickel Corp	Planned	Cathode raw materials	Cobalt concentrate	1800	MT contained Co/yr
Jindalee Lithium	Planned	Cathode raw materials	Lithium	95,602	MT contained Li/yr
Manganese X Energy Corp.	Pre-commercial/ startup	Cathode raw materials	Manganese concentrates	2000	MT/yr electrolytic manganese metal
Mason Resources	Planned	Anode raw materials	Natural graphite	51,900	MT graphite/yr
Net Zero Metals	Planned	Cathode raw materials	Nickel concentrate	34000	MT contained Ni/yr
New Nemaska Lithium	Planned	Cathode raw materials	Spodumene	5160	MT contained Li/yr
NION Nickel Inc	Pre-commercial/ startup	Cathode raw materials	Lithium carbonate - crude	39305	MT contained Ni/yr
Sayona Mining Limited	Planned	Cathode raw materials	Spodumene	3181	MT contained Li/yr
Sayona Quebec Inc.	Planned	Cathode raw materials	Spodumene concentrate	4324	MT contained Li/yr
Snow Lake Resources Ltd.	Pre-commercial/ startup	Cathode raw materials	Lithium	9600	MT contained Li/yr

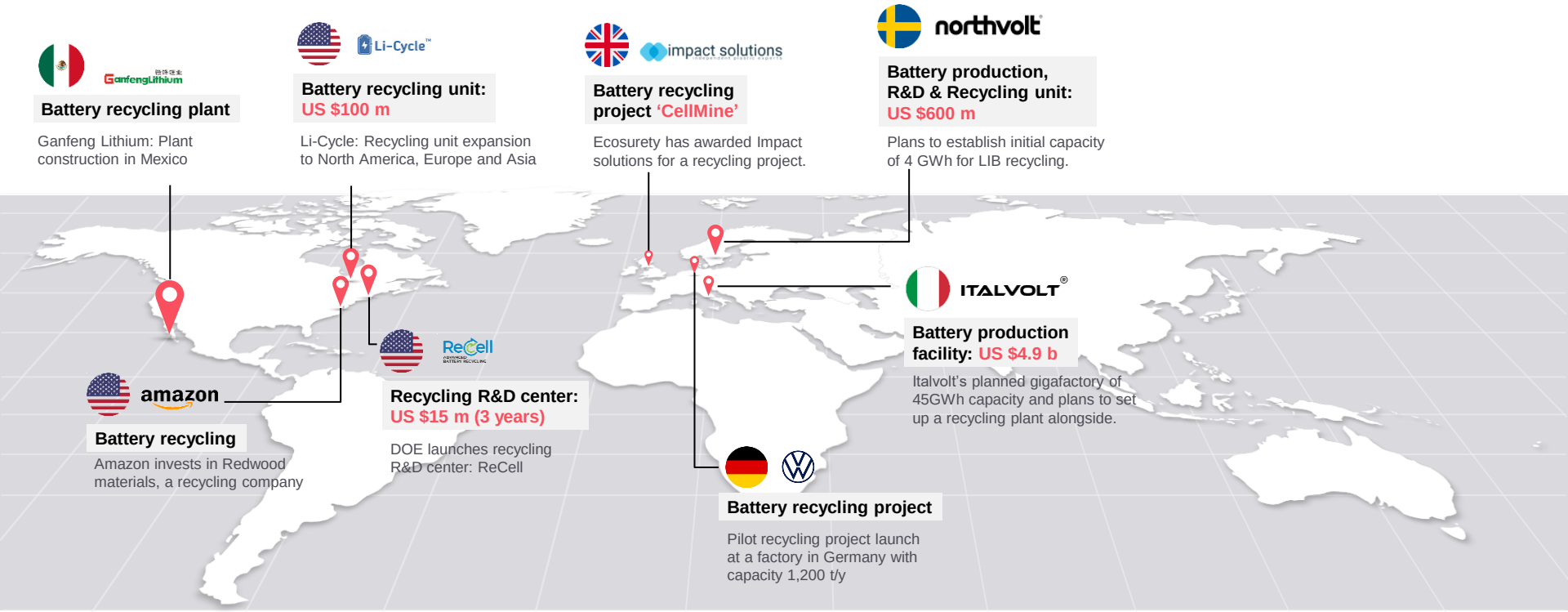
Source: FutureBridge Analysis

Despite a robust lithium manufacturing pipeline, the EU faces threats from recent price drops and global oversupply; potentially forcing reliance on cheaper imports and hindering self-sufficiency goals

Player	Project type	Type	Est. Capacity, 2030 (kt LCE)	Est. Capacity, 2030 (kt Li)
AMG Lithium	Lithium	Refinery	17.6	3.3
Bondalti Chemicals & Neometals	Lithium	Refinery	21.9	4.1
British Lithium & Imerys	Lithium	Integrated	20.0	3.8
Cornish Lithium	Lithium	Integrated	6.8	1.3
Eramet & Electricité de Strasbourg	Lithium	Integrated	10.0	1.9
European Metals	Lithium	Integrated	25.8	4.8
Green Lithium	Lithium	Refinery	43.9	8.3
Imerys	Lithium	Integrated	29.8	5.6
Infinity Lithium Corp.	Lithium	Integrated	29.2	5.5
Keliber Oy	Lithium	Integrated	13.2	2.5
LevertonHELM	Lithium	Refinery	21.6	4.1
Lithium de France	Lithium	Integrated	32.0	6.0
Lithium Iberia	Lithium	Integrated	26.3	5.0
Livista Energy	Lithium	Refinery	32.0	6.0
Livista Energy	Lithium	Refinery	30.0	5.6
LusoRecursos Portugal Lithium	Lithium	Integrated	18.7	3.5
Northern Lithium	Lithium	Integrated	6.6	1.2
Northvolt & Galp	Lithium	Refinery	28.1	5.3
RockTech Lithium	Lithium	Refinery	21.1	4.0
RockTech Lithium	Lithium	Refinery	21.1	4.0
Tees Valley Lithium	Lithium	Refinery	84.3	15.8
Viridian Lithium	Lithium	Refinery	21.9	4.1

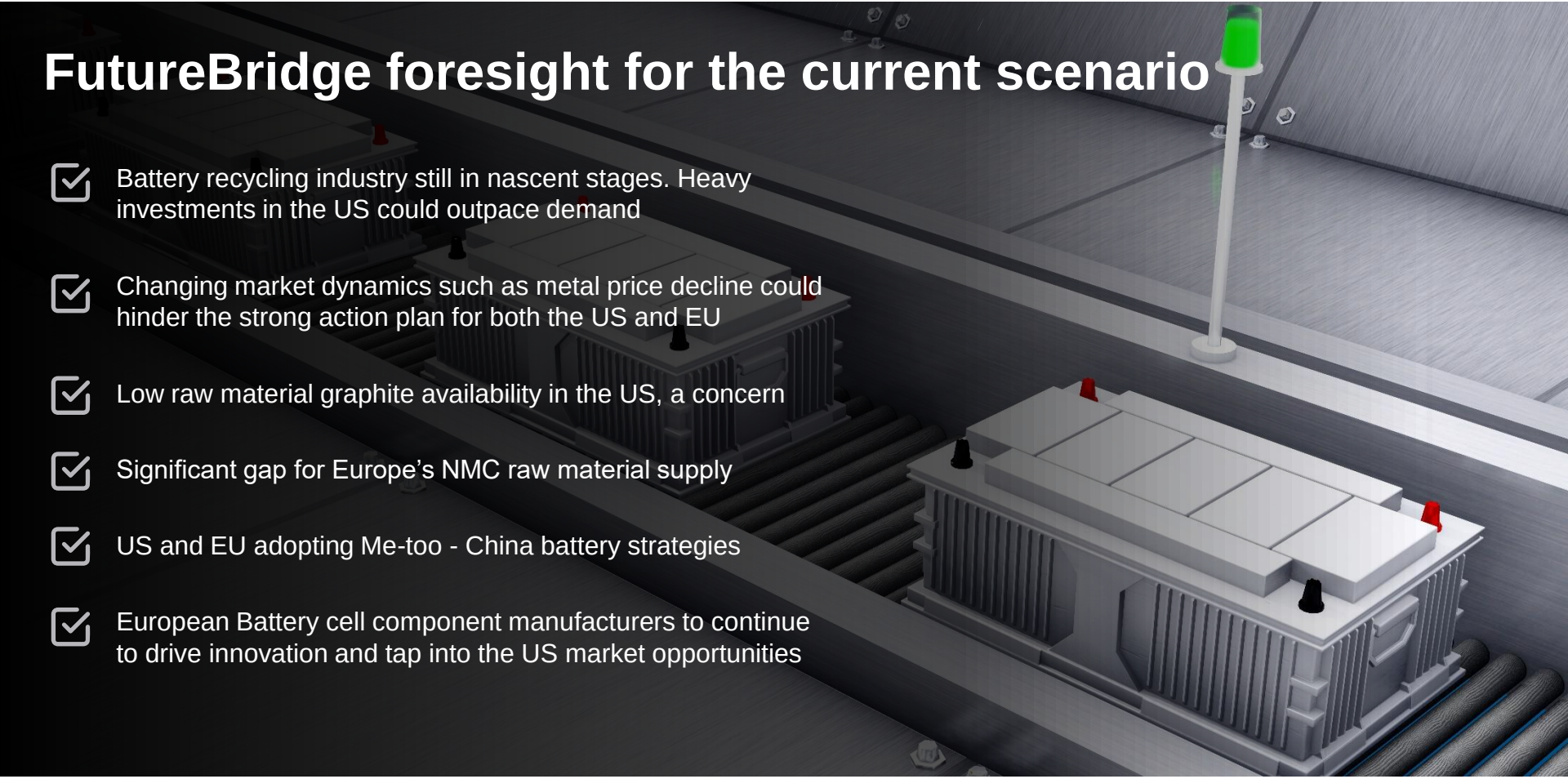
Source: FutureBridge Analysis

Li-ion battery recycling in the EU and US remains nascent, hampered by limited end-of-life battery supply, and low recycling yields. Both regions still need to rely on virgin raw materials, hindering their recyclability and self-sufficiency goals.



Source: FutureBridge Analysis

FutureBridge foresight for the current scenario



- Battery recycling industry still in nascent stages. Heavy investments in the US could outpace demand
- Changing market dynamics such as metal price decline could hinder the strong action plan for both the US and EU
- Low raw material graphite availability in the US, a concern
- Significant gap for Europe's NMC raw material supply
- US and EU adopting Me-too - China battery strategies
- European Battery cell component manufacturers to continue to drive innovation and tap into the US market opportunities

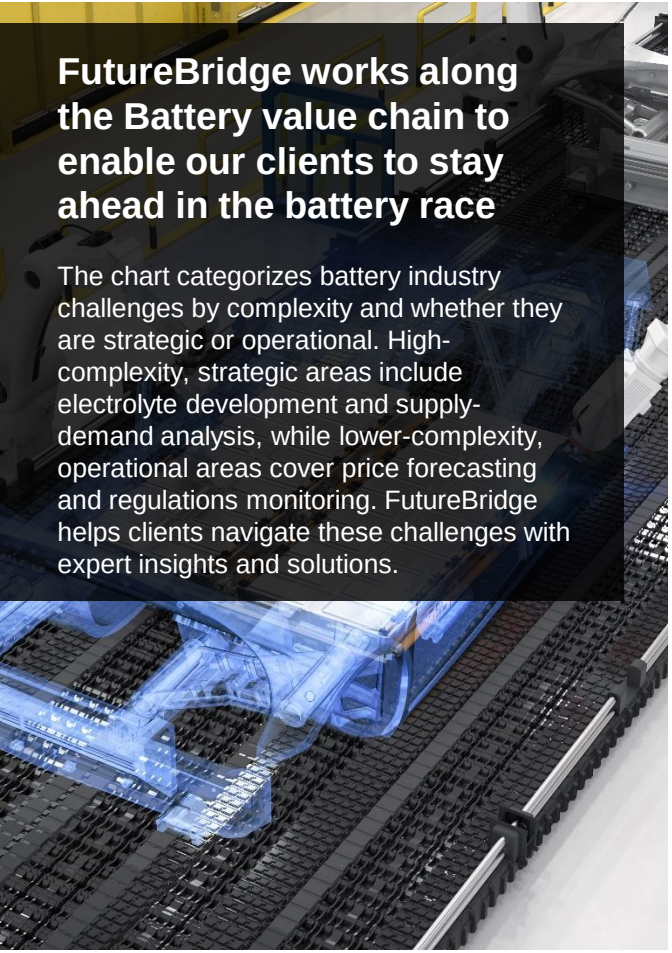
04

FutureBridge partners with Li-battery stakeholders along the value chain to accelerate innovations, to help derisk and capitalize on market opportunities

How FutureBridge partners with players in the batteries industry across the innovation cycle

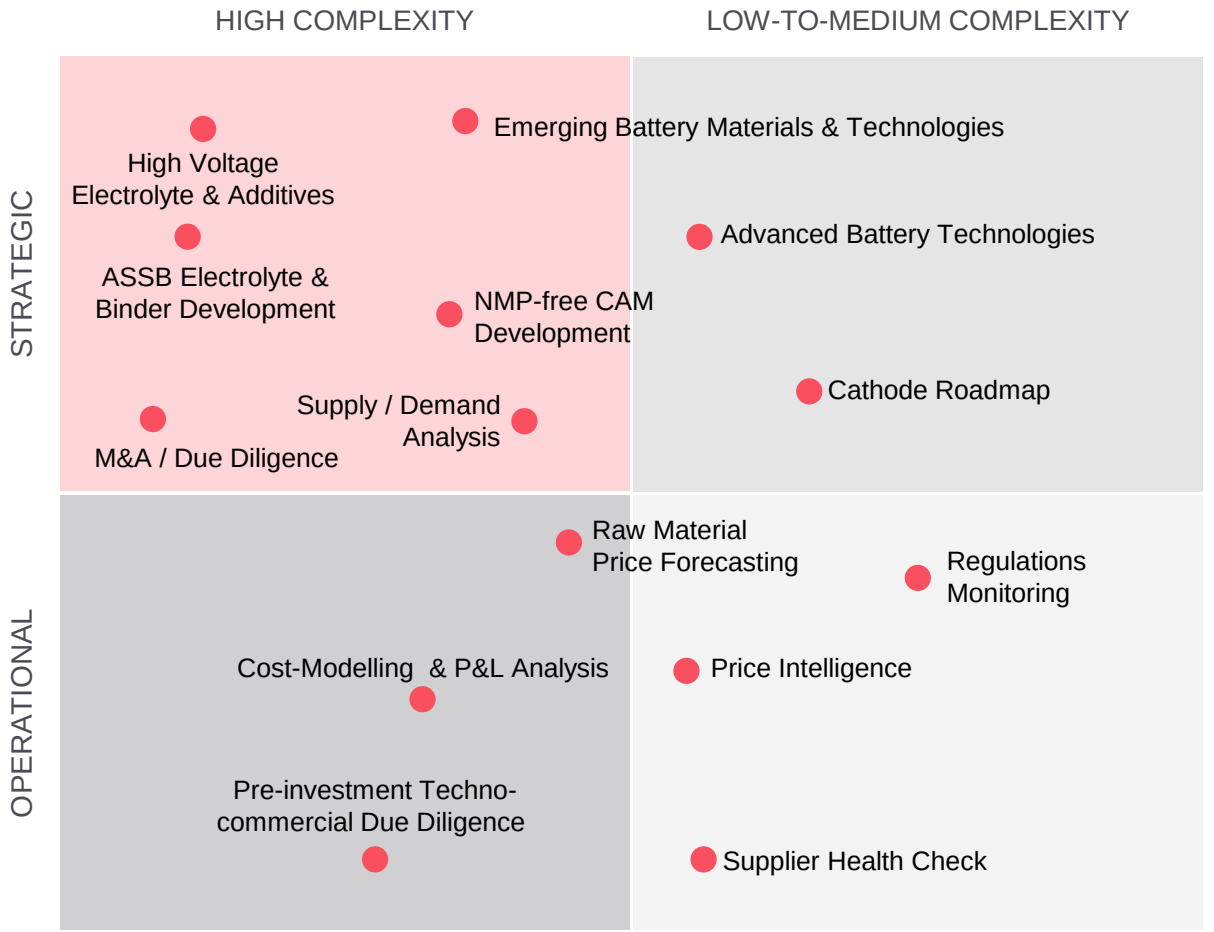
Supporting battery innovation at every stage – from early ideas to market success.

TRL 1–3	TRL 1–7	TRL 5–7	TRL >8	TRL >5	TRL >3	TRL >8
Ideation	**Validation**	**Innovation Value Assessment**	**Deep-dive Techno-commercial Analysis**	**Pilot / prototype**	**Start-up Identification**	**Pre-deal technology and commercial due diligence**
How can FutureBridge accelerate your innovation journey?						
▪ Identifying & analyzing technologies, IP, players, ecosystems, risks and trends	▪ Customer needs & value-chains ▪ Business models ▪ Feedstocks & markets ▪ Go / No-Go	▪ Market potential ▪ Any technical challenges addressed ▪ Value proposition basis on the willingness of demand side to pay extra	▪ Customer need ▪ Market potential ▪ Competitor analysis ▪ Technical challenges ▪ Scenario analysis	▪ Scaling-up ▪ Testing and prototyping ▪ Validating innovation idea and feedback ▪ Collaboration, financing, etc.	• Identification and selection of best-fit start-up for investing	• Pre-deal technology and commercial due diligence on best-fit start-up
Examples of key questions we've worked on						
Are there game-changing ideas I might be missing?	Can you validate my innovation ideas before I invest further?	What's my value proposition? What does the ROI look like?	Can you provide an independent market and tech analysis?	Who are the right partners to test and scale my innovation?	Can you help me find the right start-up to invest in?	How can I be sure I'm making a smart investment?



FutureBridge works along the Battery value chain to enable our clients to stay ahead in the battery race

The chart categorizes battery industry challenges by complexity and whether they are strategic or operational. High-complexity, strategic areas include electrolyte development and supply-demand analysis, while lower-complexity, operational areas cover price forecasting and regulations monitoring. FutureBridge helps clients navigate these challenges with expert insights and solutions.



Let’s continue the conversation

Thank you for taking the time to read our report which we trust has been interesting. If you would like to explore this topic further, please be in touch via LinkedIn, email or book a slot to talk with us

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