

Global and China EV Batteries and Materials: Technology, Trends, and Market Forecasts

Table of Contents

Chapter 1	Introduction	1-1
Chapter 2	Global EV and EV Battery Market Outlook	2-1
2.1	EV Market	2-1
2.2	EV Batteries	2-4
2.2.1	EV Battery Market Forecast	2-4
2.2.2	EV Battery Energy Density	2-12
2.2.3	EV Battery Cell Price	2-12
2.2.4	EV Battery Market Share	2-16
2.2.5	Rise of China	2-20
2.2.5.1	Aggressive EV Battery Expansion	2-20
2.2.5.2	Chinese Battery Technology	2-24
2.2.6	Future Batteries	2-28
2.2.6.1	Lithium-air (Li-air)	2-28
2.2.6.2	Lithium-metal (Li-metal)	2-29
2.2.6.3	Solid-State Lithium	2-30
2.2.6.4	Lithium-sulfur (Li-S)	2-32
2.2.6.5	Sodium-ion (Na-ion)	2-34
Chapter 3	Chinese EV and EV Battery Market Outlook	3-1
3.1	China EV Market	3-1
3.2	China EV Batteries	3-4
3.2.1	China EV Battery Market Forecast	3-4
3.2.2	Rise of China	3-7
3.2.2.1	Aggressive EV Battery Expansion	3-7

3.2.2.2	Chinese Battery Technology	3-13
3.2.2.3	EV Battery Overcapacity	3-27
Chapter 4	Cathode Material Analysis	4-1
4.1	Introduction	4-1
4.1.1	Cathode Material Costs	4-1
4.1.2	Cathode Materials And Battery Types	4-4
4.1.2.1	LCO (Lithium Cobalt Oxide) Cathodes	4-7
4.1.2.2	NCM (Nickel Cobalt Manganese) Cathodes	4-12
4.1.2.3	LMO (Lithium Manganese Oxide) Cathodes	4-16
4.1.2.4	LFP (Lithium Iron Phosphate) Cathodes	4-20
4.1.2.5	NCA (Nickel Cobalt Aluminum) Cathodes	4-23
4.2	Lithium	4-26
4.2.1	Lithium Prices	4-26
4.2.2	Lithium Supply/Demand	4-27
4.2.3	Top Lithium-Producing Countries	4-33
4.2.4	Top Lithium-Producing Producers	4-38
4.3	Cobalt	4-44
4.3.1	Cobalt Prices	4-44
4.3.2	Cobalt Supply/Demand	4-47
4.3.3	Top Cobalt-Producing Countries	4-55
4.3.4	Top Cobalt-Producing Producers	4-60
4.4	Nickel/Manganese	4-64
Chapter 5	Global Anode, Electrolyte, And Separator Material Analysis	5-1
5.1	Overview	5-1
5.2	Global Anode Market	5-3
5.3	Global Separator (Membrane) Market	5-9

5.4	Global Electrolytes Market	5-15
Chapter 6	China Anode, Electrolyte, And Separator Material Analysis	6-1
6.1	Overview	6-1
6.2	China Anode Market	6-3
6.3	China Separator (Membrane) Market	6-9
6.4	China Electrolytes Market	6-11
Chapter 7	Supplier Profiles and Strategies	7-1
7.1	Aekyung Chemical	7-1
7.2	Aleees	7-1
7.3	Asahi Kasei	7-3
7.4	B&M	7-5
7.5	BASF	7-5
7.6	BTR New Energy Materials	7-7
7.7	BNE	7-8
7.8	Cangzhou Mingzhu	7-8
7.9	Central Glass	7-9
7.10	Do-Fluoride Chemical	7-9
7.11	Easpring	7-10
7.12	Ecopro	7-11
7.13	Foshan Jinhui Hi-tech Optoelectronic Material	7-12
7.14	Guangzhou Tinci Materials Technology	7-12
7.15	Guotai-Huarong	7-13
7.16	Hitachi Chemical	7-14
7.17	Huiqiang New Energy	7-15
7.18	Hunan Changyuan Lico	7-15
7.19	Idemitsu Kosan	7-15

7.20	JFE Chemical	7-16
7.21	Johnson Matthey	7-17
7.22	Kureha	7-18
7.23	L&F	7-19
7.24	Mingzhu	7-19
7.25	Mitsubishi Chemical	7-20
7.26	Nichia	7-20
7.27	Ningbo Jinhe New Materials	7-21
7.28	Posco	7-21
7.29	Pulead Technology Industry	7-22
7.30	Reshine	7-22
7.31	Shenzhen Senior Technology	7-23
7.32	ShanShan	7-23
7.33	Shenzhen Capchem Technology	7-24
7.34	SK Innovation	7-24
7.35	Shinzoom	7-25
7.36	Sinuo	7-25
7.37	Soulbrain	7-26
7.38	Stella Chemifa	7-26
7.39	Sumitomo Metal Mining	7-28
7.40	Tanaka Chemical	7-29
7.41	Tangray	7-29
7.42	Teijin	7-30
7.43	Toray Battery	7-31
7.44	Ube Industries	7-31
7.45	Umicore	7-31
7.46	W-Scope	7-32
7.47	Xiamen Tungsten	7-33

7.48	Xinxiang Zhongke Science and Technology	7-33
7.49	XTC New Energy Materials	7-34
7.50	Zeto	7-34
7.51	Zhuhai Smoothway Electronic Materials	7-35
7.52	Zichen	7-35
Chapter 8	Battery Company Profiles and Strategies	8-1
8.1	AESC	8-1
8.2	BYD	8-2
8.3	Beijing National Battery Technology	8-3
8.4	CALB	8-3
8.5	Camel Group Co	8-4
8.6	CATL	8-4
8.7	Cham Battery Technology Co	8-5
8.8	Chaowei Power Holdings Limited	8-5
8.9	CITIC Guo'An Mengguli (MGL)	8-5
8.10	CNSG Anhui Hong Sifang Co	8-6
8.11	Coslight	8-6
8.12	DLG Power Battery	8-6
8.13	Do-Fluoride (Jiaozuo) New Energy Technology	8-6
8.14	EVE Energy Co., Ltd.	8-7
8.15	Farasis Energy (Ganzhou) Co., Ltd.	8-7
8.16	First New Energy Co. Ltd	8-7
8.17	Great Power Energy Technology Co., Ltd	8-8
8.18	Guoxuan Hi-Tech	8-8
8.19	Harbin Coslight Power Co., Ltd.	8-9
8.20	Henan Lithium Power Source Co	8-10
8.21	Henan Xintaihang	8-10

8.22	Highstar Battery	8-10
8.23	Huanyu New Energy Technology Co., Ltd.	8-10
8.24	Hunan Copower EV Battery Co., Ltd	8-10
8.25	Jiangsu Tenpower	8-11
8.26	Jiangsu Zhihang New Energy Co., Ltd.	8-11
8.27	Kokam Co., Ltd	8-11
8.28	LG Chem	8-12
8.29	Lithium Energy Japan	8-14
8.30	Mcnair New Energy Co., Ltd	8-14
8.31	Melsen Power	8-14
8.32	Microvast Power Systems Co., Ltd.	8-14
8.33	Narada Power Source Co., Ltd.	8-15
8.34	Ningbo CRRC New Energy Technology Co., Ltd.	8-15
8.35	NorthVolt	8-15
8.36	OptimumNano	8-16
8.37	Panasonic	8-16
8.38	Plylion Battery Co., Ltd.	8-17
8.39	Primearth EV Energy Co., Ltd.	8-17
8.40	Samsung SDI	8-18
8.41	Shandong Forever New Energy	8-20
8.42	Shandong Hengyu New Energy	8-20
8.43	Shanghai CENAT New Energy Co., Ltd.	8-21
8.44	Shenzhen BAK	8-21
8.45	Sinopoly Battery	8-21
8.46	Sinowatt	8-22
8.47	SK Innovation	8-22
8.48	Skyrich Power Co., Ltd.	8-23
8.49	Supreme Power Systems Co., Ltd.	8-23

8.50	Suzhou Youlion Battery Inc.	8-23
8.48	Tianjin EV Energies Co., Ltd. (JEVE)	8-21
8.49	Tianjin Lishen Battery Joint-Stock Co., Ltd.	8-22
8.50	Tianneng Power	8-22
8.51	TerraE	8-23
8.52	Tesla	
8.53	Tianjin EV Energies Co., Ltd. (JEVE)	8-24
8.54	Tianjin Lishen Battery Joint-Stock Co., Ltd.	8-25
8.55	Tianneng Power	8-25
8.56	Wanxiang-A123	8-25
8.57	Wina Power	8-26
8.58	Wuhu ETC Battery Limited	8-26
8.60	Zhongdao Energy Co., Ltd.	8-27
8.61	Zhuhai Yinlong New Energy Co., Ltd.	8-27
8.62	Zhuoneng New Energy	8-27
8.63	Zibo Guoli	8-27
8.64	ZTT Energy Storage Technology Co., Ltd.	8-28
List of Tables		
2.1	Global EV Market Forecast	2-3
2.2	Global EV Battery Makers	2-6
2.3	Summary Table of Lithium-Based Batteries	2-14
2.4	EV Battery Breakdown by Company and EV Model	2-15
2.5	Shipment Forecast of EV Battery by Region	2-19
2.6	Outlook for EV/PHEV Sales	2-21
2.7	Summary Table of Future Batteries	2-35
3.1	Best Selling Chinese Electric Vehicles	3-3

3.2	China Battery Demand By Type	3-5
3.3	China Personal Vehicle EV Battery Output By Type	3-17
3.4	China EV Battery Output By Vehicle Type	3-18
3.5	China Personal Vehicle EV Battery Shipments By Shape	3-21
3.6	China Personal Vehicle EV Battery Shipments By Density	3-22
3.7	China Personal Vehicle EV Battery Shipments By Customer	3-25
4.1	Major Lithium Metal Oxides Used In Cathodes	4-5
4.2	Cathode Material Characteristics	4-6
4.3	Lithium Cobalt Oxide (LCO) Properties	4-10
4.4	Lithium Nickel Manganese Cobalt Oxide Properties	4-14
4.5	Lithium Manganese Oxide Properties	4-18
4.6	Lithium Nickel Cobalt Aluminum Oxide Properties	4-24
4.7	Lithium Production and Reserves by Country	4-32
4.8	Amount Of Cobalt Per Battery For Different Devices	4-52
4.9	Cobalt Mine Production by Country	4-54
5.1	Material Revenue Forecast	5-2
5.2	Properties and Suppliers of Anode Materials	5-5
5.3	Characteristics and Suppliers of Separators	5-11
6.1	Material Revenue Forecast	6-2
List of Figures		
2.1	EV Battery Market Forecast by Vehicle Type	2-8
2.2	EV Battery Market Forecast (MWh)	2-9
2.3	Battery Market by Application 2000	2-10
2.4	Battery Market by Application 2015 And 2025	2-11
2.5	EV Battery Density by Type	2-13
2.6	EV Battery Market Share by Manufacturer	2-17

2.7	EV Battery Shipments 2017 and 2018	2-18
2.8	EV Battery Manufacturer Capacity by Region	2-22
2.9	China EV Battery Shares	2-25
2.10	China EV Battery Shares – NCM	2-26
2.11	China’s EV Battery Output by Type	2-27
2.12	Comparison Between a Conventional and All-Solid-State LIB	2-31
2.13	Comparison Between a Conventional and Metal Polysulfide LIB	2-33
3.1	China EV Battery Demand	3-6
3.2	China EV Battery Manufacturers	3-10
3.3	China NEV Battery Shares (Personal/Commercial)	3-11
4.4	China Personal EV Battery Shares	3-12
3.5	China Personal Vehicle EV Battery Output By Type	3-14
3.6	China EV Battery Shares – LFP	3-15
3.7	China EV Battery Shares – NCM	3-16
3.8	China Personal Vehicle EV Battery Output By Shape	3-20
3.9	China Personal Vehicle EV Battery Output By Density	3-23
3.10	China Personal Vehicle EV Battery Output By Type	3-24
4.1	Li Battery Materials Cost Breakdown	4-2
4.2	Cathode Materials Market Share by Type	4-7
4.3	LCO Market Share by Material Supplier	4-11
4.4	NCM Market Share by Material Supplier	4-15
4.5	LMO Market Share by Material Supplier	4-19
4.6	LFP Market Share by Material Supplier	4-22
4.7	NCA Market Share by Material Supplier	4-25
4.8	Lithium Prices 2009-2018	4-28
4.9	Lithium Supply by Country – 2017	4-29
4.10	Lithium Supply by Country – 2025	4-30
4.11	Lithium Supply by Country – 2014-2025	4-31

4.12	Cobalt 1-Year Price Graph	4-45
4.13	Cobalt 5-Year Price Graph	4-46
4.14	Cobalt Supply/Demand	4-49
4.15	Cobalt Demand by Application	4-50
4.16	Cobalt Components by Battery Type	4-53
4.17	Nickel 5-Year Price Graph	4-65
4.18	Manganese 5-Year Price Graph	4-66
5.1	Anode Materials Market Share by Type	5-4
5.2	Market Shares of Anode Materials Suppliers	5-8
5.3	Market Shares of Separator Materials Suppliers	5-12
5.4	Wet Vs Dry Separator Forecast for EV Batteries	5-13
5.5	Global Demand for Separators for Automotive	5-14
5.6	Market Shares of Electrolyte Materials Suppliers	5-18
6.1	China Anode Materials Market Share by Type	6-4
6.2	China Market Shares Of Artificial Graphite Suppliers	6-5
6.2	China Market Shares Of Natural Graphite Suppliers	6-6
6.4	China Market Shares Of Wet Separator Materials Suppliers	6-8
6.5	China Market Shares Of Dry Separator Materials Suppliers	6-9
6.6	China Separator Shipment Breakdown By Type	6-10
6.7	China Market Shares Of Electrolyte Materials Suppliers	6-12