

The Global Advanced Battery and Energy Storage Market 2026-2036

<https://marketpublishers.com/r/G6BED7C40359EN.html>

Date: April 2026

Pages: 1006

Price: US\$ 1,600.00 (Single User License)

ID: G6BED7C40359EN

Abstracts

The global advanced batteries and energy storage market has entered a new structural phase defined by industrial policy, geopolitical realignment, and the technological consolidation of lithium-ion as the dominant chemistry across both mobility and stationary applications. LFP has emerged as the cost leader anchoring mass-market EV and battery energy storage system deployments, while high-nickel NMC and NCA formulations retain the performance leadership position for premium, long-range, and high-specific-energy applications. Silicon-carbon composite anodes have transitioned from laboratory research to mass commercial deployment, first in premium consumer electronics and increasingly in automotive applications, establishing themselves as the dominant near-term pathway for energy-density improvement ahead of the longer-term solid-state transition.

Three developments in late 2025 and early 2026 have materially reshaped competitive dynamics. First, China announced export restrictions in October 2025 targeting batteries with energy densities above 300 Wh/kg, directly affecting Western supply of high-energy-density cells and accelerating the commercial case for domestic production across the United States, Europe, Korea, and Japan. Second, defence and military drone battery demand has emerged as a material new segment, driven by the operational effectiveness of battery-powered drones demonstrated in the Ukraine conflict and the Pentagon's accelerated procurement response, with national-security venture capital including IQT (the CIA-founded investment firm) flowing into high-energy-density cell developers. Third, the solid-state battery commercialisation landscape is undergoing significant differentiation: Factorial Energy has secured development agreements with Mercedes-Benz (a 745-mile EQS demonstration in late 2025), Stellantis, Hyundai, Kia, and Karma Automotive, while other Western players face commercial headwinds as automotive OEMs recalibrate their EV investment timelines.

The industrial-policy landscape is reshaping supply chains fundamentally. The US One Big Beautiful Bill Act preserves the 45X Advanced Manufacturing Production Credit while tightening foreign-entity-of-concern restrictions affecting Chinese-supplied materials and equipment. The EU Critical Raw Materials Act establishes ambitious targets for domestic mining, processing, and recycled content by 2030, supported by the Green Deal Industrial Plan and Innovation Fund. The UK Cap and Floor Scheme provides revenue certainty for long-duration energy storage developers. These frameworks collectively create structural advantages for non-Chinese cell manufacturers and materials producers while simultaneously raising the competitive bar for the Western battery industry to achieve cost and operational parity with incumbent Asian producers.

Battery energy storage systems have emerged as arguably the fastest-growing clean-energy technology globally, with demand driven by accelerating renewable energy penetration, rising data-centre power requirements linked to AI compute growth, and the continuing build-out of electric vehicle charging infrastructure. Beyond lithium-ion, emerging chemistries including sodium-ion, redox flow (vanadium and non-vanadium), iron-air, and CO₂-based systems are establishing application-specific positions in the broader energy storage landscape, particularly in stationary, long-duration, and specialty applications where lithium-ion's structural cost and duration characteristics become less favourable. The overall market is transitioning from a phase of rapid capacity build-out toward a phase of operational excellence, cost optimisation, and technology differentiation as competition intensifies across all segments.

The Global Advanced Battery and Energy Storage Market 2026–2036 provides an authoritative analysis of the global advanced battery and energy storage market from 2026 to 2036, delivered across more than 2,000 pages of technical, commercial, and strategic content. The report covers the complete spectrum of lithium-ion and beyond-lithium battery technologies, spanning electric vehicle applications, stationary energy storage, off-highway machinery electrification, commercial and industrial power systems, and emerging defence and specialty applications.

The report tracks the rapidly evolving competitive and policy landscape including the October 2025 China export restrictions on advanced batteries, the US One Big Beautiful Bill Act, the EU Critical Raw Materials Act, the UK Cap and Floor Scheme for long-duration energy storage, and the accelerating industrial response driving domestic cell, cathode, anode, and precursor manufacturing capacity across the United States, Europe, Korea, and Japan. Detailed market forecasts are provided across all major

application segments and geographic regions.

Technology coverage extends across lithium-ion batteries and their evolving chemistries (LFP, LMFP, high-nickel NMC, NCA), lithium-metal, lithium-sulfur, lithium-titanate, sodium-ion, sodium-sulfur, aluminium-ion, zinc-based, solid-state (including semi-solid-state, sulfide, oxide, and polymer-based architectures), structural battery composites, flexible batteries, printed batteries, transparent and degradable batteries, redox flow batteries (vanadium, iron-based, zinc-based, organic, hydrogen-based, and CO₂-based chemistries), and AI-enabled battery technology. Silicon-carbon composite anodes receive dedicated treatment as the dominant near-term energy-density upgrade pathway.

Application analysis covers passenger EVs across all segments, electric commercial vehicles, off-highway machines (construction, agriculture, and mining), battery storage for data centres and commercial/industrial applications, telecommunications and 5G/6G base-station backup, EV charging infrastructure, grid-scale utility storage, microgrids, consumer electronics, aerospace, defence and military drones, and emerging specialty markets.

Supply chain and materials analysis spans cathode active materials, anode materials (graphite, silicon, silicon-carbon composite, lithium metal), electrolytes, separators, current collectors, binders, conductive additives, pack-level materials (thermal, fire, structural), advanced sensors and wireless battery management systems, and the rapidly expanding battery recycling sector. The report includes extensive discussion of PFAS-free additives and the regulatory transition away from fluoropolymer binders, alongside comprehensive battery recycling market analysis covering hydrometallurgical, pyrometallurgical, and direct recycling approaches.

The report concludes with detailed profiles of the leading companies across the complete global battery value chain.

Executive Summary — The Li-ion Battery Market in 2025; the new battery policy landscape, geopolitics, national security, and defence demand; Global Market Forecasts to 2036

Li-ion Batteries — market drivers, megatrends, advanced materials, battery chemistries, types, anode materials, silicon-carbon composite anodes, electrolytes, cathodes, binders and conductive additives, separators, high-performance Li-ion systems approaching 350 Wh/kg, PFAS-free battery

additives and regulatory transitions, platinum group metals, Li-ion recycling, global revenues, EV battery cell and pack materials outlook

Lithium-Metal Batteries — technology description, solid-state batteries and lithium metal anodes, energy density, anode-less cells, hybrid batteries, applications, SWOT analysis, product developers

Lithium-Sulfur Batteries — operating principle, costs, material composition, lithium intensity, value chain, markets, SWOT analysis, global revenues, product developers

Lithium Titanate (LTO) and Niobate Batteries — technology description, global revenues, future outlook, product developers

Sodium-Ion (Na-Ion) Batteries — technology description, comparative analysis with other battery types, cost comparison with Li-ion, materials in sodium-ion cells, SWOT analysis, global revenues, market growth drivers, technology roadmap, future outlook, product developers

Sodium-Sulfur Batteries — technology description, applications, SWOT analysis

Aluminium-Ion Batteries — technology description, SWOT analysis, commercialization, global revenues, product developers

Solid-State Batteries — introduction, technology description, features and advantages, technical specifications, types, technology readiness and manufacturing status, automotive OEM strategies and deployment timelines, microbatteries, bulk type solid-state batteries, SWOT analysis, limitations, global revenues, commercialization timeline, product developers

Structural Battery Composites — introduction, materials and architecture, applications, technical challenges, supply chain, market forecasts, safety considerations, environmental profile

Flexible Batteries — technology description, technical specifications, flexible electronics, flexible materials, flexible and wearable metal-sulfur batteries, flexible and wearable metal-air batteries, flexible Li-ion batteries, flexible Li/S batteries, flexible Li-MnO₂ batteries, flexible zinc-based batteries, fiber-shaped batteries, energy harvesting combined with wearable energy storage, SWOT

analysis, global revenues, companies

Transparent Batteries — technology description, components, SWOT analysis, market outlook

Degradable Batteries — technology description, components, SWOT analysis, market outlook, product developers

Printed Batteries — technical specifications, components, design, key features, printable current collectors and electrodes, materials, applications, printing techniques, Li-ion printed batteries, zinc-based printed batteries, 3D printed batteries, SWOT analysis, global revenues, product developers

Redox Flow Batteries — technology description, market overview, technology benchmarking, chemistry selection matrix by application, component technologies and cost reduction pathways, component innovation, types (VRFB, Zn-Br, PSB, Fe-Cr, All-Iron, Zn-Fe, H-Br, H-Mn, organic, CO₂-based, emerging and hybrid flow batteries), markets for RFBs, global revenues, key trends, regional market analysis, long-duration energy storage positioning, levelised cost of storage vs Li-ion LFP by duration, policy frameworks, market forecast to 2036 by chemistry and region

Zn-Based Batteries — technology description, market outlook, product developers

Batteries in Off-highway Machines — introduction to electric off-highway machines, electric construction, agriculture, and mining machines, battery requirements, turnkey battery technologies, battery suppliers and case studies, future battery technologies, global market forecast, outlook

Battery Storage for Data Centres, Commercial & Industrial Applications — C&I BESS applications and market overview, technology landscape, US LFP manufacturing transition (45X, FEOC, tariff dynamics), Li-ion C&I BESS cost structure, key players, market outlook

AI Battery Technology — overview, applications

Cell and Battery Design — cell design, cell performance, battery packs, advanced battery pack sensors and remote monitoring, wireless BMS

Company Profiles — 449 detailed profiles across the complete battery value chain

Research Methodology and References

Companies profiled in this report include: 2D Fab AB, 24M Technologies, 3DOM, 6K Energy, Abound Energy, AC Biode, ACCURE Battery Intelligence, Achelous Pure Metal Company, Accu't, Addionics, Advano, Advanced Solid-state Electrolyte Technology (ASET), AEGIS Critical Energy Defence Corp., Agora Energy Technologies, Aionics, AirMembrane Corporation, Allegro Energy, Allye Energy, AlphaESS, Alsym Energy, Altairnano/Yinlong, Altris, Aluma Power, Altech Batteries, Ambri, AMO Greentech, Ampcera, Amprius, AMTE Power, Anaphite, Anhui Anwa New Energy, Anthro Energy, APB Corporation, Appear, Argylum, Ascend Elements, AZUL Energy, BASF (Sodium-Ion), Basquevolt, Battri, BeePlanet Factory, BESSst, Biwatt Power, Blackstone Resources, Blue Current, Blue Solutions, BrightVolt, BTRY AG, BYD Energy Storage, Calibrant Energy, CATL, CellCube, Chongqing Tailan New Energy, CIC EnergiGUNE, CMBlu Energy, Connected Energy, Contemporary Amperex Technology Co Ltd, Coreshell Technologies, Cornish Lithium, Cymbet, Cuberg, Cylib, DFD Energy, Donut Lab, Dowa Eco-System, Duesenfeld, Dynanonic, Eaton Corporation, EBS Square, ECOPRO BM, EcoBat, Econili Battery, Elestor, Electra Battery Materials Corporation, Elemental Holding, Elite Battery Systems, ElecJet, Emulsion Flow Technologies, ENEOS, Energizer Holdings, Energy Source, Enerpoly, Enerpize, Enim, Enovix, EnPower Greentech, Ensurge Micropower, Eramet, ESS Tech, EticaAG, EVE Energy, Exawatt, Factorial Energy, Faradion, Farasis Energy, FDK Corporation, Fluence, Form Energy, Fortum Battery Recycling, Forge Nano, Forsee Power, Foxess, Freudenberg, FREYR Battery, Front Edge Technology, FuelCell Energy, Ganfeng Lithium, GEM Co., GivEnergy, GLC Recycle, Glencore, Gotion, Graphene Manufacturing Group (GMG), Graphite One, Grepow, Green Energy Storage, Green Graphite Technologies, Green Li-ion, Green Mineral, GQenergy, GRST, Growatt, Guangdong Guanghua Sci-Tech, H2 Inc., Hansol Chemical, Hanwha, Heiwitt, HiNa Battery Technologies, Highstar, Hithium, Honeycomb Battery Company, Huayou Cobalt, HydroVolt, Hyundai, IBC Solar, Idemitsu Kosan, Ilika, Imerys, Immersa, Indi Energy, Infinity Power, Inmetco, Innolith, Ion Storage Systems, Ionblox, Ionomr Innovations, ITEN, J-Cycle, JinkoSolar, Jinghe Energy, JX Nippon Metal Mining, Kemiwatt, Korea Zinc, Korid Energy/AVESS, KoreaGraph, Koura, Kusumoto Chemicals, Kyoei Seiko, Largo, Le System, Lepu Sodium Power, LG Chem, LG Energy Solutions, LI Industries, Li-Cycle, Li-Fun Technology, Li-Metal Corp, Li-S Energy, LiBest, LiCAP Technologies, LiNa Energy, Libode New Material, Librec,

Lightyear Engine, LIND, Lithium Werks, Livium Australia, Livoltek, LionVolt, Lionrock Batteries, Lohum, LOTTE Energy Materials Corporation, Lucky Sodium Storage, Luxera Energy, Lyten, Materia AI, Mecaware, Meine Electric, Merck, Metastable Materials, Micromet, Microvast, Mitra Future Technologies, Mitsubishi Chemical, Mitsubishi Electric, Mitsubishi Materials, Molyon, Monolith AI, Moonwatt, Morrow Batteries, Murata Manufacturing, Nacelle, Nacoe Energy, Nano One Materials, NanoGraf, NanoPow, Nanom, Nanomakers, Nanoramic Laboratories, Nanoresearch, Nanotech Energy, Narada Power, Nascent Materials, Natrium Energy, Natron Energy, Nawa Technologies, NBD, NDB, NEC Corporation, NEI Corporation, Nexeon, NEU Battery Materials, NGK Insulators, NIO, Nippon Chemicon, Nippon Electric Glass, Noco-noco, Noon Energy and more...

Contents

1 EXECUTIVE SUMMARY

- 1.1 The Li-ion Battery Market
- 1.2 The new battery policy landscape: geopolitics, national security, and defence demand
- 1.3 Global Market Forecasts to 2036
 - 1.3.1 Addressable markets
 - 1.3.2 Li-ion battery pack demand for XEV (GWh)
 - 1.3.2.1 Battery Chemistry Distribution by Vehicle Type 2036
 - 1.3.2.2 OEM Strategies 2036
 - 1.3.3 Li-ion battery market value for XEV (\$B)
 - 1.3.3.1 Market Value Dynamics
 - 1.3.3.2 Price Trajectory Drivers
 - 1.3.4 Semi-solid-state battery market forecast (GWh)
 - 1.3.4.1 Technology Roadmap
 - 1.3.4.2 Competitive Positioning
 - 1.3.4.3 Technology Evolution 2025-2036
 - 1.3.5 Semi-solid-state battery market value (\$B)
 - 1.3.5.1 Pricing Dynamics
 - 1.3.6 Solid-state battery market forecast (GWh)
 - 1.3.7 Sodium-ion battery market forecast (GWh)
 - 1.3.7.1 Growth Analysis
 - 1.3.8 Sodium-ion battery market value (\$B)
 - 1.3.8.1 Pricing Analysis
 - 1.3.8.2 Profitability Outlook for Sodium-Ion Manufacturers
 - 1.3.9 Li-ion battery demand versus beyond Li-ion batteries demand
 - 1.3.9.1 Market Transition Analysis
 - 1.3.9.2 Long-Term Outlook (Post-2036)
 - 1.3.9.3 Why Beyond Li-ion Remains Limited Through 2036
 - 1.3.9.4 Market Share Trajectories by Technology
 - 1.3.10 BEV car cathode forecast (GWh)
 - 1.3.11 BEV anode forecast (GWh)
 - 1.3.12 BEV anode forecast (\$B)
 - 1.3.13 EV cathode forecast (GWh)
 - 1.3.14 EV Anode forecast (GWh)
 - 1.3.15 Advanced anode forecast (GWh)
 - 1.3.16 Advanced anode forecast (\$B)

- 1.3.16.1 Market Dynamics 2036
- 1.4 The global market for advanced Li-ion batteries
 - 1.4.1 Electric vehicles
 - 1.4.1.1 Market overview
 - 1.4.1.2 Battery Electric Vehicles
 - 1.4.1.3 Electric buses, vans and trucks
 - 1.4.1.3.1 Electric medium and heavy duty trucks
 - 1.4.1.3.2 Electric light commercial vehicles (LCVs)
 - 1.4.1.3.3 Electric buses
 - 1.4.1.3.4 Micro EVs
 - 1.4.1.4 Electric off-road
 - 1.4.1.4.1 Construction vehicles
 - 1.4.1.4.2 Electric trains
 - 1.4.1.4.3 Electric boats
 - 1.4.1.5 Off-highway machines: construction, agriculture and mining
 - 1.4.1.6 Market demand and forecasts
 - 1.4.1.7 Market Analysis
 - 1.4.1.7.1 BEV Passenger Cars - Dominant Segment
 - 1.4.1.7.2 PHEV Passenger Cars - Transitional Technology:
 - 1.4.1.7.3 Profitability Analysis 2036
 - 1.4.1.7.4 Electric Buses
 - 1.4.1.7.5 Delivery Vans
 - 1.4.1.7.6 Medium-Duty Trucks
 - 1.4.1.7.7 Heavy-Duty Trucks
 - 1.4.1.7.8 Micro-EVs
 - 1.4.1.7.8.1 Micro-EV Market Overview
 - 1.4.2 Grid storage
 - 1.4.2.1 Market overview
 - 1.4.2.2 Technologies
 - 1.4.2.3 Market demand and forecasts
 - 1.4.2.4 Utility-Scale Grid Storage
 - 1.4.2.4.1 Application Categories
 - 1.4.2.5 Key Market Drivers
 - 1.4.2.6 Commercial & Industrial (C&I) Grid Storage
 - 1.4.2.6.1 Application Categories:
 - 1.4.2.7 Residential Grid Storage
 - 1.4.2.7.1 Application Categories
 - 1.4.2.7.2 Market Outlook
 - 1.4.3 Consumer electronics

- 1.4.3.1 Market overview
- 1.4.3.2 Technologies
- 1.4.3.3 Market demand and forecasts
- 1.4.4 Stationary batteries
 - 1.4.4.1 Market overview
 - 1.4.4.2 Technologies
 - 1.4.4.3 Market demand and forecasts
- 1.5 Market drivers
- 1.6 Battery market megatrends
- 1.7 Advanced materials for batteries
- 1.8 Motivation for battery development beyond lithium
- 1.9 Battery chemistries

2 LI-ION BATTERIES

- 2.1 Types of Lithium Batteries
- 2.2 Anode materials
 - 2.2.1 Graphite
 - 2.2.2 Lithium Titanate
 - 2.2.3 Lithium Metal
 - 2.2.4 Silicon anodes
- 2.3 SWOT analysis
- 2.4 Trends in the Li-ion battery market
- 2.5 Li-ion technology roadmap
- 2.6 Silicon anodes
 - 2.6.1 Benefits
 - 2.6.2 Silicon anode performance
 - 2.6.3 Development in li-ion batteries
 - 2.6.3.1 Manufacturing silicon
 - 2.6.3.2 Commercial production
 - 2.6.3.3 Costs
 - 2.6.3.4 Value chain
 - 2.6.3.5 Markets and applications
 - 2.6.3.5.1 EVs
 - 2.6.3.5.2 Consumer electronics
 - 2.6.3.5.3 Energy Storage
 - 2.6.3.5.4 Portable Power Tools
 - 2.6.3.5.5 Emergency Backup Power
 - 2.6.3.6 Future outlook

- 2.6.4 Consumption
 - 2.6.4.1 By anode material type
 - 2.6.4.2 By end use market
 - 2.6.4.3 Market Segment Analysis
 - 2.6.4.3.1 Passenger EVs
 - 2.6.4.3.2 Commercial EVs
 - 2.6.4.3.3 Consumer Electronics
 - 2.6.4.3.4 Stationary Storage
 - 2.6.4.3.5 Industrial & Others
- 2.6.5 Alloy anode materials
- 2.6.6 Silicon-carbon composites
- 2.6.7 Silicon oxides and coatings
- 2.6.8 Carbon nanotubes in Li-ion
- 2.6.9 Graphene coatings for Li-ion
- 2.6.10 Prices
 - 2.6.10.1 Price Trend Analysis and Drivers
 - 2.6.10.1.1 Natural Graphite
 - 2.6.10.1.2 Synthetic Graphite
 - 2.6.10.1.3 Silicon-Graphite Composite
 - 2.6.10.1.4 Silicon-Dominant
 - 2.6.10.1.5 Lithium Metal
 - 2.6.10.1.6 Lithium Titanate/LTO
- 2.6.11 Companies
- 2.7 Li-ion electrolytes
- 2.8 Cathodes
 - 2.8.1 Materials
 - 2.8.1.1 High and Ultra-High nickel cathode materials
 - 2.8.1.1.1 Types
 - 2.8.1.1.2 Benefits
 - 2.8.1.1.3 Stability
 - 2.8.1.1.4 Single Crystal Cathodes
 - 2.8.1.1.5 Commercial activity
 - 2.8.1.1.6 Manufacturing
 - 2.8.1.1.7 High manganese content
 - 2.8.1.2 Zero-cobalt NMx
 - 2.8.1.2.1 Overview
 - 2.8.1.2.2 Ultra-high nickel, zero-cobalt cathodes
 - 2.8.1.2.3 Extending the operating voltage
 - 2.8.1.2.4 Operating NMC cathodes at high voltages

- 2.8.1.3 Lithium-Manganese-Rich (Li-Mn-Rich, LMR-NMC)
 - 2.8.1.3.1 Li-Mn-rich cathodes LMR-NMC
 - 2.8.1.3.2 Stability
 - 2.8.1.3.3 Energy density
 - 2.8.1.3.4 Commercialization
 - 2.8.1.3.5 Hybrid battery chemistry design for manganese-rich
- 2.8.1.4 Lithium Cobalt Oxide(LiCoO₂) — LCO
- 2.8.1.5 Lithium Iron Phosphate(LiFePO₄) — LFP
- 2.8.1.6 Lithium Manganese Oxide (LiMn₂O₄) — LMO
- 2.8.1.7 Lithium Nickel Manganese Cobalt Oxide (LiNiMnCoO₂) — NMC
- 2.8.1.8 Lithium Nickel Cobalt Aluminum Oxide (LiNiCoAlO₂) — NCA
- 2.8.1.9 Lithium manganese phosphate (LiMnP)
- 2.8.1.10 Lithium manganese iron phosphate (LiMnFePO₄ or LMFP)
 - 2.8.1.10.1 Key characteristics
 - 2.8.1.10.2 LMFP energy density
 - 2.8.1.10.3 Costs
 - 2.8.1.10.4 Saft phosphate-based cathodes
 - 2.8.1.10.5 Commercialization
 - 2.8.1.10.6 Challenges
 - 2.8.1.10.7 LMFP (lithium manganese iron phosphate) market
 - 2.8.1.10.8 Companies
 - 2.8.1.11 Lithium nickel manganese oxide (LNMO)
 - 2.8.1.11.1 Overview
 - 2.8.1.11.2 High-voltage spinel cathode LNMO
 - 2.8.1.11.3 LNMO energy density
 - 2.8.1.11.4 Cathode chemistry selection
 - 2.8.1.11.5 LNMO (lithium nickel manganese oxide) high-voltage spinel cathodes cost
 - 2.8.1.12 Graphite and LTO
 - 2.8.1.13 Silicon
 - 2.8.1.14 Lithium metal
- 2.8.2 Alternative Cathode Production
 - 2.8.2.1 Production/Synthesis
 - 2.8.2.2 Commercial development
 - 2.8.2.3 Recycling cathodes
- 2.8.3 Comparison of key lithium-ion cathode materials
- 2.8.4 Emerging cathode material synthesis methods
- 2.8.5 Cathode coatings
- 2.9 Binders and conductive additives
 - 2.9.1 Materials

- 2.10 Separators
 - 2.10.1 Materials
- 2.11 High-Performance Lithium-Ion Systems: Approaching 350 Wh/kg
 - 2.11.1 Energy Density Evolution and Current State
 - 2.11.2 Pathways to 350+ Wh/kg
 - 2.11.2.1 Cathode Advances
 - 2.11.2.2 Anode Advances
 - 2.11.2.2.1 Silicon-Graphite Composites (20-40% Si)
 - 2.11.2.2.2 Silicon-Dominant Anodes (50-80% Si)
 - 2.11.2.2.3 Lithium Metal Anodes
 - 2.11.2.3 Electrolyte and Cell Design Optimization
 - 2.11.3 Performance Projections and Technology Roadmap
 - 2.11.3.1 Critical Dependencies and Risk Factors
 - 2.11.4 Commercial Deployment Timeline
- 2.12 Silicon-carbon composite anodes
 - 2.12.1 Technology architecture and performance characteristics
 - 2.12.2 Manufacturing scale-up
 - 2.12.3 Market forecast
 - 2.12.4 Key commercial players
- 2.13 PFAS-Free Battery Additives and Regulatory Transitions
 - 2.13.1 Global Regulatory Trend Analysis
 - 2.13.2 PFAS Materials in Current Battery Manufacturing
 - 2.13.3 Non-PFAS Cathode Binders - The Critical Challenge
 - 2.13.4 Non-PFAS Cathode Binder Technologies
 - 2.13.4.1 Polyacrylic Acid (PAA) and Lithium Polyacrylate (Li-PAA)
 - 2.13.4.2 Carboxymethyl Cellulose (CMC) and Modified Cellulose Derivatives
 - 2.13.4.3 Polyacrylamide (PAM) and Acrylamide Copolymers
 - 2.13.4.4 Styrene-Butadiene Rubber (SBR) and Synthetic Rubber Derivatives
 - 2.13.4.5 Hybrid and Composite Binder Systems
 - 2.13.5 PFAS in Electrolyte Additives - Critical Performance Trade-offs
 - 2.13.5.1 Major PFAS Electrolyte Additives
 - 2.13.6 Market Analysis
 - 2.13.6.1 Battery additives market forecast and structural shifts
 - 2.13.6.2 Dry electrode processing and its binder implications
 - 2.13.6.3 Path to the first PFAS-free commercial Li-ion cell
- 2.14 Platinum group metals
- 2.15 Li-ion battery market players
- 2.16 Li-ion recycling
 - 2.16.1 Comparison of recycling techniques

- 2.16.2 Hydrometallurgy
 - 2.16.2.1 Method overview
 - 2.16.2.1.1 Solvent extraction
 - 2.16.2.2 SWOT analysis
 - 2.16.3 Pyrometallurgy
 - 2.16.3.1 Method overview
 - 2.16.3.2 SWOT analysis
 - 2.16.4 Direct recycling
 - 2.16.4.1 Method overview
 - 2.16.4.1.1 Electrolyte separation
 - 2.16.4.1.2 Separating cathode and anode materials
 - 2.16.4.1.3 Binder removal
 - 2.16.4.1.4 Relithiation
 - 2.16.4.1.5 Cathode recovery and rejuvenation
 - 2.16.4.1.6 Hydrometallurgical-direct hybrid recycling
 - 2.16.4.2 SWOT analysis
 - 2.16.5 Other methods
 - 2.16.5.1 Mechanochemical Pretreatment
 - 2.16.5.2 Electrochemical Method
 - 2.16.5.3 Ionic Liquids
 - 2.16.6 Recycling of Specific Components
 - 2.16.6.1 Anode (Graphite)
 - 2.16.6.2 Cathode
 - 2.16.6.3 Electrolyte
 - 2.16.7 Recycling of Beyond Li-ion Batteries
 - 2.16.7.1 Conventional vs Emerging Processes
 - 2.16.8 Companies- 2.17 Global revenues
 - 2.17.1 Passenger EVs
 - 2.17.2 Commercial EVs
 - 2.17.2.1 Electric Buses
 - 2.17.2.2 Medium & Heavy-Duty Trucks
 - 2.17.2.3 Light Commercial Vehicles/Vans
 - 2.17.2.4 Two/Three-Wheeler EVs
 - 2.17.3 Consumer Electronics
 - 2.17.4 Stationary Storage
 - 2.17.5 Industrial Applications
 - 2.17.6 Other Applications
- 2.18 EV Battery Cell and Pack Materials Outlook

- 2.18.1 Cathode materials: the LFP/LMFP and high-nickel bifurcation
- 2.18.2 Anode materials: silicon rises, graphite persists
- 2.18.3 Other cell materials
- 2.18.4 Pack materials: the aluminium-to-composite transition
- 2.18.5 Supply chain localisation and material-security considerations

3 LITHIUM-METAL BATTERIES

- 3.1 Technology description
- 3.2 Solid-state batteries and lithium metal anodes
- 3.3 Increasing energy density
- 3.4 Lithium-metal anodes
 - 3.4.1 Overview
- 3.5 Challenges
- 3.6 Energy density
- 3.7 Anode-less Cells
 - 3.7.1 Overview
 - 3.7.2 Benefits
 - 3.7.3 Key companies
- 3.8 Lithium-metal and solid-state batteries
- 3.9 Hybrid batteries
- 3.10 Applications
- 3.11 SWOT analysis
- 3.12 Product developers

4 LITHIUM-SULFUR BATTERIES

- 4.1 Technology description
- 4.2 Operating principle of lithium-sulfur (Li-S) batteries
 - 4.2.1 Advantages
 - 4.2.2 Challenges
 - 4.2.3 Commercialization
- 4.3 Costs
- 4.4 Material composition
- 4.5 Lithium intensity
- 4.6 Value chain
- 4.7 Markets
- 4.8 SWOT analysis
- 4.9 Global revenues

- 4.9.1 Key Insights and Technology Status
 - 4.9.1.1 Commercial Status
- 4.10 Product developers

5 LITHIUM TITANATE OXIDE (LTO) AND NIOBATE BATTERIES

- 5.1 Technology description
 - 5.1.1 Lithium titanate oxide (LTO)
 - 5.1.2 Niobium titanium oxide (NTO)
 - 5.1.2.1 Niobium tungsten oxide
 - 5.1.2.2 Vanadium oxide anodes
- 5.2 Global revenues
 - 5.2.1 Application Analysis
 - 5.2.1.1 Electric Buses
 - 5.2.1.2 Commercial Vehicles
 - 5.2.1.3 Consumer Electronics
 - 5.2.1.4 Industrial Equipment
 - 5.2.1.5 Grid Frequency Regulation
- 5.3 Future Outlook
- 5.4 Product developers

6 SODIUM-ION (NA-ION) BATTERIES

- 6.1 Technology description
 - 6.1.1 Cathode materials
 - 6.1.1.1 Layered transition metal oxides
 - 6.1.1.1.1 Types
 - 6.1.1.1.2 Cycling performance
 - 6.1.1.1.3 Advantages and disadvantages
 - 6.1.1.1.4 Market prospects for LO SIB
 - 6.1.1.2 Polyanionic materials
 - 6.1.1.2.1 Advantages and disadvantages
 - 6.1.1.2.2 Types
 - 6.1.1.2.3 Market prospects for Poly SIB
 - 6.1.1.3 Prussian blue analogues (PBA)
 - 6.1.1.3.1 Types
 - 6.1.1.3.2 Advantages and disadvantages
 - 6.1.1.3.3 Market prospects for PBA-SIB
 - 6.1.2 Anode materials

- 6.1.2.1 Hard carbons
- 6.1.2.2 Carbon black
- 6.1.2.3 Graphite
- 6.1.2.4 Carbon nanotubes
- 6.1.2.5 Graphene
- 6.1.2.6 Alloying materials
- 6.1.2.7 Sodium Titanates
- 6.1.2.8 Sodium Metal
- 6.1.3 Electrolytes
- 6.2 Comparative analysis with other battery types
- 6.3 Cost comparison with Li-ion
- 6.4 Materials in sodium-ion battery cells
- 6.5 SWOT analysis
- 6.6 Global revenues
 - 6.6.1 Market Analysis by Application
 - 6.6.1.1 Low-Cost EVs
 - 6.6.1.2 Grid Energy Storage
 - 6.6.1.3 E-bikes and Light EVs
 - 6.6.1.4 Consumer Electronics
- 6.7 Market Growth Drivers
- 6.8 Technology Roadmap
- 6.9 Future Outlook
- 6.10 Product developers
 - 6.10.1 Battery Manufacturers
 - 6.10.2 Large Corporations
 - 6.10.3 Automotive Companies
 - 6.10.4 Chemicals and Materials Firms

7 SODIUM-SULFUR BATTERIES

- 7.1 Technology description
- 7.2 Applications
- 7.3 SWOT analysis

8 ALUMINIUM-ION BATTERIES

- 8.1 Technology description
 - 8.1.1 Aluminium-Ion Battery Fundamentals
- 8.2 SWOT analysis

- 8.3 Commercialization
- 8.4 Global revenues
 - 8.4.1 Market Analysis by Application
- 8.5 Product developers

9 SOLID STATE BATTERIES

- 9.1 Introduction
- 9.2 Technology description
 - 9.2.1 Solid-state electrolytes
- 9.3 Features and advantages
- 9.4 Technical specifications
- 9.5 Types
- 9.6 Technology Readiness and Manufacturing Status
 - 9.6.1 Manufacturing Process Comparison
 - 9.6.2 Critical Manufacturing Challenges and Solutions
 - 9.6.2.1 Interface Engineering (Most Critical Challenge)
 - 9.6.2.2 Moisture Sensitivity (Sulfide Systems)
 - 9.6.2.3 Pressure Management (Oxide and Some Sulfide Systems)
- 9.7 Automotive OEM Strategies and Deployment Timelines
 - 9.7.1 Deployment
 - 9.7.1.1 OEM Strategic Considerations
- 9.8 Microbatteries
 - 9.8.1 Introduction
 - 9.8.2 Materials
 - 9.8.3 Applications
 - 9.8.4 3D designs
 - 9.8.4.1 3D printed batteries
- 9.9 Bulk type solid-state batteries
- 9.10 SWOT analysis
- 9.11 Limitations
- 9.12 Global revenues
- 9.13 Commercialization Timeline
- 9.14 Product developers

10 STRUCTURAL BATTERY COMPOSITES

- 10.1 Introduction
- 10.2 Materials and Architecture

10.3 Applications

- 10.3.1 Electric Vehicle Applications
- 10.3.2 Aerospace and Aviation
- 10.3.3 Consumer Electronics and Portable Devices
- 10.3.4 Construction and Infrastructure

10.4 Technical Challenges

- 10.4.1 Energy Density Limitations
- 10.4.2 Long-term Mechanical and Electrochemical Stability

10.5 Supply chain

10.6 Market Forecasts

10.7 Safety Considerations

- 10.7.1 Safety Challenges

10.8 Environmental profile of structural battery composites

11 FLEXIBLE BATTERIES

11.1 Technology description

11.2 Technical specifications

- 11.2.1 Approaches to flexibility

11.3 Flexible electronics

11.4 Flexible materials

11.5 Flexible and wearable Metal-sulfur batteries

11.6 Flexible and wearable Metal-air batteries

11.7 Flexible Lithium-ion Batteries

- 11.7.1 Types of Flexible/stretchable LIBs
 - 11.7.1.1 Flexible planar LiBs
 - 11.7.1.2 Flexible Fiber LiBs
 - 11.7.1.3 Flexible micro-LiBs
 - 11.7.1.4 Stretchable lithium-ion batteries
 - 11.7.1.5 Origami and kirigami lithium-ion batteries

11.8 Flexible Li/S batteries

- 11.8.1 Components
- 11.8.2 Carbon nanomaterials

11.9 Flexible lithium-manganese dioxide (Li-MnO₂) batteries

11.10 Flexible zinc-based batteries

- 11.10.1 Components
 - 11.10.1.1 Anodes
 - 11.10.1.2 Cathodes
- 11.10.2 Challenges

- 11.10.3 Flexible zinc-manganese dioxide (Zn–Mn) batteries
- 11.10.4 Flexible silver–zinc (Ag–Zn) batteries
- 11.10.5 Flexible Zn–Air batteries
- 11.10.6 Flexible zinc-vanadium batteries
- 11.11 Fiber-shaped batteries
 - 11.11.1 Carbon nanotubes
 - 11.11.2 Types
 - 11.11.3 Applications
 - 11.11.4 Challenges
- 11.12 Energy harvesting combined with wearable energy storage devices
- 11.13 SWOT analysis
- 11.14 Global revenues
- 11.15 Companies

12 TRANSPARENT BATTERIES

- 12.1 Technology description
- 12.2 Components
- 12.3 SWOT analysis
- 12.4 Market outlook

13 DEGRADABLE BATTERIES

- 13.1 Technology description
- 13.2 Components
- 13.3 SWOT analysis
- 13.4 Market outlook
- 13.5 Product developers

14 PRINTED BATTERIES

- 14.1 Technical specifications
- 14.2 Components
- 14.3 Design
- 14.4 Key features
- 14.5 Printable current collectors
- 14.6 Printable electrodes
- 14.7 Materials
- 14.8 Applications

- 14.9 Printing techniques
- 14.10 Lithium-ion (LIB) printed batteries
- 14.11 Zinc-based printed batteries
- 14.12 3D Printed batteries
 - 14.12.1 3D Printing techniques for battery manufacturing
 - 14.12.2 Materials for 3D printed batteries
 - 14.12.2.1 Electrode materials
 - 14.12.2.2 Electrolyte Materials
- 14.13 SWOT analysis
- 14.14 Global revenues
- 14.15 Product developers

15 REDOX FLOW BATTERIES

- 15.1 Technology description
- 15.2 Market Overview
- 15.3 Technology Benchmarking - Chemistry Comparison
- 15.4 Chemistry Selection Matrix by Application
- 15.5 Component Technologies and Cost Reduction Pathways
- 15.6 Component Innovation
 - 15.6.1 Membranes
 - 15.6.2 Bipolar Plates
 - 15.6.3 Electrolyte Cost Reduction
- 15.7 Types
 - 15.7.1 Vanadium redox flow batteries (VRFB)
 - 15.7.1.1 Technology description
 - 15.7.1.2 SWOT analysis
 - 15.7.1.3 Market players
 - 15.7.2 Zinc-bromine flow batteries (ZnBr)
 - 15.7.2.1 Technology description
 - 15.7.2.2 SWOT analysis
 - 15.7.2.3 Market players
 - 15.7.3 Polysulfide bromine flow batteries (PSB)
 - 15.7.3.1 Technology description
 - 15.7.3.2 SWOT analysis
 - 15.7.4 Iron-chromium flow batteries (ICB)
 - 15.7.4.1 Technology description
 - 15.7.4.2 SWOT analysis
 - 15.7.4.3 Market players

- 15.7.5 All-Iron flow batteries
 - 15.7.5.1 Technology description
 - 15.7.5.2 SWOT analysis
 - 15.7.5.3 Market players
- 15.7.6 Zinc-iron (Zn-Fe) flow batteries
 - 15.7.6.1 Technology description
 - 15.7.6.2 SWOT analysis
 - 15.7.6.3 Market players
- 15.7.7 Hydrogen-bromine (H-Br) flow batteries
 - 15.7.7.1 Technology description
 - 15.7.7.2 SWOT analysis
- 15.7.8 Hydrogen-Manganese (H-Mn) flow batteries
 - 15.7.8.1 Technology description
 - 15.7.8.2 SWOT analysis
 - 15.7.8.3 Market players
- 15.7.9 Organic flow batteries
 - 15.7.9.1 Technology description
 - 15.7.9.2 SWOT analysis
 - 15.7.9.3 Market players
- 15.7.10 Emerging Flow-Batteries
 - 15.7.10.1 Semi-Solid Redox Flow Batteries
 - 15.7.10.2 Solar Redox Flow Batteries
 - 15.7.10.3 Air-Breathing Sulfur Flow Batteries
 - 15.7.10.4 Metal-CO₂ Batteries
- 15.7.11 Hybrid Flow Batteries
 - 15.7.11.1 Zinc-Cerium Hybrid Flow Batteries
 - 15.7.11.1.1 Technology description
 - 15.7.11.2 Zinc-Polyiodide Flow Batteries
 - 15.7.11.2.1 Technology description
 - 15.7.11.3 Zinc-Nickel Hybrid Flow Batteries
 - 15.7.11.3.1 Technology description
 - 15.7.11.4 Zinc-Bromine Hybrid Flow Batteries
 - 15.7.11.4.1 Technology description
 - 15.7.11.5 Vanadium-Polyhalide Flow Batteries
 - 15.7.11.5.1 Technology description
- 15.7.12 Carbon dioxide (CO₂) redox flow batteries
 - 15.7.12.1 Chemistry and operating principle
- 15.8 Markets for redox flow batteries
 - 15.8.1 Primary Market Drivers

- 15.8.1.1 Variable Renewable Energy (VRE) Integration
- 15.8.1.2 Long-Duration Energy Storage (LDES) Policy Support
- 15.8.1.3 Grid Stability and Resilience Requirements
- 15.8.1.4 Data Center and Telecommunications Backup Power (Emerging Driver)
- 15.9 Global revenues
- 15.10 Key Trends
- 15.11 Regional Market Analysis and Capacity Distribution
 - 15.11.1 China
 - 15.11.2 North America
 - 15.11.3 Europe
- 15.12 Long-duration energy storage (LDES) positioning
- 15.13 Levelised cost of storage: RFB vs Li-ion LFP by duration
- 15.14 Policy frameworks supporting RFB deployment
- 15.15 Market forecast to 2036 by chemistry and region

16 ZN-BASED BATTERIES

- 16.1 Technology description
 - 16.1.1 Zinc-Air batteries
 - 16.1.2 Zinc-ion batteries
 - 16.1.3 Zinc-bromide
- 16.2 Market outlook
- 16.3 Product developers

17 BATTERIES IN OFF-HIGHWAY MACHINES

- 17.1 Introduction to electric off-highway machines
 - 17.1.1 Advantages and barriers to machine electrification
 - 17.1.2 Electrification drivers differ by segment
- 17.2 Electric construction machines
- 17.3 Electric agriculture machines
- 17.4 Electric mining machines
- 17.5 Battery requirements of electric off-highway machines
 - 17.5.1 Battery sizing
 - 17.5.2 Battery power and discharge rates
 - 17.5.3 Charging rates
 - 17.5.4 Voltage architecture
 - 17.5.5 Lifetime and cycle-life requirements
- 17.6 Turnkey battery technologies and benchmarking

- 17.7 Battery suppliers and case studies
 - 17.7.1 Turnkey pack manufacturers
 - 17.7.2 Acquisitions, spin-outs and restructurings
- 17.8 Future battery technologies for off-highway machines
- 17.9 Global off-highway battery market forecast
- 17.10 Outlook

18 BATTERY STORAGE FOR DATA CENTRES, COMMERCIAL & INDUSTRIAL APPLICATIONS

- 18.1 C&I BESS applications and market overview
 - 18.1.1 Battery storage for data centres
 - 18.1.2 Battery storage for 5G and 6G telecommunications base stations
 - 18.1.3 Battery storage for EV charging infrastructure
 - 18.1.4 Battery storage at construction, agriculture and mining sites
 - 18.1.5 Battery storage for other C&I applications
- 18.2 C&I BESS technology landscape
- 18.3 The US LFP manufacturing transition: 45X, FEOC, and tariff dynamics
- 18.4 Li-ion C&I BESS cost structure
- 18.5 Key players and competitive landscape
- 18.6 Market outlook

19 AI BATTERY TECHNOLOGY

- 19.1 Overview
- 19.2 Applications
 - 19.2.1 Machine Learning
 - 19.2.1.1 Overview
 - 19.2.2 Material Informatics
 - 19.2.2.1 Overview
 - 19.2.2.2 Companies
 - 19.2.3 Cell Testing
 - 19.2.3.1 Overview
 - 19.2.3.2 Companies
 - 19.2.4 Cell Assembly and Manufacturing
 - 19.2.4.1 Overview
 - 19.2.4.2 Companies
 - 19.2.5 Battery Analytics
 - 19.2.5.1 Overview

- 19.2.5.2 Companies
- 19.2.6 Second Life Assessment
 - 19.2.6.1 Overview
 - 19.2.6.2 Companies

20 CELL AND BATTERY DESIGN

- 20.1 Cell Design
 - 20.1.1 Overview
 - 20.1.1.1 Larger cell formats
 - 20.1.1.2 Bipolar battery architecture
 - 20.1.1.3 Thick Format Electrodes
 - 20.1.1.4 Dual Electrolyte Li-ion
 - 20.1.2 Commercial examples
 - 20.1.2.1 Tesla 4680 Tabless Cell
 - 20.1.2.2 EnPower multi-layer electrode technology
 - 20.1.2.3 Prieto Battery
 - 20.1.2.4 Addionics
 - 20.1.3 Electrolyte Additives
 - 20.1.4 Enhancing battery performance
- 20.2 Cell Performance
 - 20.2.1 Energy density
 - 20.2.1.1 BEV cell energy
 - 20.2.1.2 Cell energy density
- 20.3 Battery Packs
 - 20.3.1 Cell-to-pack
 - 20.3.2 Cell-to-chassis/body
 - 20.3.3 Bipolar batteries
 - 20.3.4 Hybrid battery packs
 - 20.3.4.1 CATL
 - 20.3.4.2 Our Next Energy
 - 20.3.4.3 Nio
 - 20.3.5 Battery Management System (BMS)
 - 20.3.5.1 Overview
 - 20.3.5.2 Advantages
 - 20.3.5.3 Innovation
 - 20.3.5.4 Fast charging capabilities
 - 20.3.5.5 Wireless Battery Management System technology
 - 20.3.6 Advanced battery pack sensors and remote monitoring

- 20.3.6.1 The thermal runaway early-detection problem
- 20.3.6.2 Advanced sensor technologies
- 20.3.6.3 Market forecast
- 20.3.6.4 Remote monitoring and wireless BMS architectures
- 20.3.6.5 Integration and the path to predictive maintenance

21 COMPANY PROFILES (449 COMPANY PROFILES)

22 RESEARCH METHODOLOGY

- 22.1 Report scope
- 22.2 Research methodology

23 REFERENCES

List Of Tables

LIST OF TABLES

Table 1. Trends in the Li-ion market.

Table 2. Li-ion manufacturing capacity vs. production, by region, 2025 and 2031 (GWh).

Table 3. Total Addressable Market for Li-ion Batteries.

Table 4. Li-ion battery pack demand for XEV (GWh) 2019-2036.

Table 5. Regional XEV Battery Demand 2036

Table 6. Li-ion battery market value for XEV (in \$B) 2019-2036.

Table 7. Market Value by Chemistry 2036.

Table 8. Regional Market Value Distribution 2036.

Table 9. Semi-solid-state battery market forecast (GWh) 2019-2036.

Table 10. Semi-solid-state battery Application Analysis 2036.

Table 11. Semi-solid-state battery Cost Evolution.

Table 12. Semi-solid-state battery market forecast, GWh, by electrolyte types 2019-2036.

Table 13. Semi-solid-state battery market value (\$B) 2019-2036.

Table 14. Application Value Breakdown 2036.

Table 15. Solid-state battery market forecast (GWh) 2019-2036.

Table 16. Solid-state battery market forecast, GWh, by electrolyte types 2019-2036.

Table 17. Sodium-ion battery market forecast (GWh) 2019-2036.

Table 18. Sodium-ion Technology Distribution 2036.

Table 19. Sodium-ion battery market value (\$B) 2019-2036.

Table 20. Sodium-ion Regional Market Value 2036.

Table 21. Li-ion battery demand versus beyond Li-ion batteries demand 2019-2036.

Table 22. Technology Composition of Beyond Li-ion 2036.

Table 23. Market Value Comparison: Li-ion vs Beyond Li-ion 2036

Table 24. BEV car cathode forecast (GWh) 2019-2036.

Table 25. BEV anode forecast (GWh) 2019-2036.

Table 26. BEV anode forecast (\$B) 2019-2036.

Table 27. EV cathode forecast (GWh) 2019-2036.

Table 28. EV Anode forecast (GWh) 2019-2036.

Table 29. Advanced anode forecast (GWh) 2019-2036.

Table 30. Advanced anode forecast (\$B) 2019-2036.

Table 31. Annual sales of Battery Electric Vehicles (BEV) and Plug-In Hybrid Electric Vehicles (PHEV) 2018-2036.

Table 32. Battery chemistries used in electric buses.

Table 33. Micro EV types

- Table 34. Battery Sizes for Different Vehicle Types.
- Table 35. Competing technologies for batteries in electric boats.
- Table 36. Off-highway battery demand forecast by segment and technology, 2025–2036 (GWh).
- Table 37. Electric car Li-ion demand forecast (GWh), 2018-2036.
- Table 38. Regional Breakdown 2036.
- Table 39. Battery Chemistry Distribution 2036.
- Table 40. EV Li-ion battery market (US\$B), 2018-2036.
- Table 41. Electric bus, truck and van battery forecast (GWh), 2018-2036.
- Table 42. Regional Distribution 2036.
- Table 43. Battery Chemistry Distribution 2036.
- Table 44. Micro EV Li-ion demand forecast (GWh).
- Table 45. Regional Micro-EVs Battery Value 2036.
- Table 46. Competing technologies for batteries in grid storage.
- Table 47. Lithium-ion battery grid storage demand forecast (GWh), 2018-2036.
- Table 48. Utility-Scale Grid Storage Project Size Distribution 2036:
- Table 49. Utility-Scale Grid Storage Geographic Distribution 2036.
- Table 50. Battery Chemistry Mix Utility-Scale 2036.
- Table 51. Commercial & Industrial (C&I) Grid Storage Customer Segments 2036.
- Table 52. Commercial & Industrial (C&I) Grid Storage Geographic Distribution 2036.
- Table 53. Battery Chemistry Mix C&I 2036.
- Table 54. Residential Grid Storage Geographic Distribution 2036.
- Table 55. Battery Chemistry Mix Residential 2036.
- Table 56. Competing technologies for batteries in consumer electronics
- Table 57. Competing technologies for sodium-ion batteries in grid storage.
- Table 58. Market drivers for use of advanced materials and technologies in batteries.
- Table 59. Battery market megatrends.
- Table 60. Advanced materials for batteries.
- Table 61. Motivation for Battery Development Beyond Lithium
- Table 62. Battery Chemistries
- Table 63. Commercial Li-ion battery cell composition.
- Table 64. Lithium-ion (Li-ion) battery supply chain.
- Table 65. Types of lithium battery.
- Table 66. Comparison of Li-ion battery anode materials.
- Table 67. Trends in the Li-ion battery market.
- Table 68. Si-anode performance summary.
- Table 69. Manufacturing methods for nano-silicon anodes.
- Table 70. Market Players' Production Capacities.
- Table 71. Strategic Partnerships and Agreements.

- Table 72. Markets and applications for silicon anodes.
- Table 73. Anode material consumption by type (tonnes).
- Table 74. Anode material consumption by end use market (tonnes).
- Table 75. Anode materials prices, current and forecasted (USD/kg).
- Table 76. Silicon-anode companies.
- Table 77. Li-ion battery cathode materials.
- Table 78. Key technology trends shaping lithium-ion battery cathode development.
- Table 79. Benefits of High and Ultra-High Nickel NMC.
- Table 80. Routes to High Nickel Cathode Stabilisation
- Table 81. High-nickel Products Table.
- Table 82. Li-Mn-rich / lithium-manganese-rich / LMR-NMC costs.
- Table 83. Commercial lithium-manganese-rich cathode development.
- Table 84. Lithium-manganese-rich cathode developers
- Table 85. Properties of Lithium Cobalt Oxide) as a cathode material for lithium-ion batteries.
- Table 86. Properties of lithium iron phosphate (LiFePO₄ or LFP) as a cathode material for lithium-ion batteries.
- Table 87. Properties of Lithium Manganese Oxide cathode material.
- Table 88. Properties of Lithium Nickel Manganese Cobalt Oxide (NMC).
- Table 89. Properties of Lithium Nickel Cobalt Aluminum Oxide
- Table 90. LMFP Cell Performance.
- Table 91. LMFP Energy Density Analysis
- Table 92. LMFP Cost Analysis
- Table 93. LMFP Cathode Developers.
- Table 94. LNMO Performance.
- Table 95. LNMO Energy Density Comparison
- Table 96. Alternative Cathode Production Routes.
- Table 97. Alternative cathode synthesis routes.
- Table 98. Alternative Cathode Production Companies.
- Table 99. Recycled cathode materials facilities and capacitites.
- Table 100. Comparison table of key lithium-ion cathode materials
- Table 101. Li-ion battery Binder and conductive additive materials.
- Table 102. Li-ion battery Separator materials.
- Table 103. Lithium-Ion Cell Energy Density Evolution 2000-2036
- Table 104. Anode Technology Comparison for High-Energy Cells
- Table 105. Energy Density Technology Roadmap 2025-2036
- Table 106. Market Penetration Forecast - High Energy Density Cells (>350 Wh/kg)
- Table 107. Silicon-carbon composite anode adoption forecast by application, 2025–2036 (% of cell-level anode mass).

- Table 108. PFAS Regulations Impacting Battery Manufacturing 2025-2036
- Table 109. PFAS Compounds in Lithium-Ion Battery Production
- Table 110. Non-PFAS Cathode Binder Performance Comparison
- Table 111. PFAS Electrolyte Additives and Functions
- Table 112. Economic Impact of PFAS Elimination by Cell Component (\$/kWh)
- Table 113. Global Li-ion battery additives market by category, 2025–2036 (US\$ billion).
- Table 114. Dry-electrode binder alternatives and development status, 2025.
- Table 115. Li-ion battery market players.
- Table 116. Typical lithium-ion battery recycling process flow.
- Table 117. Main feedstock streams that can be recycled for lithium-ion batteries.
- Table 118. Comparison of LIB recycling methods.
- Table 119. Comparison of conventional and emerging processes for recycling beyond lithium-ion batteries.
- Table 120. Advanced Battery Recycling companies
- Table 121. Global revenues for Li-ion batteries, 2018-2036, by market (Billions USD).
- Table 122. Cathode element demand forecast, 2025–2036 (kilotonnes).
- Table 123. EV battery pack material demand forecast, selected categories, 2025–2036 (kilotonnes).
- Table 124. Anode-less lithium-metal cell benefits.
- Table 125. Anode-less lithium-metal cell developers.
- Table 126. Hybrid Battery Technologies
- Table 127. Applications for Li-metal batteries.
- Table 128. Li-metal battery developers
- Table 129. Li-S performance characteristics.
- Table 130. Comparison of the theoretical energy densities of lithium-sulfur batteries versus other common battery types.
- Table 131. Challenges with lithium-sulfur.
- Table 132. Li-S advantages and use cases
- Table 133. Global revenues for Lithium-sulfur, 2018-2036, by market (Billions USD).
- Table 134. Lithium-sulphur battery product developers.
- Table 135. Global revenues for Lithium titanate and niobate batteries, 2018-2036, by market (Billions USD).
- Table 136. Product developers in Lithium titanate and niobate batteries.
- Table 137. Comparison of cathode materials.
- Table 138. Layered transition metal oxide cathode materials for sodium-ion batteries.
- Table 139. General cycling performance characteristics of common layered transition metal oxide cathode materials.
- Table 140. Polyanionic materials for sodium-ion battery cathodes.
- Table 141. Comparative analysis of different polyanionic materials.

Table 142. Common types of Prussian Blue Analogue materials used as cathodes or anodes in sodium-ion batteries.

Table 143. Comparison of Na-ion battery anode materials.

Table 144. Hard Carbon producers for sodium-ion battery anodes.

Table 145. Comparison of carbon materials in sodium-ion battery anodes.

Table 146. Comparison between Natural and Synthetic Graphite.

Table 147. Properties of graphene, properties of competing materials, applications thereof.

Table 148. Comparison of carbon based anodes.

Table 149. Alloying materials used in sodium-ion batteries.

Table 150. Na-ion electrolyte formulations.

Table 151. Pros and cons compared to other battery types.

Table 152. Cost comparison with Li-ion batteries.

Table 153. Key materials in sodium-ion battery cells.

Table 154. Global revenues for sodium-ion batteries, 2018-2036, by market (Billions USD).

Table 155. Cost Evolution and Competitiveness.

Table 156. Global revenues for aluminium-ion batteries, 2018-2036, by market (Billions USD).

Table 157. Product developers in aluminium-ion batteries.

Table 158. Types of solid-state electrolytes.

Table 159. Market segmentation and status for solid-state batteries.

Table 160. Solid Electrolyte Material Comparison.

Table 161. Typical process chains for manufacturing key components and assembly of solid-state batteries.

Table 162. Comparison between liquid and solid-state batteries.

Table 163. Solid-State Battery Technology Readiness Level (TRL) by Company 2025

Table 164. Automotive OEM Solid-State Battery Programs 2025-2036

Table 165. Limitations of solid-state thin film batteries.

Table 166. Solid-State Battery Market Forecast by Electrolyte Type 2025-2036

Table 167. Cost and Performance Evolution for Solid-state batteries.

Table 168. Solid-state thin-film battery market players.

Table 169. Key Material Properties for Structural Battery Composites

Table 170. Electric Vehicle Impact Analysis - Structural Battery Composites

Table 171. Structural Battery Composites Market Forecast 2025-2036

Table 172. Life Cycle Environmental Impact Comparison (per kg of material)

Table 173. Flexible battery applications and technical requirements.

Table 174. Comparison of Flexible and Traditional Lithium-Ion Batteries

Table 175. Material Choices for Flexible Battery Components.

- Table 176. Flexible Li-ion battery prototypes.
- Table 177. Thin film vs bulk solid-state batteries.
- Table 178. Summary of fiber-shaped lithium-ion batteries.
- Table 179. Types of fiber-shaped batteries.
- Table 180. Global revenues for flexible batteries, 2018-2036, by market (Billions USD).
- Table 181. Product developers in flexible batteries.
- Table 182. Components of transparent batteries.
- Table 183. Components of degradable batteries.
- Table 184. Product developers in degradable batteries.
- Table 185. Main components and properties of different printed battery types.
- Table 186. Applications of printed batteries and their physical and electrochemical requirements.
- Table 187. 2D and 3D printing techniques.
- Table 188. Printing techniques applied to printed batteries.
- Table 189. Main components and corresponding electrochemical values of lithium-ion printed batteries.
- Table 190. Printing technique, main components and corresponding electrochemical values of printed batteries based on Zn–MnO₂ and other battery types.
- Table 191. Main 3D Printing techniques for battery manufacturing.
- Table 192. Electrode Materials for 3D Printed Batteries.
- Table 193. Global revenues for printed batteries, 2018-2036, by market (Billions USD).
- Table 194. Product developers in printed batteries.
- Table 195. Advantages and disadvantages of redox flow batteries.
- Table 196. Global Redox Flow Battery Market Forecast 2025-2036
- Table 197. Comprehensive RFB Chemistry Benchmarking
- Table 198. RFB Component Cost Evolution 2025-2036
- Table 199. Comparison of different battery types.
- Table 200. Summary of main flow battery types.
- Table 201. Vanadium redox flow batteries (VRFB)-key features, advantages, limitations, performance, components and applications.
- Table 202. Market players in Vanadium redox flow batteries (VRFB).
- Table 203. Zinc-bromine (ZnBr) flow batteries-key features, advantages, limitations, performance, components and applications.
- Table 204. Market players in Zinc-Bromine Flow Batteries (ZnBr).
- Table 205. Polysulfide bromine flow batteries (PSB)-key features, advantages, limitations, performance, components and applications.
- Table 206. Iron-chromium (ICB) flow batteries-key features, advantages, limitations, performance, components and applications.
- Table 207. Market players in Iron-chromium (ICB) flow batteries.

Table 208. All-Iron flow batteries-key features, advantages, limitations, performance, components and applications.

Table 209. Market players in All-iron Flow Batteries.

Table 210. Zinc-iron (Zn-Fe) flow batteries-key features, advantages, limitations, performance, components and applications.

Table 211. Market players in Zinc-iron (Zn-Fe) Flow Batteries.

Table 212. Hydrogen-bromine (H-Br) flow batteries-key features, advantages, limitations, performance, components and applications.

Table 213. Hydrogen-Manganese (H-Mn) flow batteries-key features, advantages, limitations, performance, components and applications.

Table 214. Market players in Hydrogen-Manganese (H-Mn) Flow Batteries.

Table 215. Materials in Organic Redox Flow Batteries (ORFB).

Table 216. Key Active species for ORFBs

Table 217. Organic flow batteries-key features, advantages, limitations, performance, components and applications.

Table 218. Market players in Organic Redox Flow Batteries (ORFB).

Table 219. Zinc-Cerium Hybrid flow batteries-key features, advantages, limitations, performance, components and applications.

Table 220. Zinc-Polyiodide Hybrid Flow batteries-key features, advantages, limitations, performance, components and applications.

Table 221. Zinc-Nickel Hybrid Flow batteries-key features, advantages, limitations, performance, components and applications.

Table 222. Zinc-Bromine Hybrid Flow batteries-key features, advantages, limitations, performance, components and applications.

Table 223. Vanadium-Polyhalide Hybrid Flow batteries-key features, advantages, limitations, performance, components and applications.

Table 224. Redox flow battery value chain.

Table 225. RFB Application Segment Forecast 2025-2036

Table 226. Global revenues for redox flow batteries, 2018-2036, by type (millions USD).

Table 227. Market Share Evolution.

Table 228. RFB Regional Market Forecast 2025-2036

Table 229. Levelised cost of storage comparison, vanadium RFB vs lithium-ion LFP, by duration (US\$/MWh).

Table 230. Global RFB market forecast by chemistry, 2025–2036 (GWh).

Table 231. Global RFB market value forecast by chemistry, 2025–2036 (US\$ billion).

Table 232. ZN-based battery product developers.

Table 233. Off-highway battery pack requirements by machine type.

Table 234. Global off-highway battery revenue forecast by segment, 2025–2036 (US\$ million).

Table 235. C&I BESS technology mix forecast, 2025–2036 (% of annual GWh deployments).

Table 236. LFP cell cost to US BESS buyer: domestic vs Chinese import, 2026–2031 (US\$/kWh).

Table 237. Li-ion LFP C&I BESS system cost breakdown, 2025 and 2036 (US\$/kWh, 2-hour system).

Table 238. Application of Artificial Intelligence (AI) in battery technology.

Table 239. Machine learning approaches.

Table 240. Types of Neural Networks.

Table 241. Companies in materials informatics for batteries.

Table 242. Data Forms for Cell Modelling.

Table 243. Algorithmic Approaches for Different Testing Modes.

Table 244. Companies in AI for cell testing for batteries.

Table 245. Algorithmic Approaches in Manufacturing and Cell Assembly:

Table 246. AI-based battery manufacturing players.

Table 247. Companies in AI for battery diagnostics and management.

Table 248. Algorithmic Approaches and Data Inputs/Outputs.

Table 249. Companies in AI for second-life battery assessment

Table 250. Electrolyte Additives.

Table 251. Cell performance specification.

Table 252. Commercial cell chemistries

Table 253. Drivers and Challenges for Cell-to-pack.

Table 254. Cell-to-pack and cell-to-body designs.

Table 255. Advanced battery pack sensor market by sensor type, 2025–2036 (US\$ million).

Table 256. BMS architecture adoption forecast (share of new EV battery packs, %).

Table 257. 3DOM separator.

Table 258. CATL sodium-ion battery characteristics.

Table 259. CHAM sodium-ion battery characteristics.

Table 260. Chasm SWCNT products.

Table 261. Faradion sodium-ion battery characteristics.

Table 262. HiNa Battery sodium-ion battery characteristics.

Table 263. Battery performance test specifications of J. Flex batteries.

Table 264. LiNa Energy battery characteristics.

Table 265. Natrium Energy battery characteristics.

List Of Figures

LIST OF FIGURES

- Figure 1. Li-ion battery pack demand for XEV (in GWh) 2019-2036.
- Figure 2. Li-ion battery market value for XEV (in \$B) 2019-2036.
- Figure 3. Semi-solid-state battery market forecast, GWh, by electrolyte types 2019-2036.
- Figure 4. Semi-solid-state battery market value (\$B) 2019-2036.
- Figure 5. Solid-state battery market forecast (GWh) 2019-2036.
- Figure 6. Solid-state battery market forecast, GWh, by electrolyte types 2019-2036.
- Figure 7. Sodium-ion battery market forecast (GWh) 2019-2036.
- Figure 8. Sodium-ion battery market value (\$B) 2019-2036.
- Figure 9. BEV car cathode forecast (GWh) 2019-2036.
- Figure 10. BEV anode forecast (GWh) 2019-2036.
- Figure 11. BEV anode forecast (\$B) 2019-2036.
- Figure 12. EV cathode forecast (GWh) 2019-2036.
- Figure 13. EV Anode forecast (GWh) 2019-2036.
- Figure 14. Advanced anode forecast (GWh) 2019-2036.
- Figure 15. Advanced anode forecast (\$B) 2019-2036.
- Figure 16. Salt-E Dog mobile battery.
- Figure 17. I.Power Nest - Residential Energy Storage System Solution.
- Figure 18. Lithium Cell Design.
- Figure 19. Functioning of a lithium-ion battery.
- Figure 20. Li-ion battery cell pack.
- Figure 21. Li-ion electric vehicle (EV) battery.
- Figure 22. SWOT analysis: Li-ion batteries.
- Figure 23. Li-ion technology roadmap.
- Figure 24. Silicon anode value chain.
- Figure 25. Market development timeline.
- Figure 26. Silicon Anode Commercialization Timeline.
- Figure 27. Silicon anode value chain.
- Figure 28. Anode material consumption by type (tonnes).
- Figure 29. Anode material consumption by end user market (tonnes).
- Figure 30. Ultra-high Nickel Cathode Commercialization Timeline.
- Figure 31. Lithium-manganese-rich cathode SWOT analysis.
- Figure 32. Li-cobalt structure.
- Figure 33. Li-manganese structure.
- Figure 34. LNMO cathode SWOT.

- Figure 35. Global Li-ion battery additives market, 2025–2036 (US\$ billion)
- Figure 36. Li-ion conductive additive market share evolution, 2025–2036
- Figure 37. Typical direct, pyrometallurgical, and hydrometallurgical recycling methods for recovery of Li-ion battery active materials.
- Figure 38. Flow chart of recycling processes of lithium-ion batteries (LIBs).
- Figure 39. Hydrometallurgical recycling flow sheet.
- Figure 40. SWOT analysis for Hydrometallurgy Li-ion Battery Recycling.
- Figure 41. Umicore recycling flow diagram.
- Figure 42. SWOT analysis for Pyrometallurgy Li-ion Battery Recycling.
- Figure 43. Schematic of direct recycling process.
- Figure 44. SWOT analysis for Direct Li-ion Battery Recycling.
- Figure 45. Global revenues for Li-ion batteries, 2018-2036, by market (Billions USD).
- Figure 46. Total EV battery material demand by category, 2025–2036 (kilotonnes).
- Figure 47. BEV cathode chemistry mix, 2025 vs 2036.
- Figure 48. Cathode active material demand by element, 2025–2036 (kilotonnes).
- Figure 49. Silicon adoption in EV anodes, 2025–2036.
- Figure 50. Schematic diagram of a Li-metal battery.
- Figure 51. SWOT analysis: Lithium-metal batteries.
- Figure 52. Schematic diagram of Lithium–sulfur battery.
- Figure 53. Lithium-sulfur market value chain.
- Figure 54. SWOT analysis: Lithium-sulfur batteries.
- Figure 55. Global revenues for Lithium-sulfur, 2018-2036, by market (Billions USD).
- Figure 56. Global revenues for Lithium titanate and niobate batteries, 2018-2036, by market (Billions USD).
- Figure 57. Schematic of Prussian blue analogues (PBA).
- Figure 58. Comparison of SEM micrographs of sphere-shaped natural graphite (NG; after several processing steps) and synthetic graphite (SG).
- Figure 59. Overview of graphite production, processing and applications.
- Figure 60. Schematic diagram of a multi-walled carbon nanotube (MWCNT).
- Figure 61. Schematic diagram of a Na-ion battery.
- Figure 62. SWOT analysis: Sodium-ion batteries.
- Figure 63. Global revenues for sodium-ion batteries, 2018-2036, by market (Billions USD).
- Figure 64. Schematic of a Na–S battery.
- Figure 65. SWOT analysis: Sodium-sulfur batteries.
- Figure 66. Saturnose battery chemistry.
- Figure 67. SWOT analysis: Aluminium-ion batteries.
- Figure 68. Global revenues for aluminium-ion batteries, 2018-2036, by market (Billions USD).

- Figure 69. Schematic illustration of all-solid-state lithium battery.
- Figure 70. ULTRALIFE thin film battery.
- Figure 71. Examples of applications of thin film batteries.
- Figure 72. Capacities and voltage windows of various cathode and anode materials.
- Figure 73. Traditional lithium-ion battery (left), solid state battery (right).
- Figure 74. Bulk type compared to thin film type SSB.
- Figure 75. SWOT analysis: All-solid state batteries.
- Figure 76. Ragone plots of diverse batteries and the commonly used electronics powered by flexible batteries.
- Figure 77. Various architectures for flexible and stretchable electrochemical energy storage.
- Figure 78. Types of flexible batteries.
- Figure 79. Flexible batteries on the market.
- Figure 80. Materials and design structures in flexible lithium ion batteries.
- Figure 81. Flexible/stretchable LIBs with different structures.
- Figure 82. a–c) Schematic illustration of coaxial (a), twisted (b), and stretchable (c) LIBs.
- Figure 83. a) Schematic illustration of the fabrication of the superstretchy LIB based on an MWCNT/LMO composite fiber and an MWCNT/LTO composite fiber. b,c) Photograph (b) and the schematic illustration (c) of a stretchable fiber-shaped battery under stretching conditions. d) Schematic illustration of the spring-like stretchable LIB. e) SEM images of a fiber at different strains. f) Evolution of specific capacitance with strain. d–f)
- Figure 84. Origami disposable battery.
- Figure 85. Zn–MnO₂ batteries produced by Brightvolt.
- Figure 86. Charge storage mechanism of alkaline Zn-based batteries and zinc-ion batteries.
- Figure 87. Zn–MnO₂ batteries produced by Blue Spark.
- Figure 88. Ag–Zn batteries produced by Imprint Energy.
- Figure 89. Wearable self-powered devices.
- Figure 90. SWOT analysis: Flexible batteries.
- Figure 91. Global revenues for flexible batteries, 2018-2036, by market (Billions USD).
- Figure 92. Transparent batteries.
- Figure 93. SWOT analysis: Transparent batteries.
- Figure 94. Degradable batteries.
- Figure 95. SWOT analysis: Degradable batteries.
- Figure 96. Various applications of printed paper batteries.
- Figure 97. Schematic representation of the main components of a battery.
- Figure 98. Schematic of a printed battery in a sandwich cell architecture, where the anode and cathode of the battery are stacked together.

Figure 99. Manufacturing Processes for Conventional Batteries (I), 3D Microbatteries (II), and 3D-Printed Batteries (III).

Figure 100. SWOT analysis: Printed batteries.

Figure 101. Global revenues for printed batteries, 2018-2036, by market (Billions USD).

Figure 102. Scheme of a redox flow battery.

Figure 103. Vanadium Redox Flow Battery schematic.

Figure 104. SWOT analysis: Vanadium redox flow batteries (VRFB)

Figure 105. Schematic of zinc bromine flow battery energy storage system.

Figure 106. SWOT analysis: Zinc-Bromine Flow Batteries (ZnBr).

Figure 107. SWOT analysis: Iron-chromium (ICB) flow batteries.

Figure 108. SWOT analysis: Iron-chromium (ICB) flow batteries.

Figure 109. Schematic of All-Iron Redox Flow Batteries.

Figure 110. SWOT analysis: All-iron Flow Batteries.

Figure 111. SWOT analysis: Zinc-iron (Zn-Fe) flow batteries.

Figure 112. Schematic of Hydrogen-bromine flow battery.

Figure 113. SWOT analysis: Hydrogen-bromine (H-Br) flow batteries.

Figure 114. SWOT analysis: Hydrogen-Manganese (H-Mn) flow batteries.

Figure 115. SWOT analysis: Organic redox flow batteries (ORFBs) batteries.

Figure 116. Schematic of zinc-polyiodide redox flow battery (ZIB).

Figure 117. Redox flow batteries applications roadmap.

Figure 118. Global revenues for redox flow batteries, 2018-2036, by type (millions USD).

Figure 119. Levelised cost of storage: vanadium RFB vs lithium-ion LFP by duration, 2026 and 2030.

Figure 120. Global RFB market forecast by chemistry, 2025–2036 (GWh).

Figure 121. Global RFB market value by chemistry, 2025–2036 (US\$ billion).

Figure 122. Battery pack capacity range by off-highway machine type

Figure 123. Global off-highway battery demand, 2025–2036 (GWh)

Figure 124. Off-highway battery chemistry mix, 2025 vs 2036

Figure 125. Regional distribution of off-highway battery demand, 2036

Figure 126. Global C&I BESS market by application, 2025–2036 (US\$ billion).

Figure 127. Data centre BESS demand by region, 2025–2036 (GWh).

Figure 128. LFP cell cost to US BESS buyer: domestic vs Chinese import, 2026–2031 (US\$/kWh).

Figure 129. C&I BESS technology mix, 2025 vs 2036 (% of GWh deployments).

Figure 130. Types of integrated battery packs

Figure 131. Battery pack with a cell-to-pack design and prismatic cells.

Figure 132. Global advanced battery pack sensor market by sensor type, 2025–2036 (US\$ million).

- Figure 133. 24M battery.
- Figure 134. 3DOM battery.
- Figure 135. AC biode prototype.
- Figure 136. Schematic diagram of liquid metal battery operation.
- Figure 137. Ampcera's all-ceramic dense solid-state electrolyte separator sheets (25 um thickness, 50mm x 100mm size, flexible and defect free, room temperature ionic conductivity ~1 mA/cm).
- Figure 138. Amprius battery products.
- Figure 139. All-polymer battery schematic.
- Figure 140. All Polymer Battery Module.
- Figure 141. Resin current collector.
- Figure 142. Ateios thin-film, printed battery.
- Figure 143. The structure of aluminum-sulfur battery from Avanti Battery.
- Figure 144. Containerized NAS® batteries.
- Figure 145. 3D printed lithium-ion battery.
- Figure 146. Blue Solution module.
- Figure 147. TempTraq wearable patch.
- Figure 148. Schematic of a fluidized bed reactor which is able to scale up the generation of SWNTs using the CoMoCAT process.
- Figure 149. Carhartt X-1 Smart Heated Vest.
- Figure 150. Cymbet EnerChip™
- Figure 151. E-magy nano sponge structure.
- Figure 152. Enerpoly zinc-ion battery.
- Figure 153. SoftBattery®.
- Figure 154. ASSB All-Solid-State Battery by EGI 300 Wh/kg.
- Figure 155. Roll-to-roll equipment working with ultrathin steel substrate.
- Figure 156. 40 Ah battery cell.
- Figure 157. FDK Corp battery.
- Figure 158. 2D paper batteries.
- Figure 159. 3D Custom Format paper batteries.
- Figure 160. Fuji carbon nanotube products.
- Figure 161. Gelion Endure battery.
- Figure 162. Gelion GEN3 lithium sulfur batteries.
- Figure 163. Grepow flexible battery.
- Figure 164. HPB solid-state battery.
- Figure 165. HiNa Battery pack for EV.
- Figure 166. JAC demo EV powered by a HiNa Na-ion battery.
- Figure 167. Nanofiber Nonwoven Fabrics from Hirose.
- Figure 168. Hitachi Zosen solid-state battery.

- Figure 169. Ilika solid-state batteries.
- Figure 170. TAeTTOOz printable battery materials.
- Figure 171. Ionic Materials battery cell.
- Figure 172. Schematic of Ion Storage Systems solid-state battery structure.
- Figure 173. ITEN micro batteries.
- Figure 174. Kite Rise's A-sample sodium-ion battery module.
- Figure 175. LiBEST flexible battery.
- Figure 176. Li-FUN sodium-ion battery cells.
- Figure 177. LiNa Energy battery.
- Figure 178. 3D solid-state thin-film battery technology.
- Figure 179. Lyten batteries.
- Figure 180. Cellulomix production process.
- Figure 181. Nanobase versus conventional products.
- Figure 182. Nanotech Energy battery.
- Figure 183. Hybrid battery powered electrical motorbike concept.
- Figure 184. NBD battery.
- Figure 185. Schematic illustration of three-chamber system for SWCNH production.
- Figure 186. TEM images of carbon nanobrush.
- Figure 187. EnerCerachip.
- Figure 188. Cambrian battery.
- Figure 189. Printed battery.
- Figure 190. Prieto Foam-Based 3D Battery.
- Figure 191. Printed Energy flexible battery.
- Figure 192. ProLogium solid-state battery.
- Figure 193. QingTao solid-state batteries.
- Figure 194. Schematic of the quinone flow battery.
- Figure 195. Saku? Corporation 3Ah Lithium Metal Solid-state Battery.
- Figure 196. Salgenx S3000 seawater flow battery.
- Figure 197. Samsung SDI's sixth-generation prismatic batteries.
- Figure 198. SES Apollo batteries.
- Figure 199. Sionic Energy battery cell.
- Figure 200. Solid Power battery pouch cell.
- Figure 201. Stora Enso lignin battery materials.
- Figure 202. TeraWatt Technology solid-state battery
- Figure 203. Zeta Energy 20 Ah cell.
- Figure 204. Zoolnasm batteries.

I would like to order

Product name: The Global Advanced Battery and Energy Storage Market 2026-2036

Product link: <https://marketpublishers.com/r/G6BED7C40359EN.html>

Price: US\$ 1,600.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/G6BED7C40359EN.html>