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Battery Passport Market by Industry (Automotive, Energy & Utility, Off-Highway/Industrial), Battery Type (Lithium-ion, Lead-acid, Sodium-ion), Technology (Blockchain, Cloud, IoT & AI-integrated), End User, Business Model, Region - Global Forecast to 2035

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Abstracts

The battery passport market is projected to reach USD 2.35 billion by 2035, from USD 0.15 billion in 2025, with a CAGR of 32.1%. The rollout of battery passports in Europe is accelerating as manufacturers align with the EU Battery Regulation. Firms are adopting blockchain-backed identifiers with secure cloud links, embedded memory units, and encrypted QR or NFC access to capture sourcing records, carbon metrics, chemistry data, and durability parameters. Sensor feeds from state-of-health indicators, cycle patterns, charging behavior, and thermal traces support consistent validation across major EU markets. Blockchain platforms provide tamper-proof audit trails, permissioned access, and traceable lifecycle entries, while recyclers gain automated insights into material composition and recovery routes. Modular battery designs with onboard diagnostics, BMS encryption, OTA capability, and harmonized data formats streamline compliance, making verified lifecycle transparency mandatory for market participation.

“Automotive is expected to surpass other industries during the forecast period.”

The automotive industry is expected to remain the largest adopter of battery passports as EV and PHEV volumes surge sharply across passenger and commercial segments from 2025 to 2032, with lithium-based chemistries maintaining a share of more than 90–95% and driving the need for authenticated sourcing, carbon metrics, durability data, and recycled-content validation. OEMs such as BMW, Mercedes-Benz, Volkswagen, Stellantis, and Kia are already integrating passport-ready data models to comply with EU Regulation 2023/1542, while Kia’s public trials and similar initiatives across North

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America and Asia reflect the shift toward unified production-to-end-of-life traceability. These systems streamline supplier reporting, align BMS data with lifecycle indicators, and support recyclers and second-life operators with verified inputs for material recovery and reuse. The scale of upcoming EV deployment, tightening disclosure mandates, and region-wide harmonization efforts position automotive players as the primary drivers of reporting standards, interoperability frameworks, and lifecycle governance practices across the battery passport ecosystem.

“Sodium-ion is expected to exhibit the fastest growth during the forecast period.”

The sodium-ion battery is advancing through focused commercial activity, with automotive and regional programs in China, India, and Europe accelerating its shift from pilot lines to scaled deployment. Industry leaders are pushing tangible progress. For instance, CATL is expanding its Naxtra platform for mobility and storage use cases. Northvolt has validated 160 Wh/kg cells for large-scale storage systems, while Faradion, under Reliance, is driving improvements in energy density and cycle stability to meet India’s mobility and grid needs. These developments reflect a move toward cost-efficient alternatives where lithium supply pressures are significant. As adoption rises, battery passports will be essential for capturing sodium-specific parameters, such as hard-carbon or Prussian-blue characteristics, conductivity thresholds, stability markers, and voltage-curve behavior. This requires distinct reporting formats and BMS logic that differ from those of lithium-ion batteries due to their unique discharge signatures and thermal responses. A tailored passport framework will support supply chain qualification, operational reliability, and regulatory compliance as the chemistry gains industrial traction. Integrating these parameters into digital passport frameworks enhances validation processes and supports accurate end-of-life planning for sodium-ion assets. The chemistry’s lower material cost and favorable sustainability characteristics align well with the rising need for traceable lifecycle data, prompting early adoption of digital battery passport structures for sourcing information, carbon metrics, and durability records.

“Europe is expected to be the largest market during the forecast period.”

Europe is the primary operational region for the deployment of the Battery Passport under Regulation (EU) 2023/1542, which defines a machine-readable passport and interoperability requirements for relevant batteries, with implementation milestones applying to batteries exceeding the regulatory capacity threshold. Industry and research consortia are shaping the technical baseline. Across Europe, several EU member states are advancing digital battery passport initiatives. Notably, Germany leads the Battery

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Pass consortium, FIWARE, IPCEI Batteries, and the BASE project (with partners from Spain, Belgium, Lithuania, the Netherlands, and Ireland) in developing decentralized, interoperable passports utilizing distributed ledger technology. France contributes through recycling pilot projects linked to the GBA, while Sweden engages via value-chain working groups, and the Netherlands and Belgium participate in BASE. Industry consortia, such as Battery Pass, CIRPASS/CIRPASS 2, and the Catena X automotive ecosystem, are developing harmonized data models for material provenance, carbon accounting, cell and pack manufacturing, degradation, end-of-life routing, and secure digital identifiers with encrypted APIs that link BMS, MES, and ERP systems. Pilots in Germany, France, and Sweden are validating cross-party consent frameworks and real-time analytics for cycle and thermal history, positioning Europe as the most advanced region for standards-based battery passport deployment.

In-depth interviews were conducted with CEOs, marketing directors, other innovation and technology directors, and executives from various key organizations operating in this market.

By Company Type: Battery Passport Providers – 69% and Others – 31%

By Designation: CXOs – 46%, Managers – 23%, and Others – 31%

By Region: North America – 8%, Europe – 61%, and Asia Pacific – 31%

The battery passport market is dominated by established players, including Minespider GmbH (Germany), AVL (Austria), Siemens (Germany), Circulor (UK), and Optel Group (Canada). These companies actively manufacture and develop new and advanced connectors. They have also set up R&D facilities and offer best-in-class products to their customers.

Research Coverage:

The study covers the battery passport market by industry (automotive, energy & utility, off-highway/industrial, other industries), battery type (lithium-ion, lead-acid, sodium-ion, other batteries), technology (blockchain-based battery passport, cloud-based battery passport, IoT & AI-integrated battery passport, other technologies), compliance (EU Battery Regulation-compliant batteries, batteries under pilot schemes, non-compliant/legacy batteries), end users (compliance end users, operational end users), business model (software-as-a-service platform, white-label solution, on-premise

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deployment, subscription, licensing, pay-per-use), and region (Asia Pacific, Europe, and North America). It also covers the competitive landscape and company profiles of the major players in the battery passport market.

Key Benefits of Purchasing this Report

The study provides a comprehensive competitive analysis of key market players, including their company profiles, key insights into product and business offerings, recent developments, and primary market strategies. The report will assist market leaders and new entrants with estimates of revenue figures for the overall battery passport market and its subsegments. It helps stakeholders understand the competitive landscape and gain additional insights to better position their businesses and develop effective go-to-market strategies. Additionally, the report provides information on key market drivers, restraints, challenges, and opportunities, enabling stakeholders to stay informed about market dynamics.

The report provides insights into the following points:

Analysis of key drivers (battery supply chain transparency and sustainability, regulatory enforcement and compliance mandates, consumer-centric traceability and brand trust), restraints (data confidentiality and market reluctance, high CapEx and OpEx for compliance, fragmented standards and interoperability gaps), opportunities (circular economy, battery-as-a-service enablement), and challenges (transition and implementation challenges, technical complexity, data accuracy, governance, and cybersecurity) influencing market growth

Product Development/Innovation: Detailed insights on upcoming technologies, R&D activities, and product launches in the battery passport market

Market Development: Comprehensive information about lucrative markets; the report analyzes battery passports across various regions

Market Diversification: Exhaustive information about new products, untapped geographies, recent developments, and investments in the battery passport market

Competitive Assessment: In-depth assessment of market shares, growth strategies, and service offerings of leading players like Minespider GmbH (Germany), AVL (Austria), Siemens (Germany), Circulor (UK), and Optel Group

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