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Automotive Battery Management System Market Assessment, By Component [Battery Pack, Control Unit, Others], By Topology [Centralized, Distributed, Others], By Battery Type [Lithium-ion, Lead Acid, Nickel, Others], By Vehicle Type [Passenger Vehicle, Commercial Vehicle, Others], By Region, Opportunities and Forecast, 2016-2030F

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Abstracts

Global automotive battery management system (BMS) market size was valued at USD 5.85 billion in 2022, expected to reach USD 15.2 billion in 2030, with a CAGR of 12.68% for the forecast period between 2023 and 2030.

Battery is important in any vehicle’s functionality, delivering power to different systems. The battery management systems help monitor battery health, operability, condition, and other updates. It monitors the battery health and protect it from overpowering and over charging scenarios. The higher demand for automotive BMS is attributed to the increased adoption of electric vehicles. As batteries supplant the internal combustion engine in BEVs, PHEVs, and other electric vehicles, the demand for BMS solutions is anticipated to rise. Vehicles equipped with internal combustion engines (ICE) necessitate a battery for engine ignition and to optimize power distribution for supplementary features such as lighting, infotainment, and transmission systems.

The battery management systems ensure the battery health and longevity while improving the performance. It optimizes the battery so that each cell is operated within its ideal voltage and temperature range, delivering streamlined power to the system. The accurate information delivered by BMS helps in enhanced range estimation, enabling end user to make smart decisions. The automotive BMS saves battery from

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getting over-charged, while reducing the energy waste to enhance the overall vehicle efficiency. The constantly improving automotive technology adds new components for efficient and effective vehicle performance.

In August 2023, LOHUM and Vecmocon partnered to speed-up the EV battery adoption. The combined efforts offered an AI-powered battery management system for electric vehicles. The companies are targeting to power over 100,000 batteries by 2025. Vecmocon is expected to integrate the crucial data attributes while LOHUM's experience around enhancing battery life will add value.

Improved Battery Technology Along with Higher EV Sales

Even since the advent of electric vehicles, the batteries and their components have been updated. EVs are becoming an alternative to the IC engine-based vehicles as new and powerful batteries increase the vehicle capacity. The EV companies constantly try to increase battery performance, life, and health. The increasing sales of EVs are flourishing the sales of lithium-ion batteries that require sophisticated battery management system to monitor and enhance their performance. The rising gas and petrol prices and the environmental impact of fossil fuel burning are impacting consumer choices. End-users are adopting efficient, affordable, and non-polluting modes of transport. With changing energy density in batteries along with the fast-charging stations, the battery manufacturers are integrating the battery setup with smart systems like BMS. As the sales of EVs rise, the demand for extended battery lifespan is rising. The better energy management delivered through BMS is a part of transforming battery technology. Vendor companies continue adopting the latest technologies like machine learning and artificial intelligence for advancing BMS solutions.

In November 2023, Infineon and Eatron partnered to advance their battery management system for EV manufacturers. The companies are expected to use machine learning technology to resolve major technological challenges such as range anxiety, battery health, and charging speed. The partnership brings advanced machine learning solutions and algorithms to the Aurix TC4x microcontroller (MCU).

Wireless Smart Battery Management Systems to Revolutionize the Market

The wireless BMS solutions are the latest addition to innovative market ideas. While easy integration of battery management systems with artificial intelligence and machine learning has added value to the industry, wireless technology will transform the market. Casually known as wBMS, the solution includes wireless cell monitoring controller

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(wCMC) unit for each battery module. It enables electronic control unit to connect multiple battery modules wirelessly. Advanced servicing, second life, disposal, and advanced data management are some benefits that the wBMS delivers to the end users. The wBMS removes the BMS signal wire harnessing to allow for automated and robotic battery pack manufacturing.

In February 2023, the LG Innotek drastically increased the production of its wireless BMS solutions. The company developed 800V wireless BMS for the first time in the sector. The company has launched these WBMS solutions to save 10-15% of the battery pack space, increasing the overall battery capacity. The wireless BMS increased the mileage of an electric vehicle by up to 12 miles.

Government Policies to Make the BMS Adoption Mandatory for EV Manufacturers

The governments around the world are trying to reduce the hazardous impact of fossil fuel burning. The transition from these fuels to alternative fuel and electric transportation has helped the authorities complete their goal. As the EVs, including two-wheelers and four-wheelers, are new to the system, certain challenges relate to their functionality. The frequent cases of faulty batteries, EVs catching fire, and other similar challenges have alerted governments across the globe. The governments order EV manufacturers to adopt preventive measures while asking them to recall the alleged faulty EV models. The highlight of the government interference in EV manufacturing involves adopting BMS and other battery monitoring solutions.

In April 2022, the Indian government launched its EV battery-swapping draft policy. The policy targets 2-wheelers and 3-wheelers and is applicable to the Advanced Chemistry Cell (ACC). The policy draft highlighted the importance of demonstrating end-to-end compatibility between EV components and batteries. The policy highlighted the requirement of BMS-enabled batteries to increase vehicle safety. Following these same guidelines, the government asked EV manufacturers to recall 7000 faulty EVs voluntarily.

Larger Cycle Life and Wide Temperature Operationality Make Li-ion Battery Most Suitable for EVs

Based on battery type, lithium-ion battery performs significantly well due to their compatibility, operationality, and energy density. The battery management system is more compatible with li-ion battery. The stable voltage and capacity properties of lithium-ion batteries make them well-suited for BMS control. Alongside the safety concerns,

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precision charging and discharging measures help the BMS prevent overcharging conditions. This provides a healthy atmosphere for the BMS to optimize the battery performance. The cell structure of lithium-ion batteries provides easy access to BMS for balancing and redistributing energy between them. The accuracy of SoC estimation is essential for optimizing battery performance and the battery's longevity. Due to lithium-ion batteries' relatively stable voltage profiles during discharge, BMS systems can accurately estimate SoC based on voltage readings. The automotive BMS vendors try to expand the battery controlling capacity and their monitoring power.

In October 2023, Infineon and Neutron Controls teamed up to deliver advanced automotive BMS platform. The new ECU8 platform can monitor up to 12 lithium-ion battery cells individually. The system can support up to 1,000 V batteries with a combination of 20 modules.

Higher EV Adoption and Flourishing EV Component Startups Makes Asia-Pacific a Prominent Market

Asia-Pacific holds a significant share in the global automotive battery management system market. With the emerging economies like China and India, the region is expected to grow rapidly during the forecast period. The increasing pollution levels, governments promoting EVs for green transportation, and growing innovation around EV manufacturing is expected to fuel the adoption of automotive BMS during the forecast period. Asia-Pacific is home to several prominent firms and research institutes that specialize in battery technology and battery management system (BMS) development. These organizations are constantly innovating and refining their BMS technologies, which has contributed to the region’s position as a leading market.

In January 2023, Beam Global declared the issuance of a new patent in India, which is related to the company's battery safety technology and was granted by CNIPA and CGPDTM. The new battery management system is equipped with a thermal storage capacity that allows for automatic adjustment of power output for the battery pack and cells.

Impact of COVID-19

Lockdowns led to decrease in demand of automotive manufacturers, especially, those manufacturing electric vehicles, leading to temporary cease or reduce production. It had a negative impact on the demand for electric vehicle batteries in the short-term, as well as the automotive battery management system market. The extended research and

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development programs were at halt during the peak of the pandemic, slowing down the launch of upgraded BMS solutions. As part of their economic recovery plans, many governments have offered incentives and support to encourage EV adoption, which has helped to offset the decrease in demand and stimulate EV sales.

Impact of Russia-Ukraine War

The Russia-Ukraine war had an adverse impact on automotive sector. It disrupted the flow of raw materials essential for the manufacturing and production flow. The war led to halts in research and development programs, impacting the system development. Furthermore, the political instability and violence diverted the consumer behavior and slowed down the demand for EVs around the area affected by conflict. Furthermore, regions covering Eastern Europe have impacted due to the implications of war. The conflict raised questions about the security of energy supply and the dependence on external sources of energy and raw materials. It caused governments and industries to focus on domestic energy sources, potentially affecting the uptake of electric vehicles and automotive BMS market in general.

Key Players Landscape and Outlook

Global automotive battery management system market is highly competitive with a blend of established and new entrants. The sector is undergoing a rapid transformation due to the increasing penetration of EVs and hybrids. Factors that shape the competitive environment include technological progress, alliances, mergers, and regional dynamics. The companies are trying to integrate their platform with latest technologies like wireless technology, artificial intelligence, machine learning, and IoT.

In November 2022, NXP Semiconductors developed a cloud-connected BMS for EVs, compatible for its high-voltage battery management system (HVBMS) through its S32G glodbox vehicle networking. AI-driven cloud-based electric vehicle (EV) twin model is designed to enhance EV battery range, performance, safety, and longevity, as well as ushering in multiple new applications.

In September 2022, Sensata Technologies, Inc. unveiled the Lithium Balance n3-BMS, a novel Battery Management System designed for high-voltage applications.

In July 2022, Marelli developed its new state-of-the-art wireless battery management systems for electric vehicles. The system reduced wiring harness by 90%, enabling the battery with more efficiency, reliability, and flexibility. The development is likely to

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reduce the EV cost around the globe.

In April 2022, Infineon Technologies AG launched a new series of battery management Integrated Circuits (ICs), featuring the TLE9012DQU and TLE9015DQU models. Specifically engineered for battery cell monitoring and balancing, these ICs boast outstanding measurement performance and unparalleled application robustness.

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