

## Different Metal-Air Batteries as Range Extenders for the Electric Vehicle Market: A Comparative Study

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### ABSTRACT

Metal-air batteries represent a category of energy storage systems that leverage the reaction between metal and oxygen from the atmosphere to produce electricity. These batteries, known for their high energy density, have attracted considerable attention as potential solutions for extending the range of electric vehicles. Understanding the capabilities and limitations of metal-air batteries as range extenders is crucial for advancing electric vehicle technology, as these batteries could offer the additional energy needed to overcome current range limitations. This review paper provides a detailed overview of various metal-air battery technologies, delving into their design, functionality, and inherent challenges. By analyzing key theoretical and practical parameters, the study highlights how these factors influence overall battery performance. Additionally, the review addresses critical cost considerations, particularly the relationship between vehicle cost and driving range, uncovering the significant trade-offs involved in adopting metal-air batteries. Through an examination of nearly all the existing metal-air batteries, this paper sheds light on their potential to serve as effective range extenders, thereby facilitating the transition to a cleaner, more sustainable transportation landscape.