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Developing a sustainable circular economy strategy for electric mobility: Assessing the role of Li-ion battery technology

Due to climate change as well as the growing capacity of new storage media for electric power, electric mobility represents a future vision for individual mobility on an environmentally friendly basis. We present a way to develop a future vision about this kind of economy and the elements its progression requires. We assess critical issues, such as barriers, drivers, opportunities and threats, for electric engine system development and prioritize those issues from a set of selected innovations and development trends. Following the critical issue assessment and analysis, we identify potential key aspects affecting the context, people, process and impact of electric mobility management dimensions. Here, context refers to critical factors clustered around potential space for innovation; capacity to anticipate, strategize and overcome gaps in the innovation curve; resources emphasizing the need for healthy combinations of skills, finance, location, markets, etc., and mobilization of relevant stakeholders including business, research and education, civil society and government actors. People dimension consists of critical factors shaping the activities of the actors involved in activities and decisions influencing electric mobility. Moreover, transforming electric mobility is a complex, participatory and multifaceted process. We can divide process-related critical factors into two broader sets of key aspects: Catalysts, contributing to the initiation, development and implementation of electric mobility and fosterers, including factors that further support the implementation and diffusion phases of electric mobility innovations. The impact dimension refers to positive changes in the socio-technical system that lead to positive environmental, social, economic, government and infrastructure transformations without compromising the needs of future generations. Through systematic bibliometric and patent analyses we show that lithium-ion (Li-ion) battery has been a key enabling technology for electric mobility and future (electric) engine systems. However, a growing number of researchers are trying to shift away from conventional Li-ion battery technology and apply nanotechnology to other energy storage devices in order to make them more cost competitive and influence superior performance as compared to Li-ion batteries. A careful analysis and evaluation of the advantages and disadvantages of these approaches is therefore indispensable.

Biography

Rafael Popper (PhD) is a Principal Scientist in Foresight, Organizational Dynamics and Systemic Change at VTT Technical Research Centre of Finland and Research Fellow at the Manchester Institute of Innovation Research of the University of Manchester. He is the Director of Executive Education in Foresight and Horizon Scanning at the Alliance Manchester Business School and Innovation Director and CEO of Futures Diamond Ltd (UK and Czech Republic). He has also worked at United Nations Industrial Development Organization (UNIDO) and as Consultant for the European Commission, World Bank and other international, governmental and business organizations in Europe, Latin America, Africa, Asia and Australia.

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