Environment - Environmental Impact; University of Texas Austin Researcher Discusses Research in Environmental Impact (The Cobalt Supply Chain and Environmental Life Cycle Impacts of Lithium-Ion Battery Energy Storage Systems)

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2024 MAR 15 (VerticalNews) -- By a News Reporter-Staff News Editor at Chemicals & Chemistry -- Investigators publish new report on environmental impact. According to news reporting originating from Austin, Texas, by VerticalNews correspondents, research stated, "Lithium-ion batteries (LIBs) deployed in battery energy storage systems (BESS) can reduce the carbon intensity of the electricity-generating sector and improve environmental sustainability. The aim of this study is to use life cycle assessment (LCA) modeling, using data from peer-reviewed literature and public and private sources, to quantify environmental impacts along the supply chain for cobalt, a crucial component in many types of LIBs."

Financial supporters for this research include **Bureau of Economic Geology** And The Jackson School of Geosciences, The University of Texas At Austin.

Our news editors obtained a quote from the research from University of Texas Austin: "The study seeks to understand where in the life cycle stage the environmental impacts are highest, thus highlighting actions that can be taken to improve sustainability of the LIB supply chain. The system boundary for this LCA is cradle-to-gate. Impact assessment follows ReCiPe Midpoint (H) 2016. We assume a 30-year modeling period, with augmentation occurring at the end of the 3rd, 7th, and 14th years of operations, before a complete replacement in the 21st year. Three refinery locations (China, Canada, and Finland), a range of ore grades, and five battery chemistries (NMC111, NMC532, NMC622, NMC811, and NCA) are used in scenarios to better estimate their effect on the life cycle impacts. Insights from the study are that impacts along nearly all pathways increase according to an inverse power-law relationship with ore grade; refining outside of China can reduce global warming potential (GWP) by over 12%; and GWP impacts for cobalt used in NCA and other NMC battery chemistries are 63% and 45-74% lower than in NMC111, respectively. When analyzed on a single-score basis, marine and freshwater ecotoxicity are prominent."

According to the news editors, the research concluded: "For an ore grade of 0.3%, the GWP values for the Canada route decrease at a rate of 58% to 65%, and those for Finland route decrease by 71% to 76% from the base case. Statistical analysis shows that cobalt content in the battery is the highest predictor ($R2 = 0.988$), followed by the ore grade ($R2 = 0.966$) and refining location ($R2 = 0.766$), when assessed for correlation individually. The results presented here point to areas where environmental burdens of LIBs can be reduced, and thus they are helpful to policy and investment decision makers."

For more information on this research see: The Cobalt Supply Chain and Environmental Life Cycle Impacts of Lithium-Ion Battery Energy Storage Systems. Sustainability, 2024,16(5). (Sustainability - http://www.mdpi.com/journal/sustainability). The publisher for Sustainability is MDPI AG.

A free version of this journal article is available at https://doi.org/10.3390/su16051910.

Our news journalists report that additional information may be obtained by contacting Jani Das, **Bureau of Economic Geology**, Jackson School of Geosciences, University of Texas Austin, Austin, TX 78712, United States. Additional authors for this research include Andrew Kleiman, Atta Ur Rehman, Rahul Verma, Michael H. Young.

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