Batteries carbon emissions dilemma

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Since their development in the early 1990s, lithium-ion rechargeable batteries have become an integral part of our daily life, powering smartphones and laptops. They are now vigorously electrifying the transportation sector, from road to river. They have also attracted significant interest as supporting devices in the world's grid, because dominant renewable energy sources, such as wind and solar, are intermittent. Lithium-ion batteries are a key enabler of a low-carbon future.

But lithium-ion batteries have their own sustainability challenges. Electric vehicles (EVs) are the largest market for lithium-ion batteries. While battery electric vehicles (BEV) generate significantly lower green-house gas emissions than comparable gasoline cars over the lifetime on average, manufacturing a typical EV is much more emissions intensive because of the battery.

Solutions come from understanding the problem but calculating a battery's carbon footprint can be quite challenging. The current battery industry is lacking transparency because of the lack of mandatory practice for reporting technical specifications and disclosure of emissions data. Additionally, the lithium-ion value chain is complex. Today, a typical lithium-ion cell is made up of over 20 different kinds of materials sourced from around the world. A variety of factors impact the footprint of each component. The energy source, raw material extraction and processing methods, as well as materials synthesis, can vary widely in their carbon footprints.

Furthermore, the broad range of lithium-ion battery chemistries makes tracking the carbon footprint more difficult. At least seven different kinds of chemistries can be found in the cathodes of current batteries and the composition and performance under each category vary among companies, resulting in different carbon emissions. The industry also needs to give a lot more attention to assessing the carbon footprint of battery recycling.

Can the Battery Passport be a solution?

Policymakers, industry experts and researchers need to address these problems and limit the unintended consequences of lithium-ion battery manufacturing. The Battery Passport, a concept launched by Global Battery Alliance in January 2020, is considered to be a promising solution to make batteries more sustainable.

The Battery Passport is a digital representation of a battery and conveys information and data about battery materials, components and all relevant environmental, social, governance (ESG) requirements. Taking advantage of digital technology tools including data verification and traceability, each Battery Passport will act as a digital identity that connects the battery and critical parts to the internet so it can be managed on a digital platform.

The Battery Passport could play an active role in carbon emissions management across the full lithium-ion battery value chain. With emissions data disclosure, the Battery Passport platform could provide transparency of greenhouse gas emissions along the value chain to all relevant stakeholders. This would also create a framework for benchmarking between stakeholders by comparing batteries clearly, thus establishing minimum acceptable standards for a sustainable and responsible battery industry.

Also, other battery information in the platform like battery chemistry, recycled content, and raw materials sources will ensure the circular recovery of battery materials and provide evidence on compliance with environmental regulations as well as human rights, child labour and anti-corruption principles. In the long term, the Battery Passport could work as a "quality seal", proving batteries' sustainability and responsibility on a global platform.

The Global Battery Alliance plans to roll out a Battery Passport with full functionality in 2022. Its effectiveness, however, remains to be seen. As a pioneer in the battery industry, in 2018 China launched a Battery-Passport-like battery source-tracing platform. In 2019, only 8% of platform users provided the information regarded as helpful for policymaking. Rooted in transparency, the success of the Battery Passport may depend largely on value chain participants' contributing data and information credibly.

Truly sustainable

Financial incentives and taxes set by governments have been encouraging customers worldwide to switch to EVs with lower carbon emissions. EV's sustainability credentials will face scrutiny from their competitors and must improve to meet buyers' expectations. The good news is battery industry is still nascent and governments, investors, manufacturers, and consumers all can play a part in shaping its future.

Batteries are an essential factor in moving towards a low-carbon and climate-resilient world. It is everyone's responsibility to make sure they are truly clean and sustainable.

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