Locally manufactured cathode foil will not sufficiently supply the booming EV industry

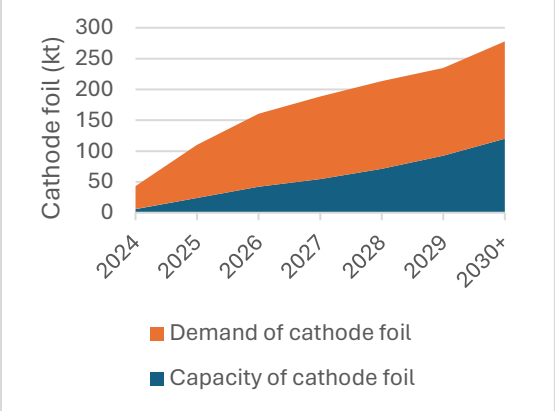
By Jakob Lugner and Gustaf Hasselberg (May 2024)

The world is experiencing a shift, where the internal combustion engines are rapidly being replaced by electric vehicles. However, to produce the batteries for these vehicles, the need for aluminum cathode foil is apparent. More and more EV-battery manufacturers are emerging, but who is going to provide the cathode foil?

This describes the future of the North American market for EV-batteries, where large players such as Tesla, LG and Samsung are ramping up production with new gigafactories emerging yearly. To produce one GWh equivalent of battery-capacity, approximately 140 tons of cathode foil is needed. Tesla's manufacturing facility in Nevada alone has the capacity to produce 100 GWh equivalents of EV-batteries. This gigafactory is just one of many. Over the next eight years the aggregated production of EV-batteries will exceed 1400 GWh per year.

As of now, there are only two companies announcing that they will produce dedicated aluminum cathode foil. The aggregated supply of these corresponds to 300 GWh equivalents of EV-battery manufacturing. There are currently no public plans for new capacity of this component over the coming years which explains the dramatic difference in capacity and demand in the figure. This will complicate the procurement of cathode foil for new players emerging in North America, especially if they are aiming to establish a local supply chain.

Noticeably, the production of primary aluminum in North America is sufficient to sustain the levels of cathode foil needed. However, there are other factors to consider. When analyzing the cost-factors of cathode foil production, it was discovered that the necessary equipment investments to conduct the production operations are significant. This makes it problematic for new players to enter the market, despite the supply and demand dynamic being in their favor. Another factor that could explain this shortage is that the most demand for cathode foil is relatively fresh, whereas the attraction of the market has previously been difficult to assess. Existing players have therefore relied on the established production outside of North America.



It is likely that the large players in the EV-battery industry have already established a global supply-chain, where the cathode foil is procured from cheaper manufacturing locations, such as Asia. Another possibility is that they have established in-house production of cathode foil, however, due to the complexity of this production, this seems rather unlikely.

To address the shortage, stakeholders in the EV battery industry must actively encourage greater competition within the cathode foil market. This strategy will facilitate a more sustainable selection of local suppliers, ensuring access to cathode foil that meets the required quantities, quality standards, and environmental criteria.

This popularized summary is derived from the master thesis: *Integrating Capacity Analysis and Should-Cost Modeling to Enhance Procurement Processes.* Written by Jakob Lugner and Gustaf Hasselberg (2024), Division of Engineering Logistics at Lund University, LTH.