Lithium Ion Batteries: Manufacturing Energy Analysis and Alternatives

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INTRODUCTION
The market for electric cars is increasing
Each car will need multiple batteries
Making batteries should be energy efficient, too

GOAL
Assign manufacturing costs and carbon emission for the most energy consuming steps of the Li-Ion battery manufacturing process and find alternatives.

METHODOLOGY
Determined steps involved in production of lithium ion batteries
Discovered energy consumption for each part of production
Focused on electrode drying and environment control
Calculated carbon emission for drying and environmental control
Researched alternatives that use less energy

ENERGY CONSUMPTION PER PROCESS

ALTERNATIVE MANUFACTURING METHODS

Traditional Dryrooms vs Glovebox Energy Usage

Traditional Spray vs Cold Spray Energy Usage

COLD SPRAYING STEP
GLOVE BOX STEP

CONCLUSION

The purpose of this project was to research the process of manufacturing lithium ion batteries and tweak the process to reduce the amount of carbon emissions produced by the development of batteries. We identified the room conditioning step of the creation of batteries as a huge producer of carbon emission and energy consumption. The alternative discovered was the use of glove boxes, whereas instead of using large, costly and energy consuming dry rooms, companies can use various smaller glove boxes with much smaller energy consumption. Glove boxes manage to reduce energy consumption in the creation of lithium ion batteries by 70%. Furthermore, another step in lithium ion battery creation which involves the drying of the packs after the cathode is administered was discovered to be capable of being completely removed through the introduction of the cold spray, which manages to reduce the energy consumption of the whole manufacturing by a whopping 83%.

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