

Borman Specialty Materials NAATBatt 2024

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Located in Southern Nevada,
Borman Specialty Materials is one of the
largest producers of Electrolytic
Manganese Dioxide outside of China.

Alongside **EMD**, Borman also produces

- **Li-EMD** (lithiated EMD)
- **LMO** (lithium manganese oxide)
- **LMNO** (lithium manganese oxide doped with Nickel)

Our plant dates to 1942

2024

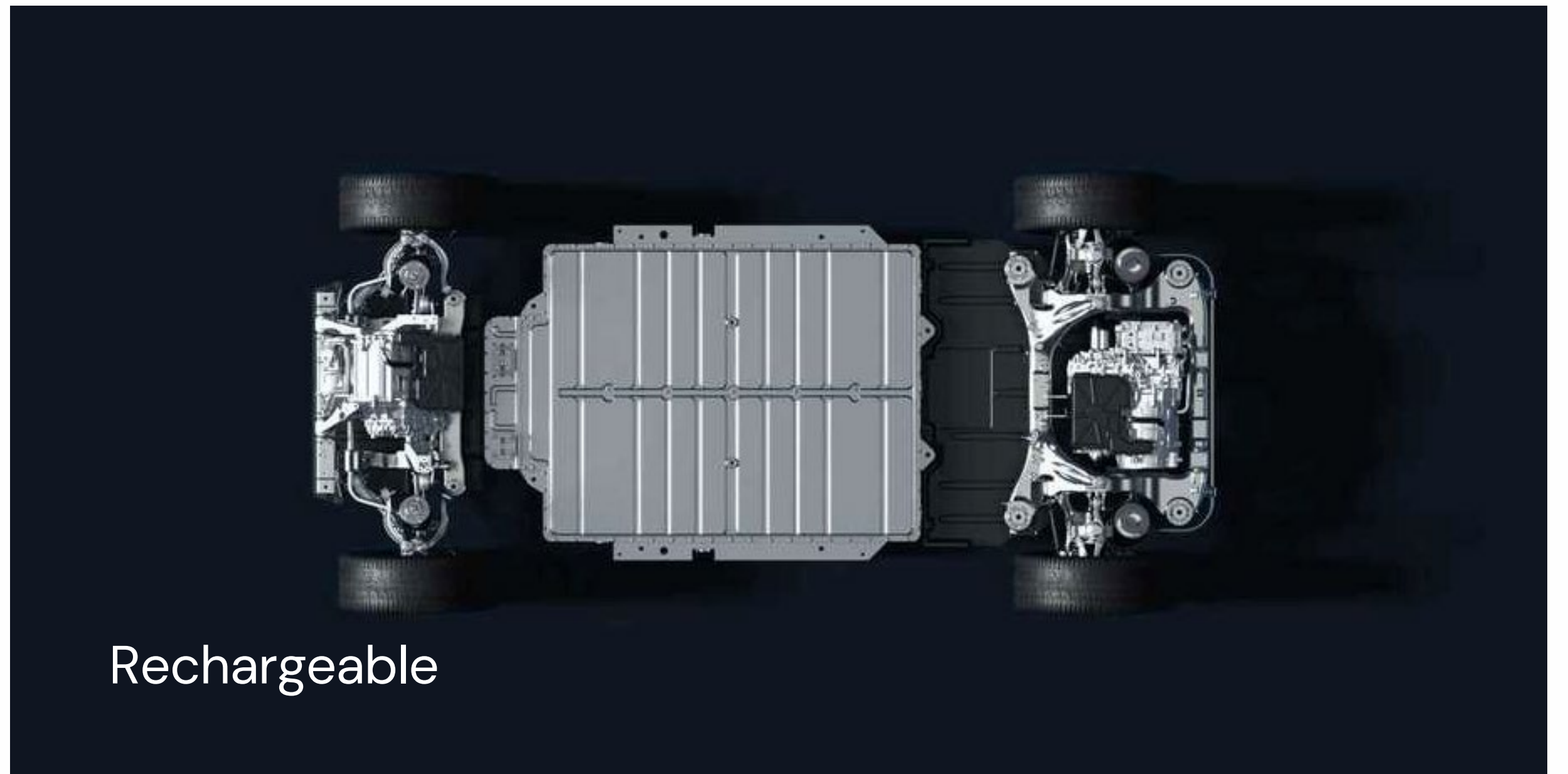


EMD
25 kt per annum

Li-EMD
LMO
LMNO
Custom programs

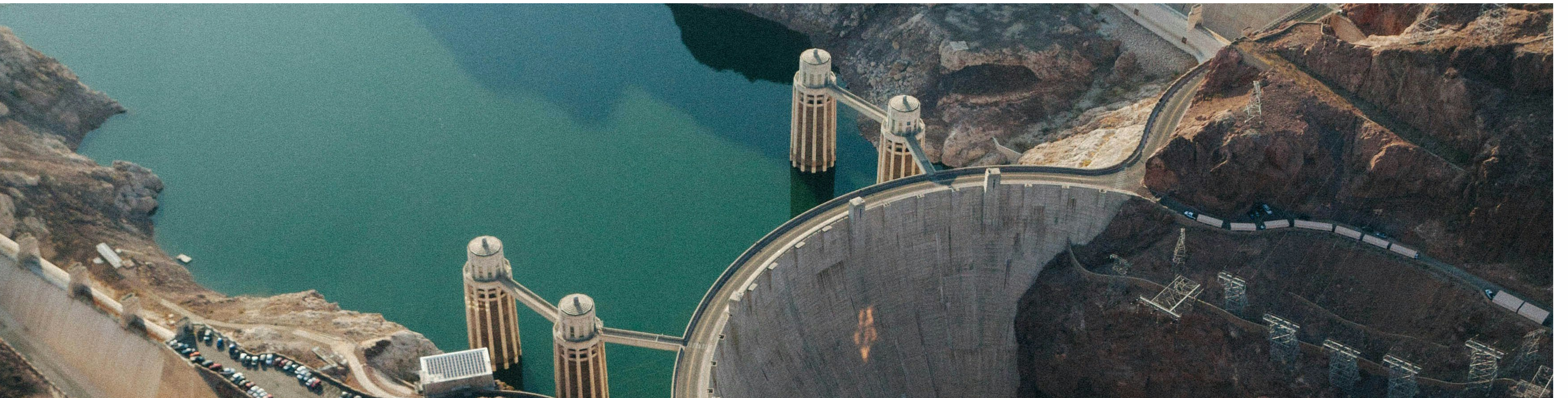


Primary batteries



Rechargeable

Our plant is directly supplied by hydropower produced by the Hoover Dam as part of the Colorado River system.



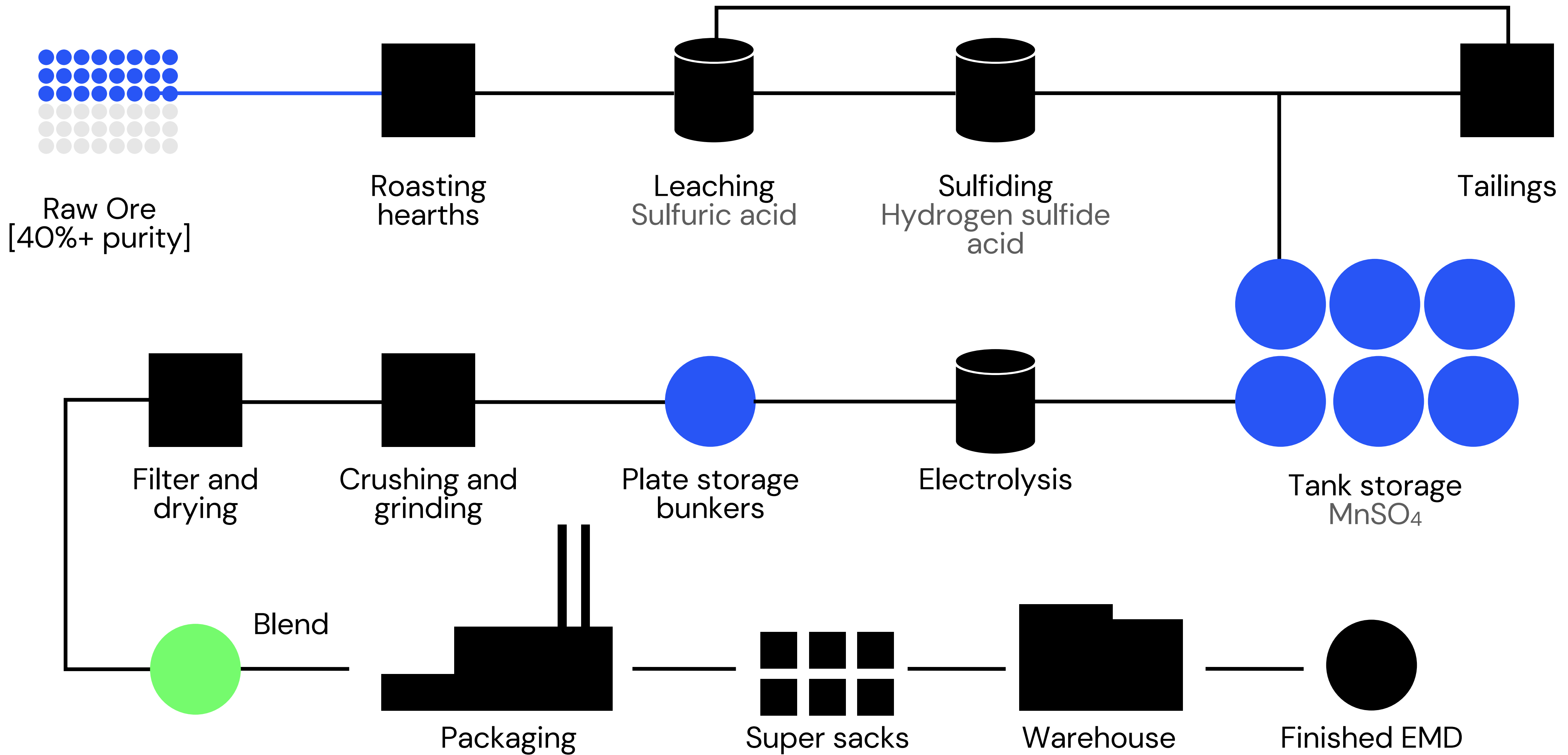
Borman utilizes high grade manganese ore (Mn) to create EMD.

Borman utilizes high grade manganese ore (Mn) to create EMD. As part of our EMD production process, Borman creates MnSO_4 (Manganese sulfate) as an intermediate product.

The MnSO_4 solution is subject to a controlled electrolysis process to plate EMD onto the anode.



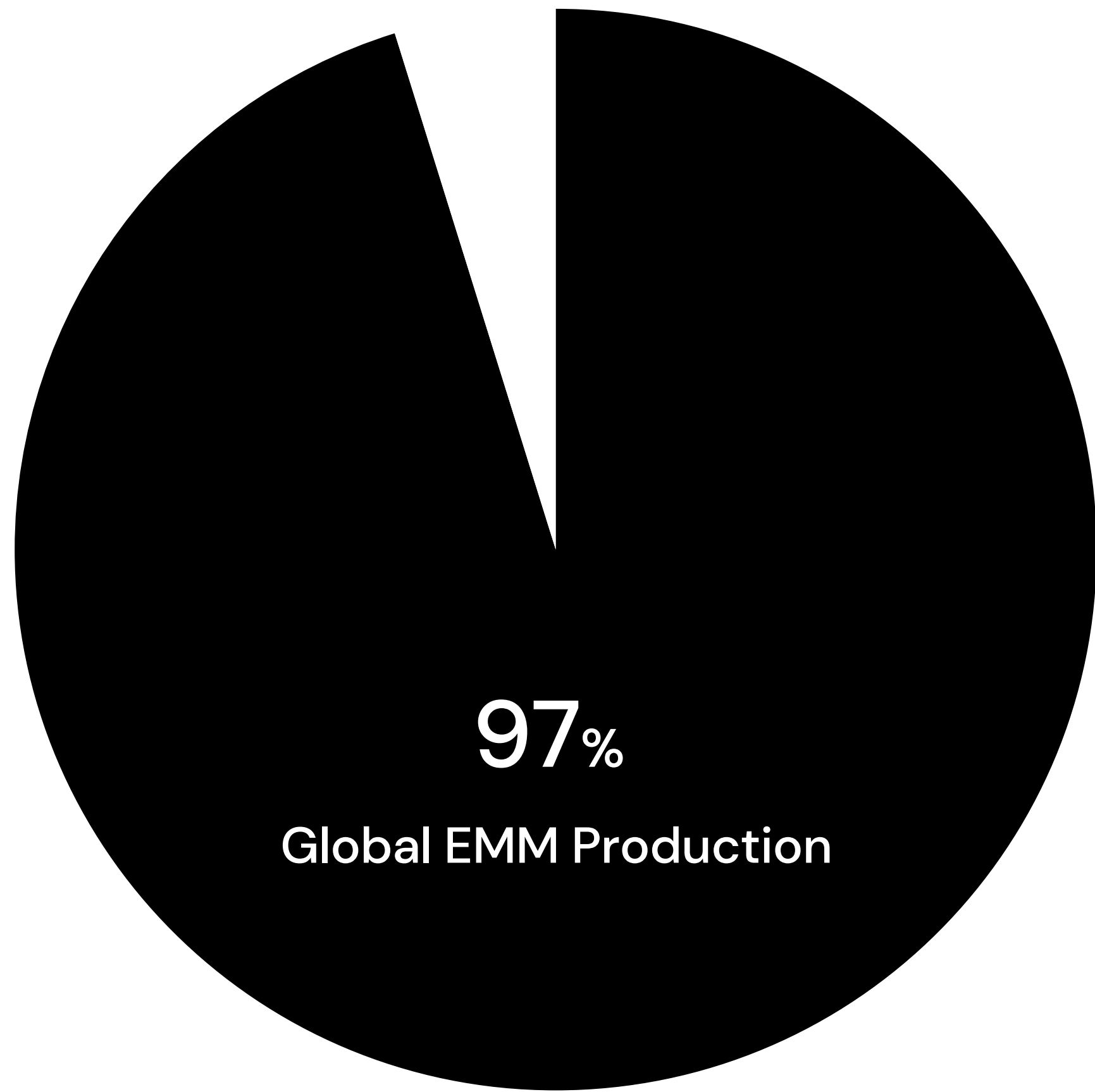
EMD production process



Why manganese

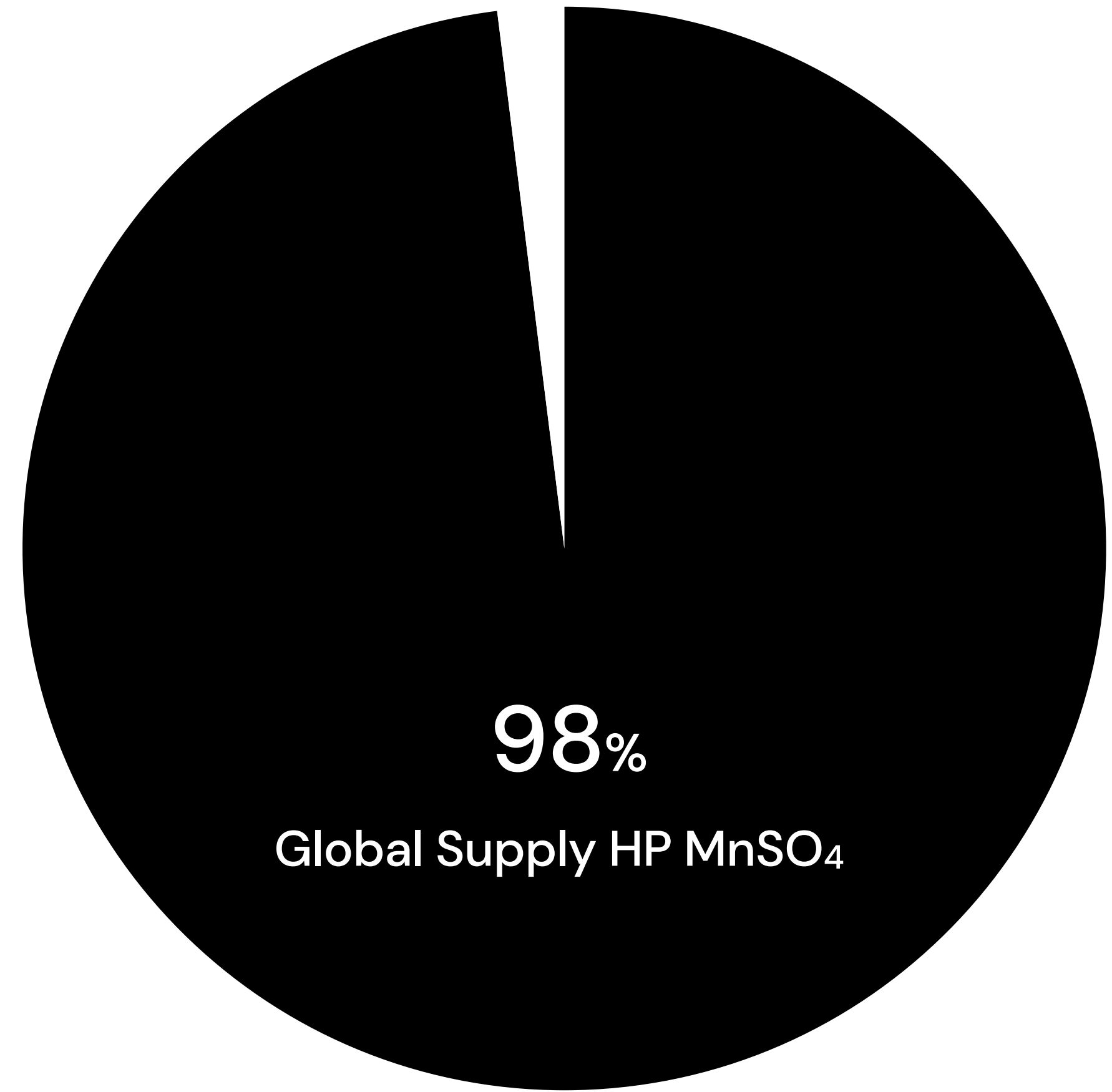
- **Earth abundant** cathode material
- Manganese ore is highly concentrated making refining and processing **less energy** intensive and **cheap**
- High grade manganese ore can be over **50% manganese by weight out of the mine**
- Manganese is **thermally stable** and non-toxic
- No reliance on artisanal mining
- Technical challenges remain

China currently dominates all spectrums of manganese processing capacity



- China
- South Africa, Indonesia

Global EMM Production 2021
1.3MM t



- China
- Japan, Belgium

Global Supply of HP MnSO₄
2021

Several refining projects are being considered outside China.

Several refining projects are being considered outside China. However, with growing trends to adopt manganese-rich chemistries in batteries, the lack of projects to supply high-purity manganese may well pose a bottleneck for the uptake of EVs.

With Borman's expansion and upgrade this strategic bottleneck can be overcome in North America.



BORMAN

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