

Building a lithium ion battery supply chain in the USA

NAAT Batt Military Workshop
February 2020

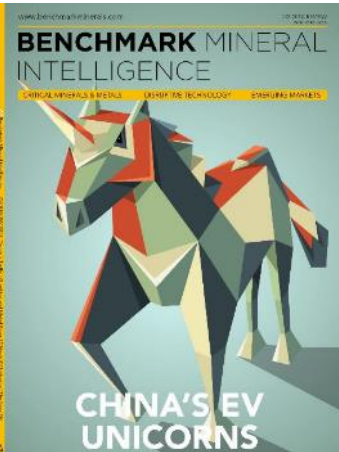
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Specializing in the lithium ion battery supply chain since day one



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Battery Megafactories



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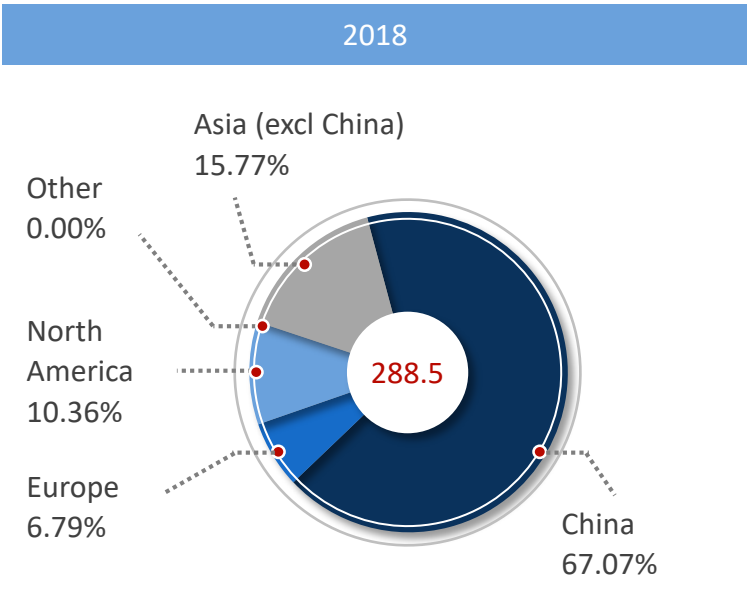
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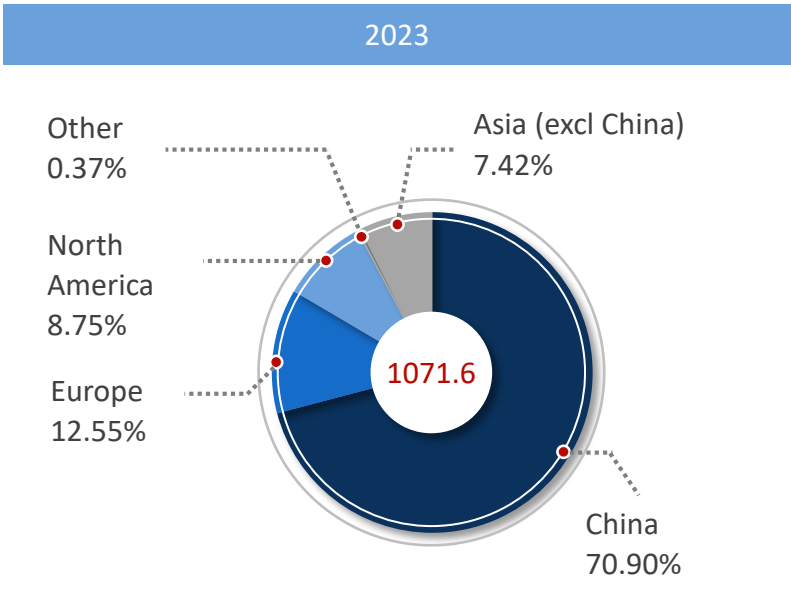


Chinese battery supply chain dominance is expected to continue through the next decade – major strategic concern for American industry and military

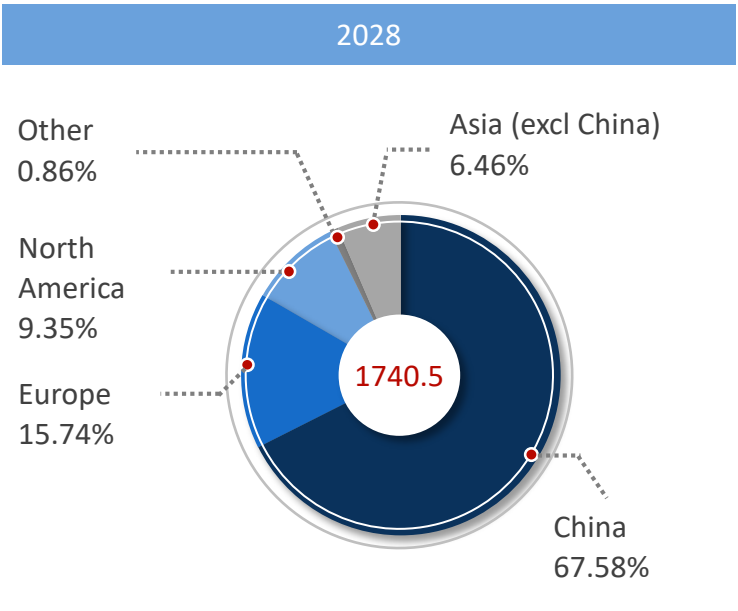
Strong and persistent Chinese control of cell manufacturing



China also controls ~80% of individual steps in raw material supply chains

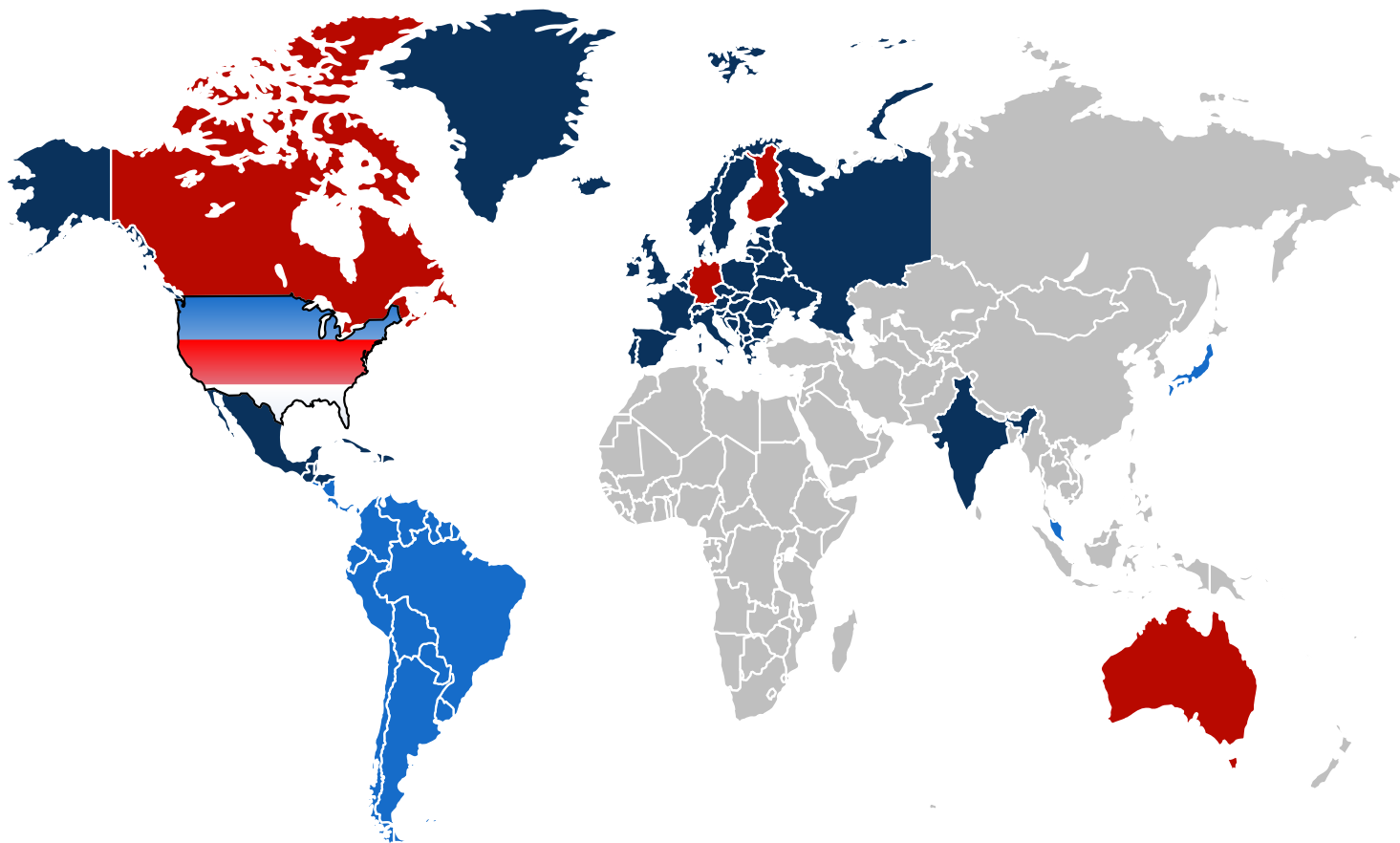


Impact of this Chinese concentration on country-level geopolitics and diplomacy cannot be underestimated



How to make sure supply chain benefits local economies where automotive OEMs operate? Significant tax benefits from high economic multipliers, which high-margin specialty battery supply chain offers

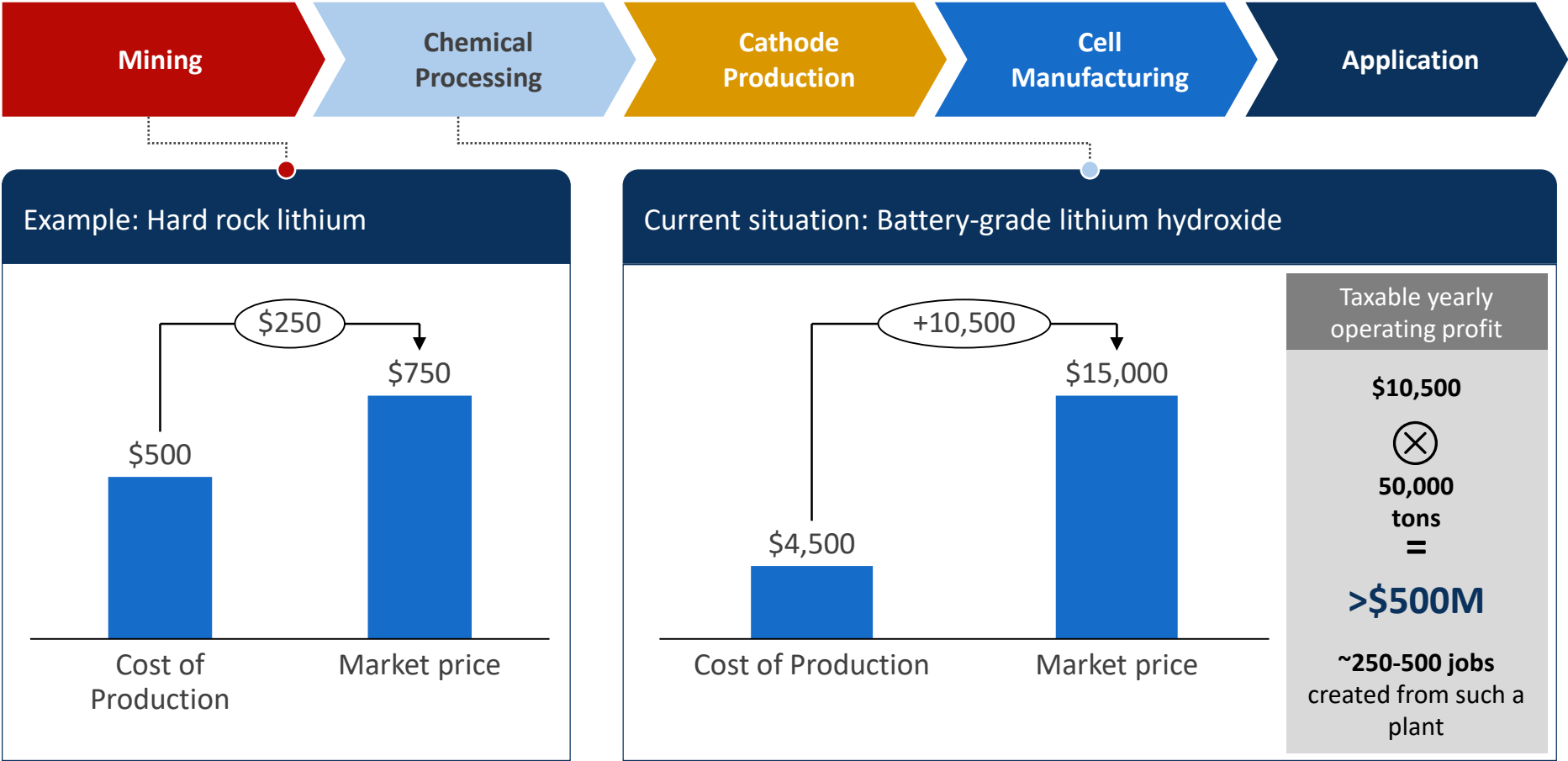
Several of the USA's peer jurisdictions are all angling their investment plans towards satisfying increasing demand from Western battery supply chains



- Core target markets- US EV manufacturers
- Secondary target markets
- Peer jurisdictions with notable supply chain attributes

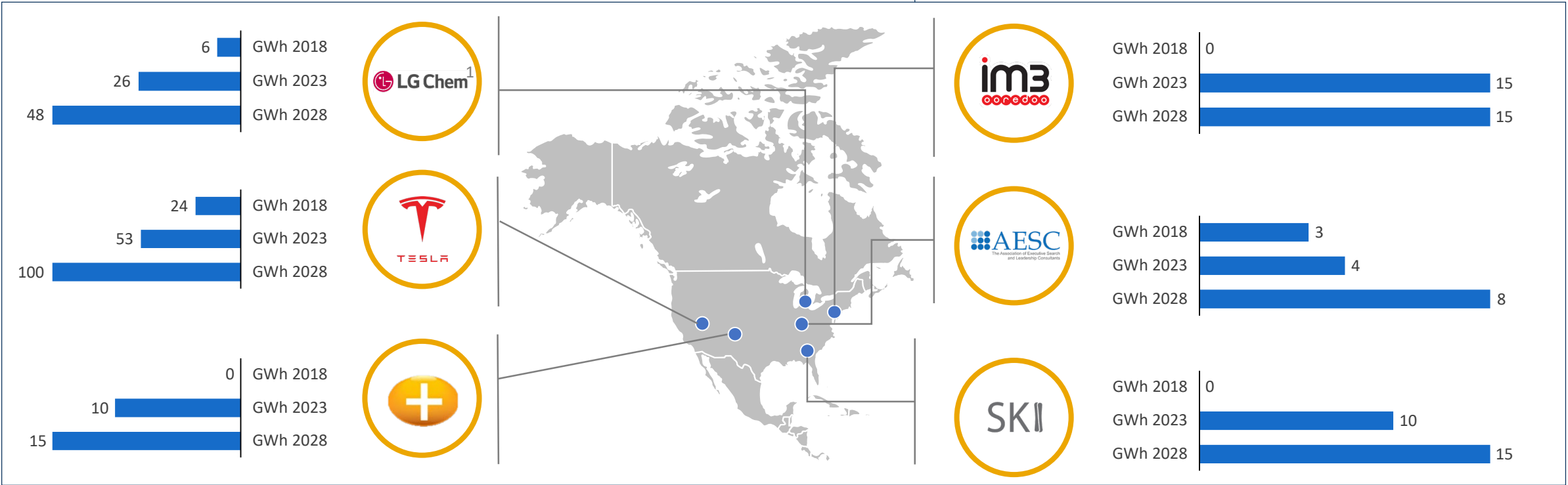
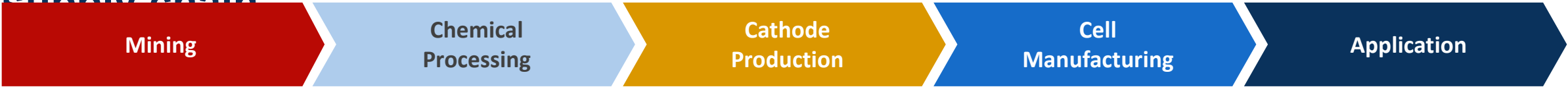
- Battery users aiming to diversify their mining and specialty chemicals supply chains away from China are looking across all major Western economies for potential solutions
- USA's potential peers in the battery supply chain are not all countries with large domestic automotive manufacturing capability, but rather with announced plans to invest or expand battery chemicals assets further

The most notable value creation opportunity in the battery supply chain is to encourage investment downstream of mining



- Value multipliers are large between mining/chemicals steps
- Value creation opportunity decreases sequentially until car manufacturing due to sophisticated cost controls from automotive OEM customers
- **DOE/DOD could play an active role here**

While the USA has received commitments for cell manufacturing, further upstream commitments are needed for a robust national strategy on battery supply chain



1 Includes both GM Lordstown plant and Endicott, MI ongoing operations

Advanced technology research and machine learning applications could be used to allay complicated military applications' battery development pathway

Example Vehicle OEM



NCM

One Standard battery chemistry across all vehicles

Challenges associated with military applications, and potential solutions

- Bigger battery sizes
- Faster charge times
- Higher safety requirements
- Lower impurity profiles
- Longer cycle life
- Longer qualification timeline
- Different operational constraints by application
- Thousands of formats

- 1 Relaxing qualification threshold
- 2 List of pre-qualified battery cells
- 3 Back-stop price mechanism
- 4 DOD/DOE grant for strategic supply chain build up
- 5 Machine learning-based battery cell testing and R&D

Benchmark will be further discussing these topics with industry and military leaders at a **free** registered closed door event in Washington, DC on May 21-22

2nd annual closed-door meeting between industry, military, and financiers

- Open to active upstream and downstream players in battery supply chain
- Chatham House rule – no press allowed (security will be in place)
- Includes half-day breakout on rare earths
- May 21-22 at W Hotel in Washington, DC (close to White House)
- 1-1 meetings between attendees
- **Free to attend for invited participants**



Scan this QR code with your phone to reach registration page



The Benchmark Team is happy to support in more detail on these topics



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