



OUR ENERGY IS ELECTRIC.

Issues and Potential Solutions for Domestic Production of Li-ion Batteries

February 3, 2020
John Warner
Chief Customer Officer

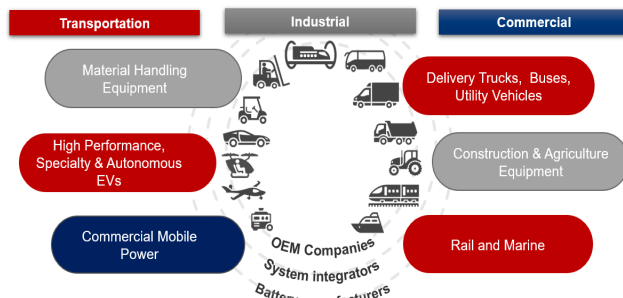


American Battery Solutions



Company	Markets	Team
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- Founded 2019
- Funded by KCK Group with \$50M
- Acquired the High-Voltage Assets of Bosch Battery Systems
- HQ & Tech Center in Lake Orion, MI
- Manufacturing in Springboro, OH
- Module, pack and system integration
- Engineering, Testing & Manufacturing

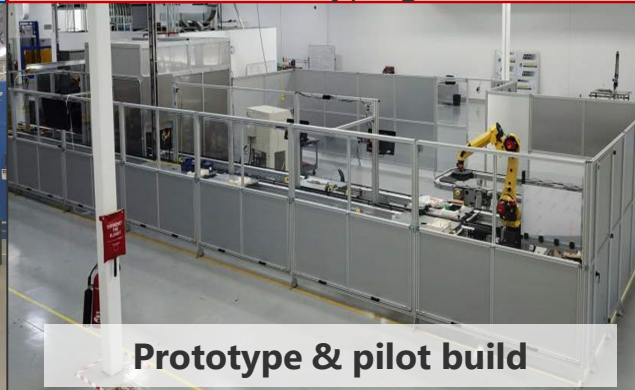


A collaboration of battery systems experts with decades of experience in designing, developing and manufacturing advanced battery systems for the transportation industry.

Testing	Prototyping	Manufacturing
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Cell, module & pack testing

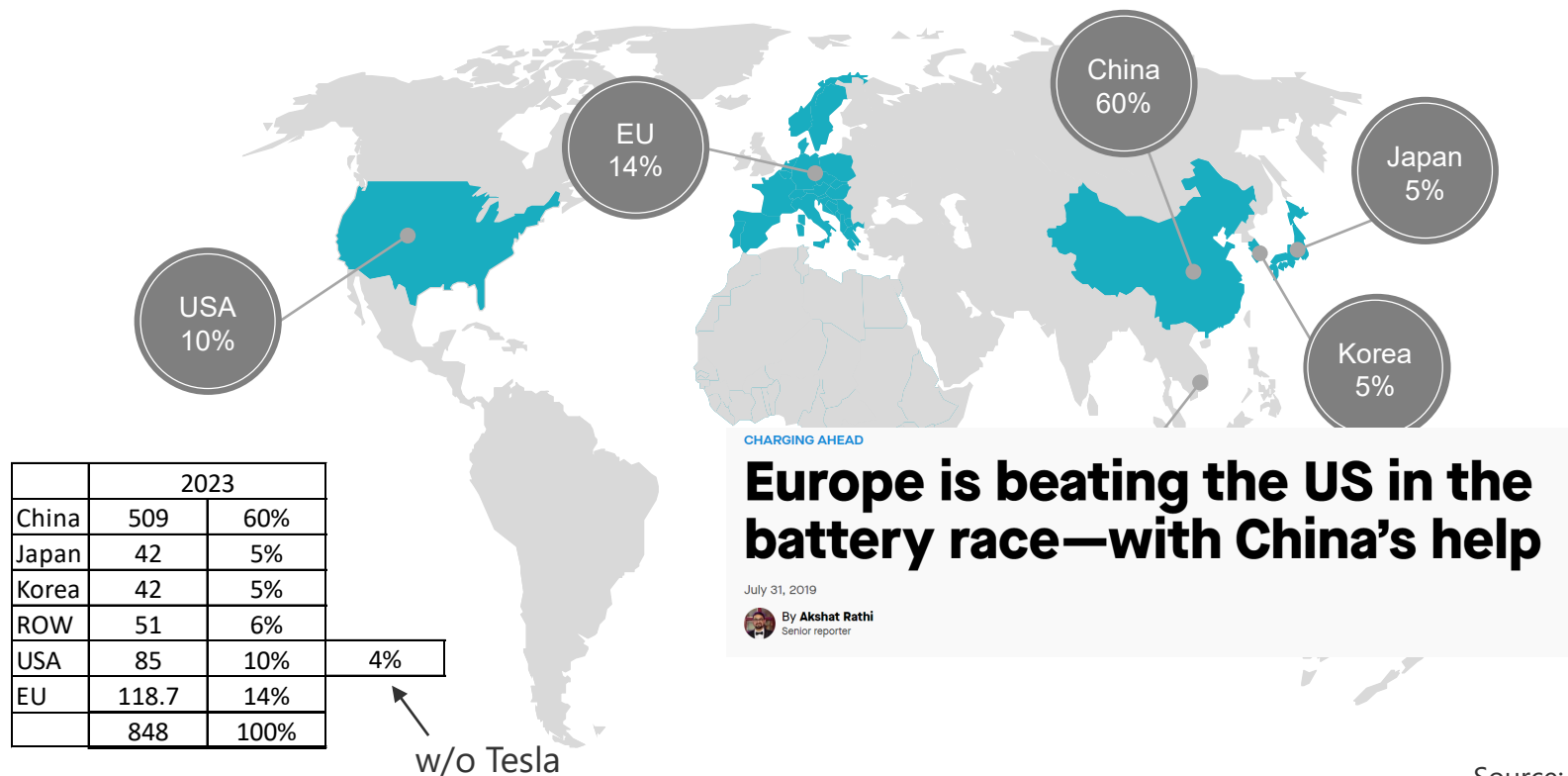


Prototype & pilot build



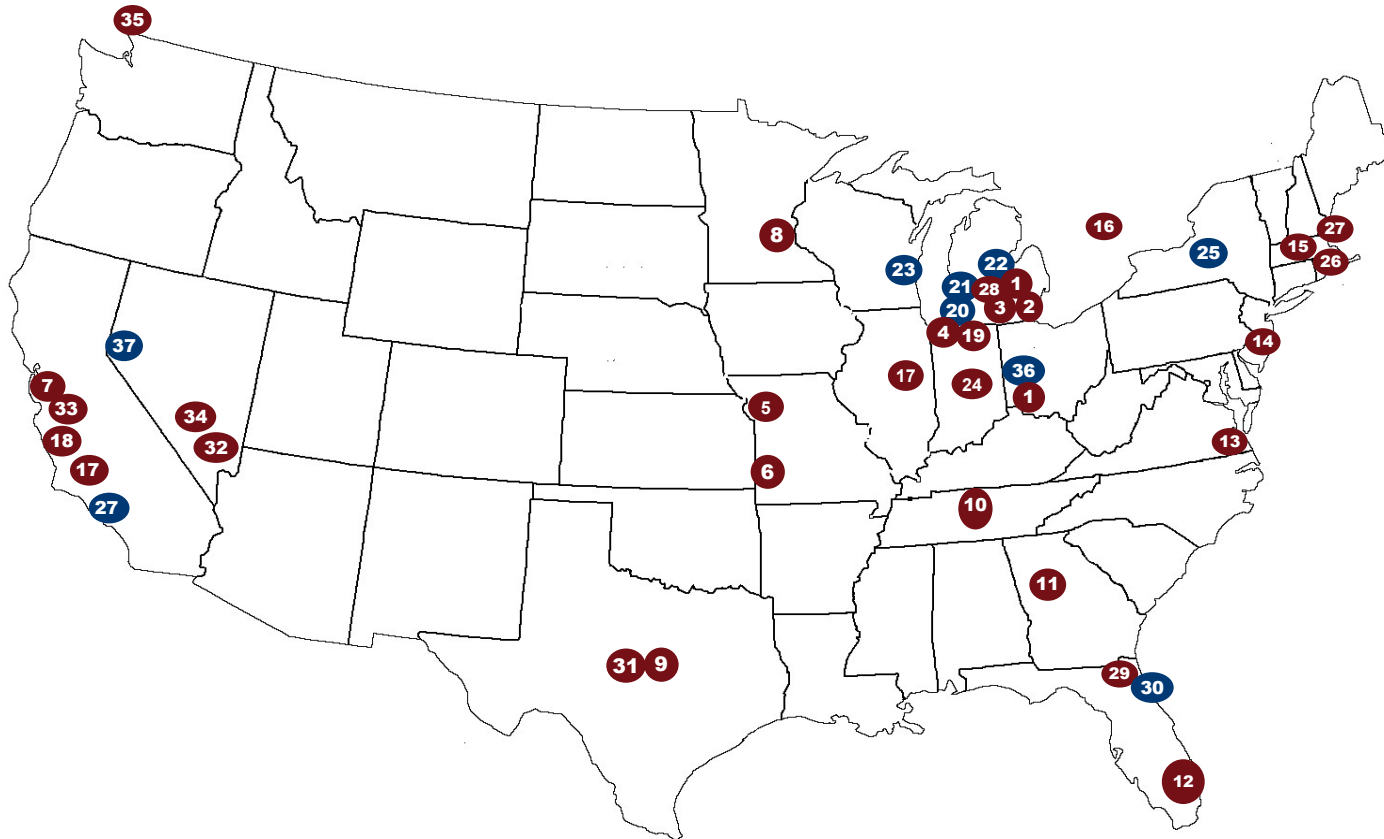
Over 60k packs built to date

Lithium-ion Battery Production



Source: Interact Analysis

US lithium-ion manufacturing



1. American Battery Solutions, Lake Orion, Mi & Springboro, OH
2. Akasol, Hazel Park, Mi
3. Navitas Systems, Ann Arbor, Mi
4. Navitas Systems Chicago, IL
5. Spear Energy, Grand View MO
6. Eaglepicher, Joplin, MO
7. Eaglepicher San Francisco
8. Medtronic, Minneapolis, Mn
9. Voltabox, Austin, Tx
10. Envision, Smyrna, Tn
11. Trojan Battery, Stonecrest & Sandersville, GA
12. Impact Power Tech, West Palm Beach, FL
13. BMZ, Virginia Beach, Va
14. Hoppecke, Hainseport, DL
15. Impact Power Tech, Braintree, MA
16. Forsee Power, Missiagua, ON
17. Flux Power, Vista, CA
18. Romeo Power, Vernon, CA
19. Inventus Power, Woodbridge, IL
20. LG, Holland, Mi
21. Clarios, Holland, Mi
22. XALT, Midland, Mi
23. Clarios, Milwaukee, Wi
24. EnerDel, Indianapolis, IN
25. Imperium3, Endicott
26. 24M, Cambridge, MA
27. A123, Hopkinton, MLordstown A
28. A123, Holland, MI
29. SK Innovation, Jacksonville, FL
30. SAFT America, Jacksonville, FL
31. Lithium Werks, Austin, TX
32. Lithium Werks, Las Vegas, NV
33. Enevate, Irvine, CA
34. K2 Energy, Henderson, NV
35. Corvus Energy, Seattle, WA
36. LG/GM, Lordstown, OH
37. Tesla/Panasonic, Reno, NV

Are batteries strategically important to the U.S.?



100% of the
cells for these
come from
overseas

Are batteries strategically important to the U.S.?

“Just about every piece of man-portable electronic equipment crucial to the success of U.S. warfighters on the battlefield is powered by some form of lithium battery...



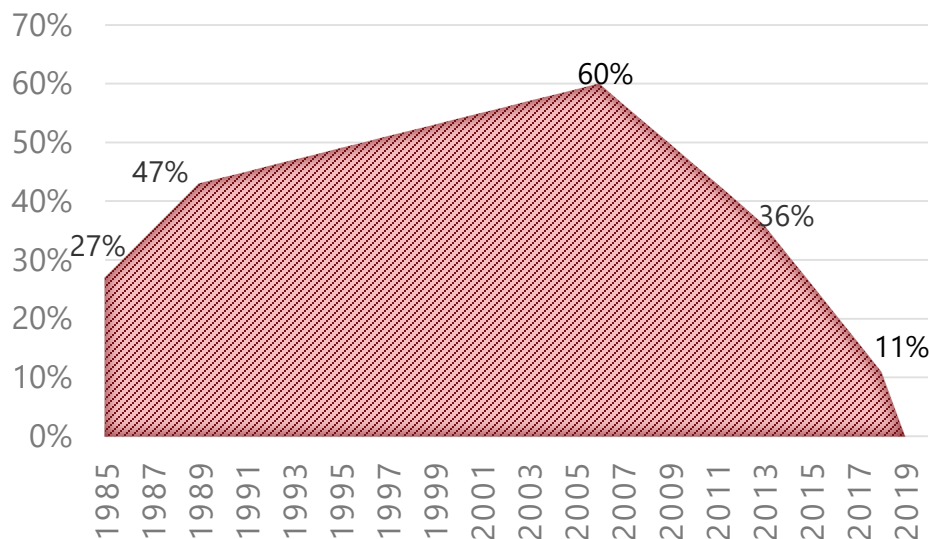
100% of the cells for these come from overseas

...Unfortunately, *their production is virtually entirely from offshore suppliers.*

<https://www.nationaldefensemagazine.org/articles/2018/11/8/offshore-battery-production-poses-problems-for-military>

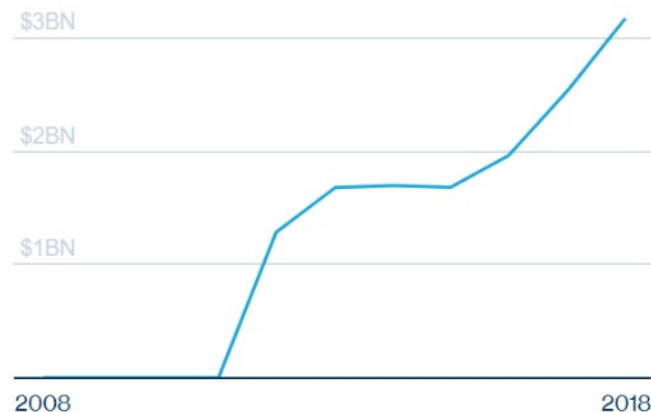
Battery Independence?

U.S. OIL IMPORTS



https://afdc.energy.gov/fuels/electricity_benefits.html

U.S. BATTERY IMPORTS



Top Countries Exporting
Batteries to the U.S.

China (\$1,480M)
South Korea (\$755M)
Japan (\$519M)
Germany (\$47M)

New battery technologies

- National labs and private industry developing wide range of technologies to improve current generation li-ion...
- ...and developing beyond lithium technologies.
- But can we commercialize them here or will these technologies end up off-shore?



Manufacturing, service or technology economy?

- The U.S. economy has transitioned from a Manufacturing Economy to a Service Economy over the past 50 years

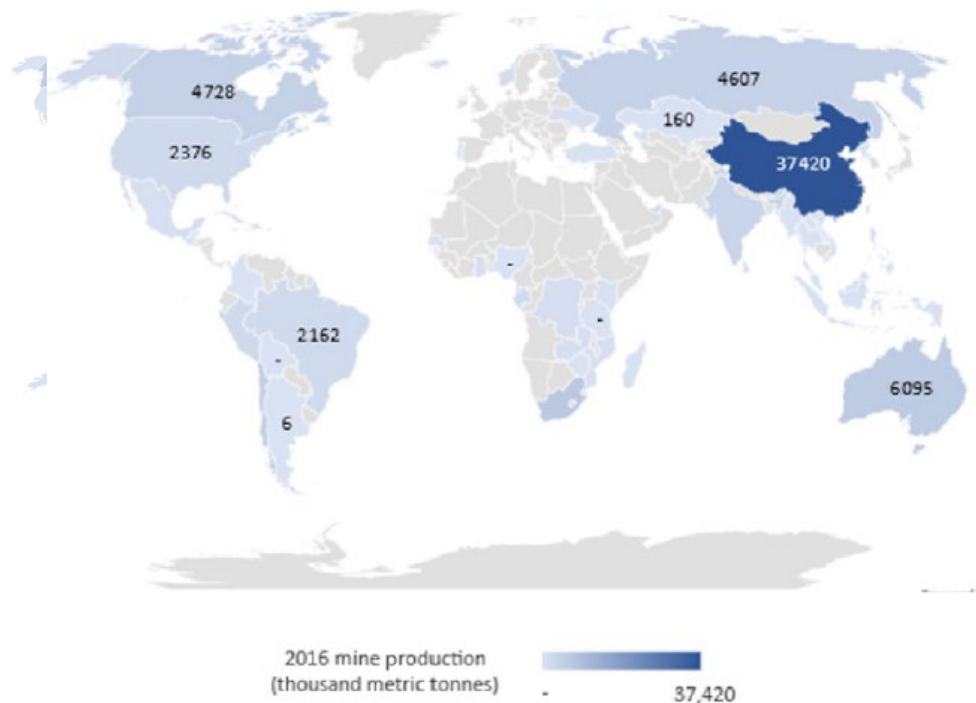


- We have the resources and know-how to create a new battery manufacturing base

Develop battery **supply chain**

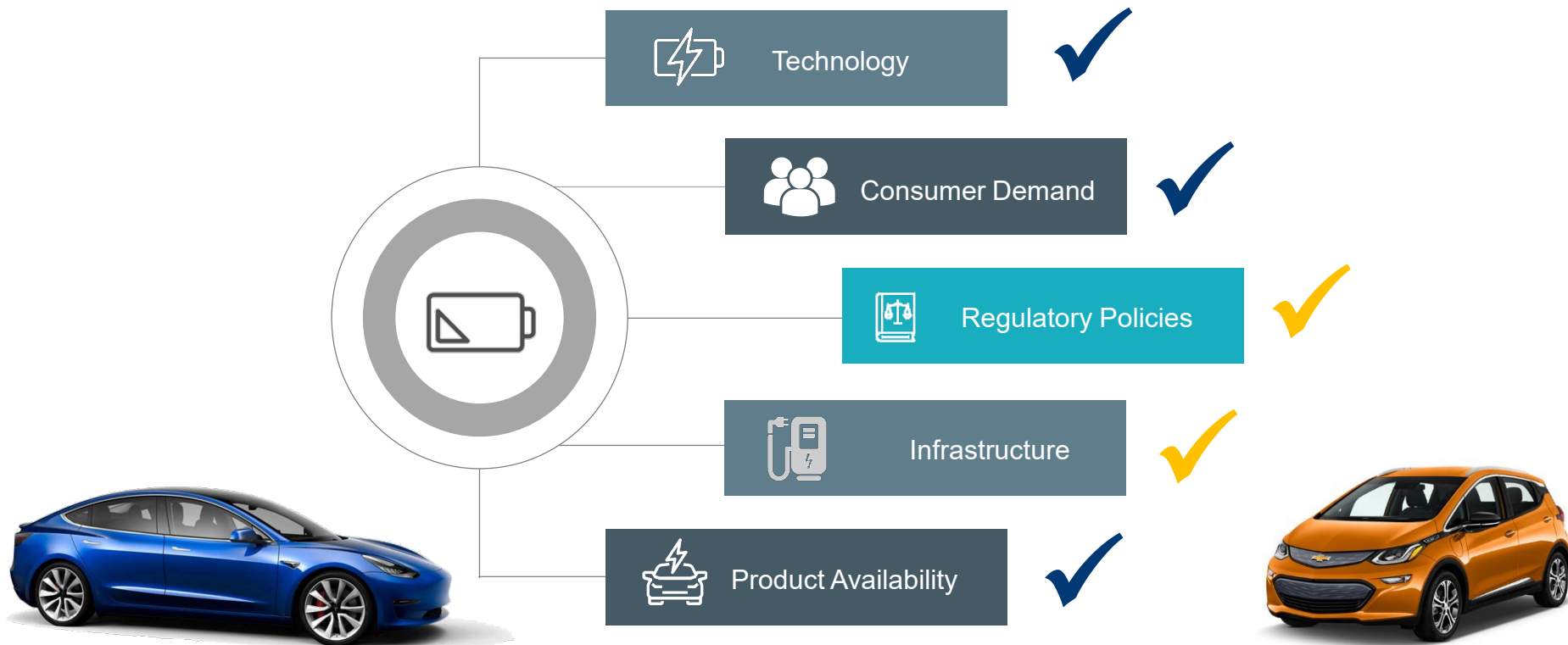
- More than 67% of the world's supply of cobalt was mined in the Democratic Republic of the Congo and more than 70% of the cobalt processing was done in China.
- The vast majority of the chemicals being used in lithium-ion batteries are being processed in China today due to low environmental standards and strong governmental support.

2016 Global Li-ion elements mine production



Source: J. Warner (2019). *Lithium-Ion Battery Chemistries*. Elsevier

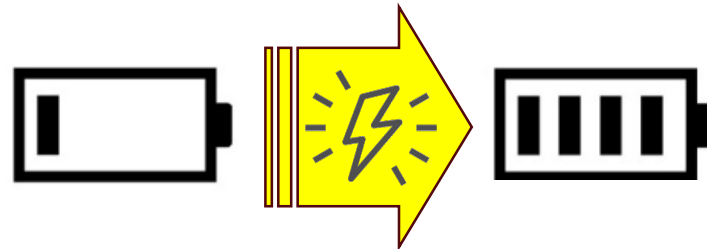
Drivers for Domestic **Battery** Manufacturing



Are batteries strategically important to the U.S.?

- Yes
- Creating a Battery Security plan like the U.S. did for Oil Security will drive policies supporting domestic growth
- Incentivize the use of domestic batteries = create customer demand
- Support U.S. battery pack industry
- Together, we can...

Recharge the U.S. Battery Industry





YOUR BATTERY PARTNER

Dr John Warner

jwarner@americanbatterysolutions.com

americanbatterysolutions.com