

**BATTERY PIPELINE – HALF
FULL OR HALF EMPTY?**

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SOME THEMES

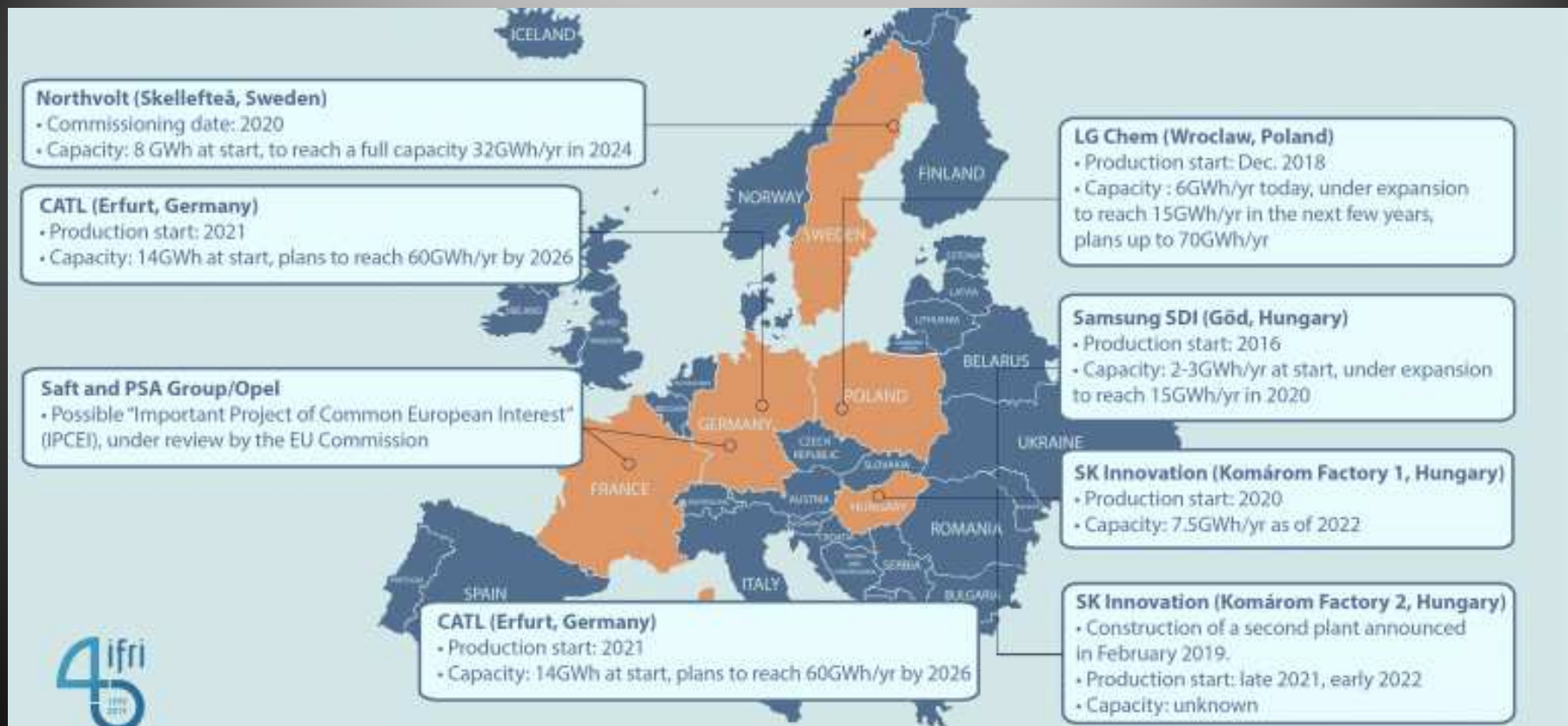
- After a slow start to non-Chinese construction of battery plants, the other two Asian automotive powers are finally making a push not only on plants, but also on supply chain of battery metals (particularly Korea)
- Global production of Lithium-ion battery cells went from 19 Gigawatt hours (GWh) in 2010 to 160 GWh in 2019. Growth in manufacturing capacity is even more impressive: yearly capacities reached 285 GWh in 2019, up from 30 GWh in 2010. Note the excess capacity....
- The US has been exceedingly slow to move (excepting the isolated example of Tesla)
- Europe is starting to gain pace with new factory builds and announcements (however it has no supply chain of metals inputs assured)
- Latin America, Africa and Australasia don't figure as players

EUROPE – STARING AT THE CHALLENGE

- EU lithium-ion cell manufacturing is less than 3% of the global share, and mainly for high-end niche markets, not the automotive sector
- Industry body is the European Battery Alliance (EBA)
- EU's automotive sector: 13.3mn jobs, or 6.1% of the total workforce
- The EBA has set a target of 200 GWh/yr manufacturing capacity by 2025, equivalent to four gigafactories of the size of the one developed by Tesla-Panasonic in Nevada

EUROPE – BUILD IT & THEY WILL COME

- This is leading to the construction of several factories in Germany (CATL), Poland (LG Chem) and Hungary (Samsung SDI, SK Innovation)
- Conversely, EU project promoters lack customers' commitments to demonstrate their financial viability and develop sufficient capacity to reach economies of scale, and ultimately deliver high-quality cells without cost overruns or delays
- Northvolt, the Swedish-based company is the most advanced European-driven manufacturing project. A pilot line is under construction and the next step would be to complete the first section of the factory in 2020 and produce 8 GWh/yr
- In components, Johnson Matthey and Umicore are both building plants in Poland to produce, respectively, enhanced lithium nickel oxide (eLNO) and cathodes
- The EBA has set a target of 200 GWh/yr manufacturing capacity to be available in the EU as of 2025, while others believe the European EV market will need 500-600 GWh/yr by 2030, or at least ten gigafactories



Source: IFRI Centre for Energy

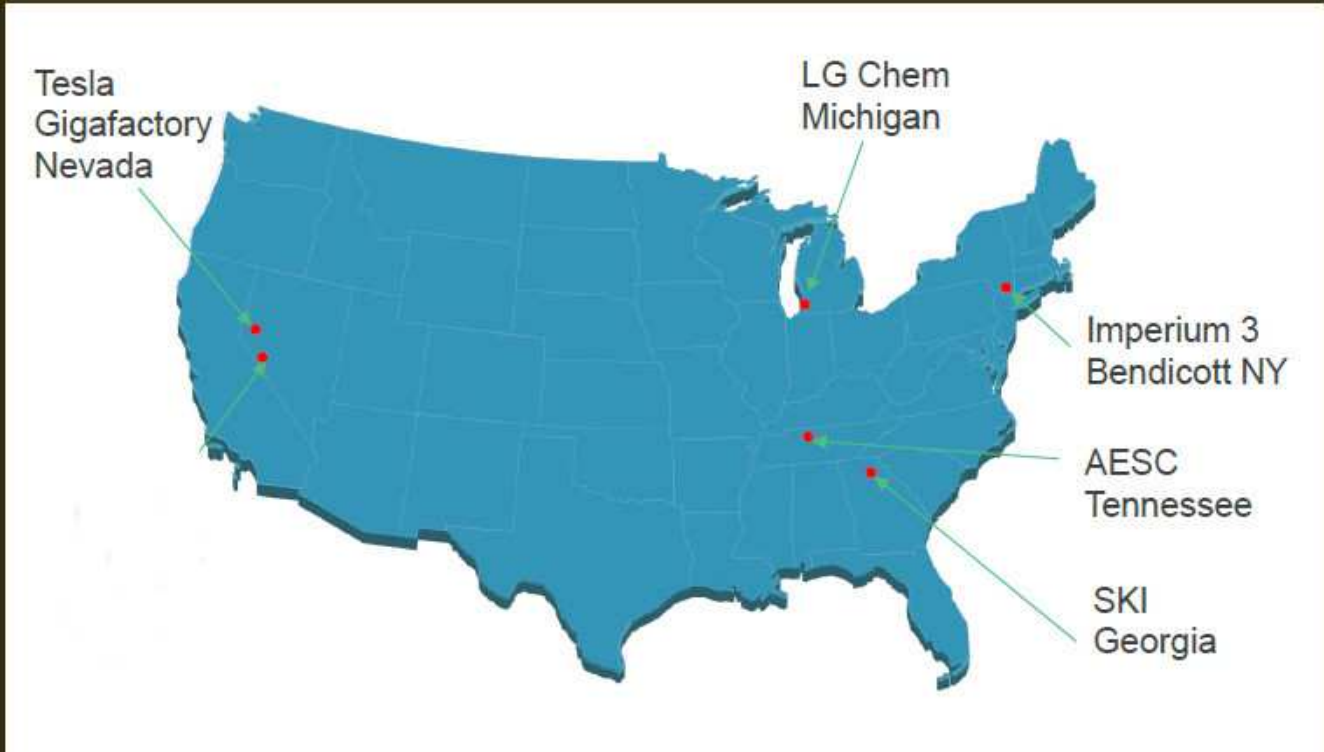
AND THE U.S.???

- Tesla does not alone a battery supply chain make....
- Detroit has been sitting on its hands
- The Big Three are not in a great financial condition to retool for the EV revolution
- They are focusing on bigger vehicles and SUVs, with smaller models left to the “foreigners”
- Government fiat (pardon the pun) will not dictate EV adoption as in Europe (but California might try its luck)
- Zero chance of subsidies

BUT SOME MOVEMENT...

- Up to five gigafactories forecast by 2028, potentially ~150GWH
- VW breaks ground on Tennessee EV plant (Nov 19)
- VW U.S. CEO equates it to introduction of the Beetle
- Ford Motor Co unveil its Mustang-inspired electric SUV as part of its plan to invest US \$11.5 billion electrifying its vehicles by 2022
- 12 states, plus Washington D.C., have adopted California's Clean Car standards

U.S. – SLOW-GOING



INDIA – STEALTH PLAYER?

- Arguably more serious than the US about Evs
- No export markets of note
- No supply chain of battery metals as yet
- Tata Chemicals to set up a Li-ion battery unit in Dholera mooting an investment of ~\$600 million. The plant will start with a capacity of 10 GWh and is later expected to be scaled up to 50 GWh.
- Suzuki will be setting up a Li-ion battery manufacturing unit in Gujarat with an investment of \$180 million in Hansalpur, near Ahmedabad.
- In the more nebulous category, Bharat Heavy Electricals Limited (BHEL) and Australia-based Libcoin were in discussions to build a 1 GWh Li-ion battery plant

KEY TAKEAWAYS/ISSUES

- The weak link in battery plant usage is consumer uptake
- Auto sales are in a swoon in many places as consumers wait to see how things evolve, for prices to come down, for government subsidies (or not), to assess the resale value of their current vehicle and for charging places to increase in numbers
- Brexit has thrown planning by transnational operators into some chaos
- Will this mean UK-specific Lithium-Ion battery plants?
- There is still no effective recycling industry established for end-of-life Li-Ion batteries
- EU state aid rules mitigate against top-down promotion of battery factories