



Charging Ahead: Silicon Li-ion EV Battery Breakthroughs and Challenges

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Investor Checklist – Attributes to Success

Desirable Attributes	Enevate
Proven better performance (multi-layer large-format cell)	✓✓✓
Lower cell and battery pack cost	✓
Improved safety	✓
Lower carbon footprint	✓
New technology can use existing gigafactory & capital	✓✓
Low capital-intensive business model	✓✓✓
Business model with high margins	✓✓✓
Validated & financially supported by global Tier1 companies	✓✓
Patent protected technology	✓✓✓
Multi-generational roadmap	✓✓
Management team with proven record of business success	✓✓✓

Pain Points for EV Adoption	Enevate Delivers
Carbon footprint	Up to 20% smaller carbon footprint
Long inconvenient charging time	10X faster, 5-minute Extreme Fast Charge
Price premium over ICE	20% lower cost anode, affordable EVs
Driving distance	30% more EV range, higher energy density
Low-temp performance	>100% better low temperature performance
Safety	Safer Battery, no lithium plating
Efficiency	Higher efficiencies in regenerative braking and charger utilization



Competitive advantage for EVs when they can charge as fast as refueling a gas vehicle

- **Enevate develops Next-Generation Li-ion battery technology for Electric Vehicles**

- Founded 2005 in Southern California, USA
- Latest investments by:



- **Our Vision:** A cleaner and sustainable environment through a variety of battery powered applications and products that are accessible and affordable to everyone

- **Our Business Model:** Battery technology licensing & transfer

- Non-capital intensive, leverages experienced high volume & quality battery makers to supply the EV industry

- **Our Technology:** Developed over 10+ years with 350+ patents issued and in-process

- Tested by 20+ battery and automotive manufacturers in Asia, US, and Europe
- Licensing new 4th Generation XFC-Energy[®] technology with eXtreme Fast Charge for high volume commercialization

Maturity ↑

Product Engineering & Manufacturing Commercialization



EV Large Pouch Cells (modules & EV pack)

Automotive B & C-samples
Start Production



EV Large Pouch Cell (full EV product size)

Typically 30-40 layers
50-150Ah
Automotive A-samples

Development & Process Engineering

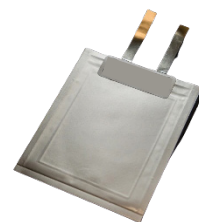
Small Pouch Cell (many-layers)

Typically 10+ layers
~1Ah+



Small Pouch Cell (few-layers)

Typically 3-7 layers,
~0.5Ah



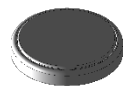
Small Pouch Cell (single-layer)

Typically ~0.1Ah

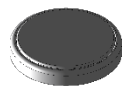
Materials & Electrochemistry Research



Materials Research & Characterization



Half-Cells (research coin cell)



Full-Cells (research coin cell)

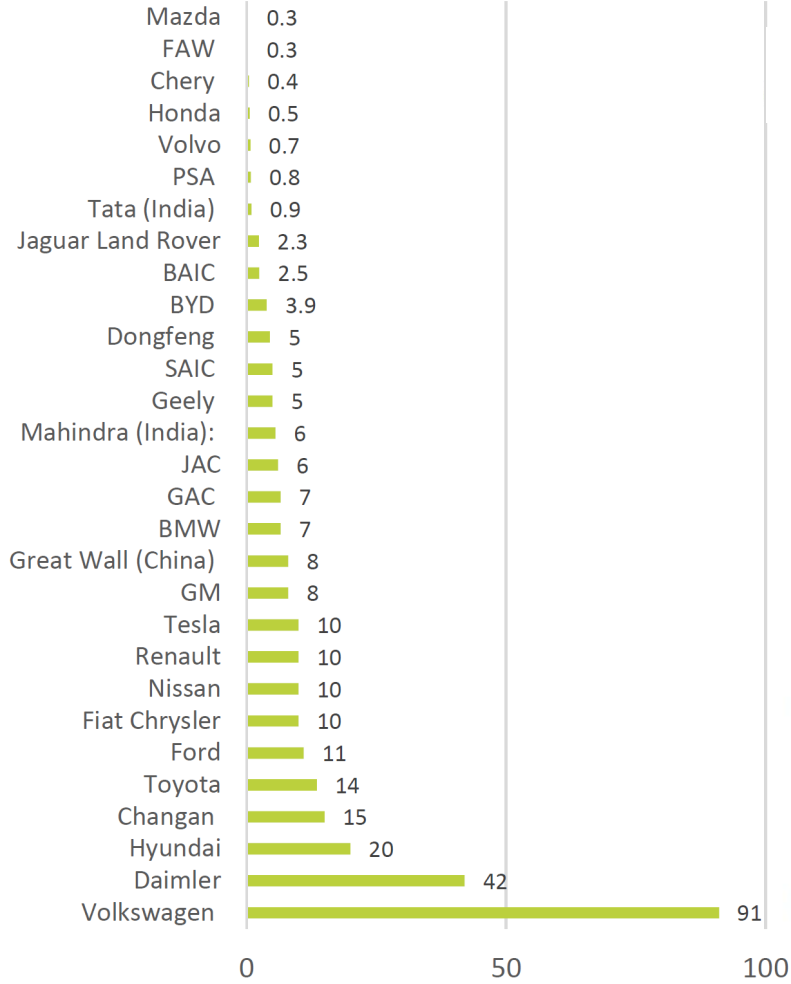
Typical Time for Any New Breakthrough Battery Technology

10-15 years

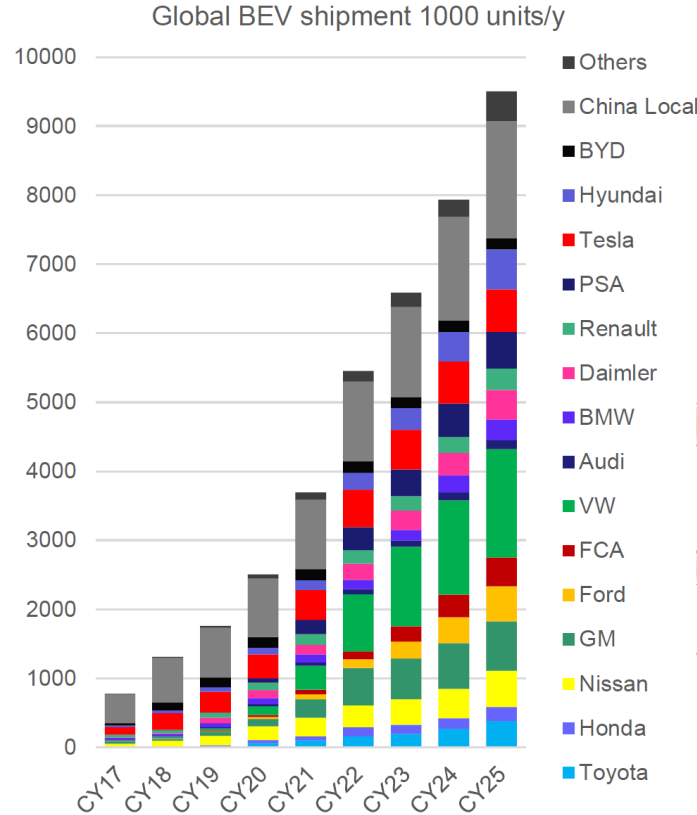
Electric Vehicle & Battery Opportunity is Massive



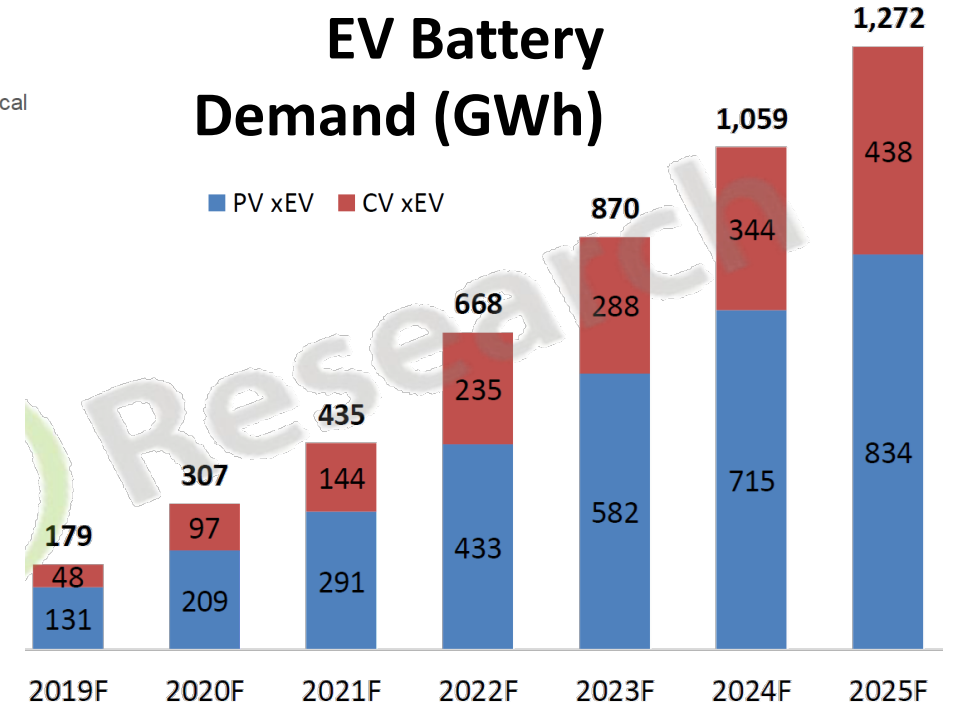
Carmakers to Invest More Than \$300B in EV



source: Avicenne, Jan 2020



EV Battery Demand (GWh)



PV: Passenger Vehicle
 CV: Commercial Vehicle
 source: SNE Research Report:
 Global EV & Battery Market Forecast, Sept 2019

By 2030, Tesla believes the global demand for EV batteries is 10 TWh per year

Home
(8-10 hours)



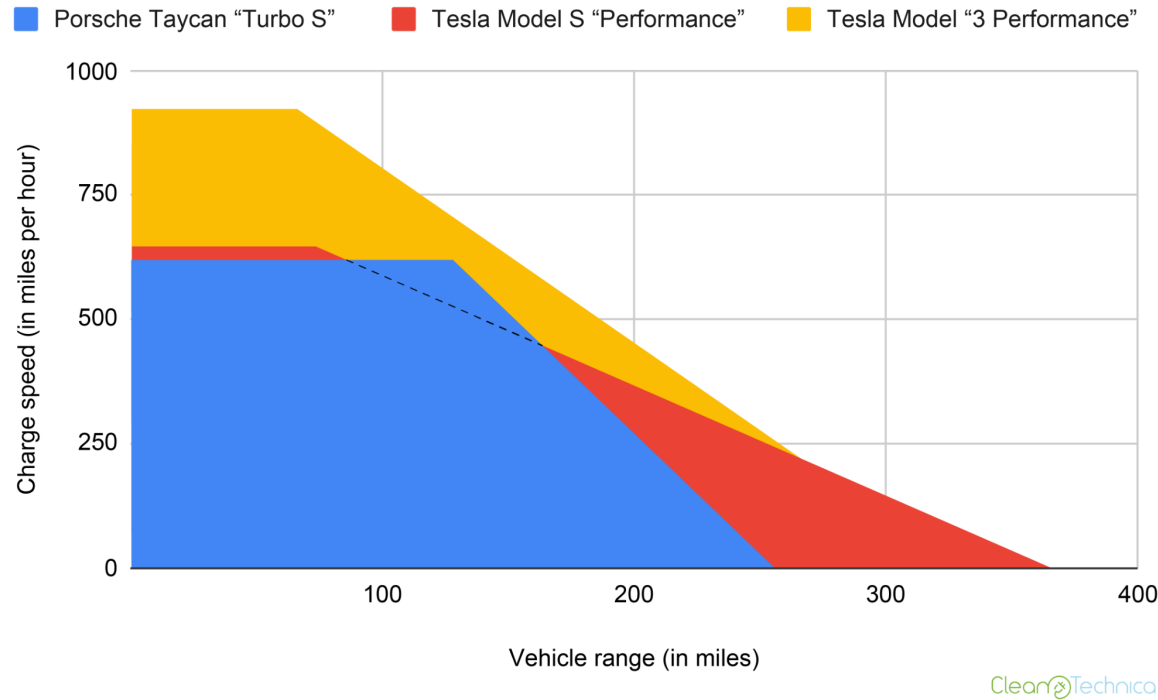
Work or Destination
(45-90 min)



Fast Charge on the Road:
Drive-through Charging Station
(5-10 min, highway or street corner)



Extreme Fast Charging changes people's perception of EV charging convenience

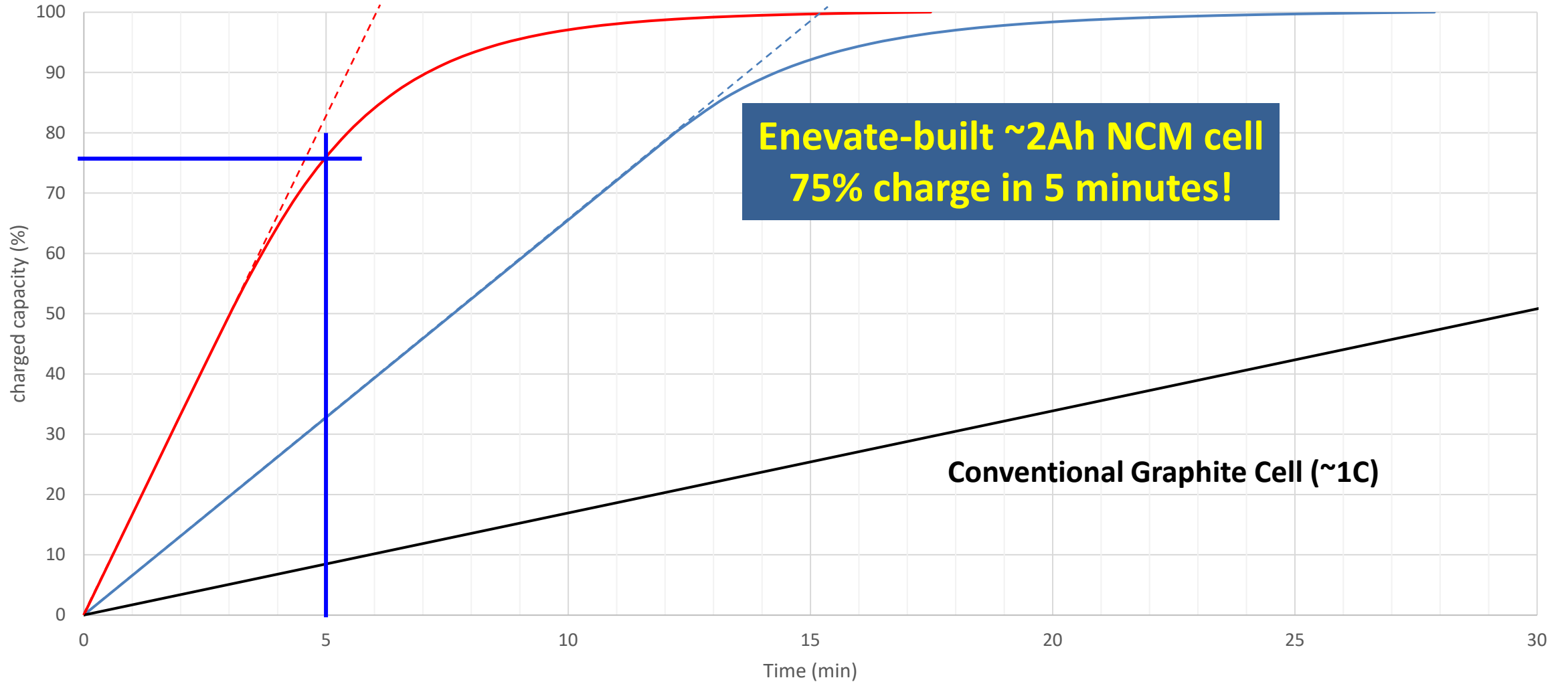


- **McKinsey & Co**
 - \$50B to ensure public charging station access similar to gas stations in just US, Europe, China
 - \$11B just for the US
- **Enevate's charging technology can save \$Billions in infrastructure investment**

- **Charging current drops quickly in most scenarios**
- **Battery will be damaged if a certain rate is exceeded at each SOC (more on this later)**
- **Enevate's battery could charge at full rate for almost the entire time reducing charge time for chargers at almost all rates**

Enevate Silicon-Dominant Cells

— 4C — 10C — Graphite cell



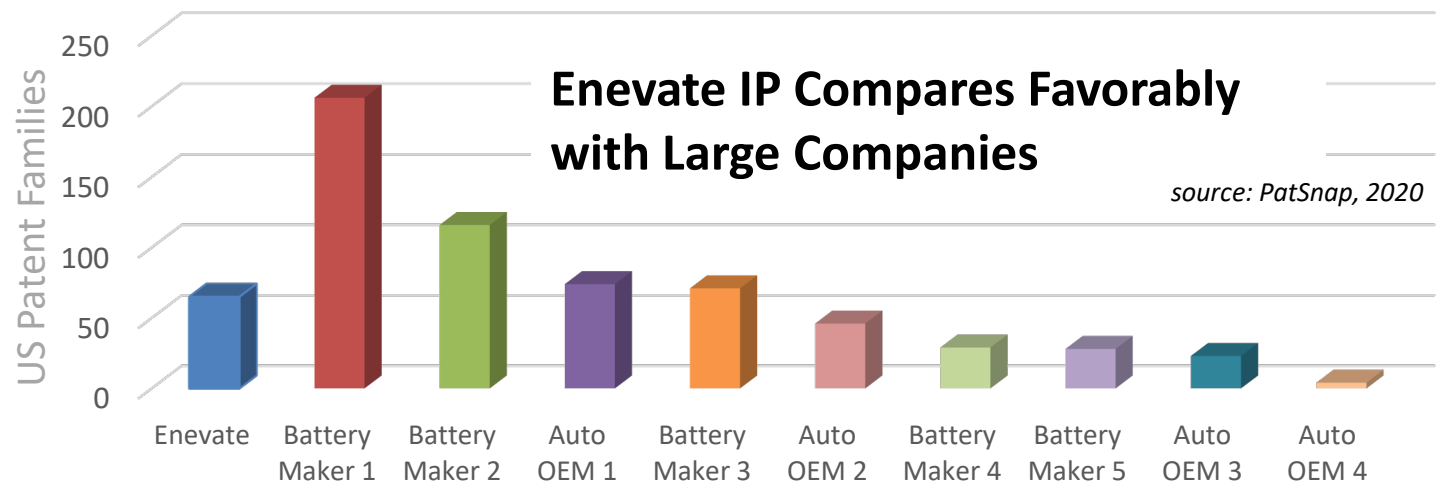
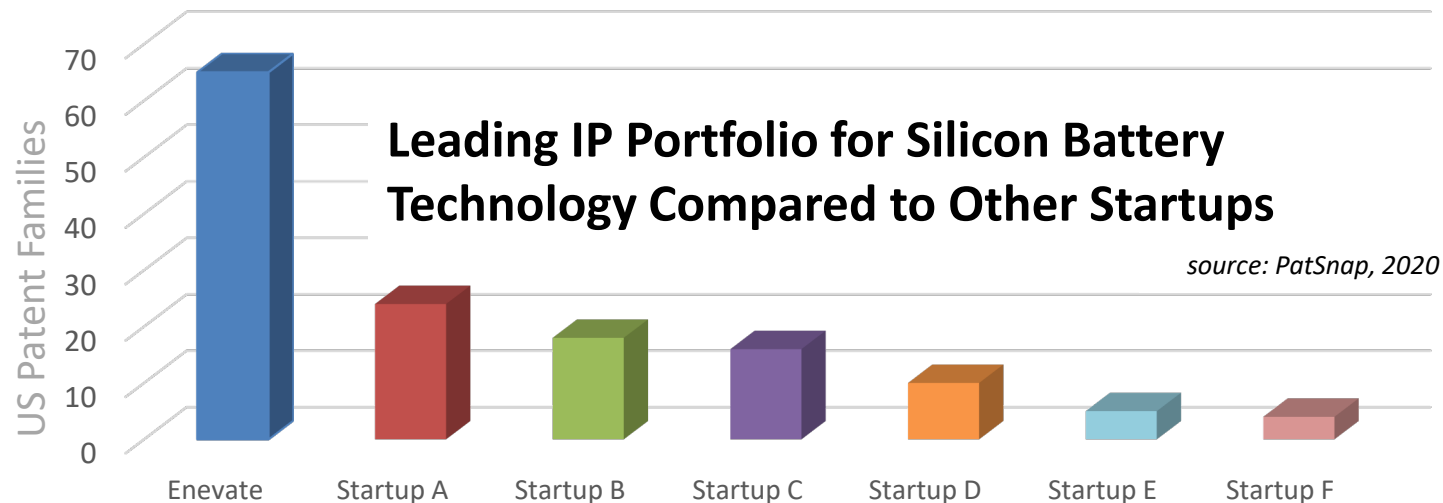
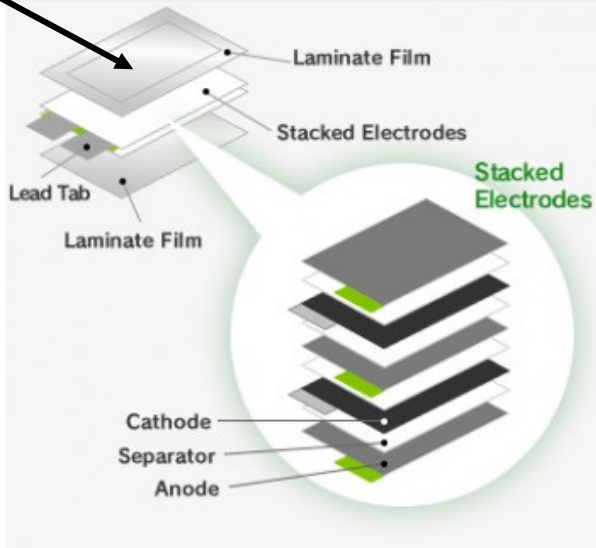
**Enevate-built ~2Ah NCM cell
75% charge in 5 minutes!**

Conventional Graphite Cell (~1C)

EV Battery Pack has many cells



EV Cell has many electrodes (negative anodes, positive cathodes)

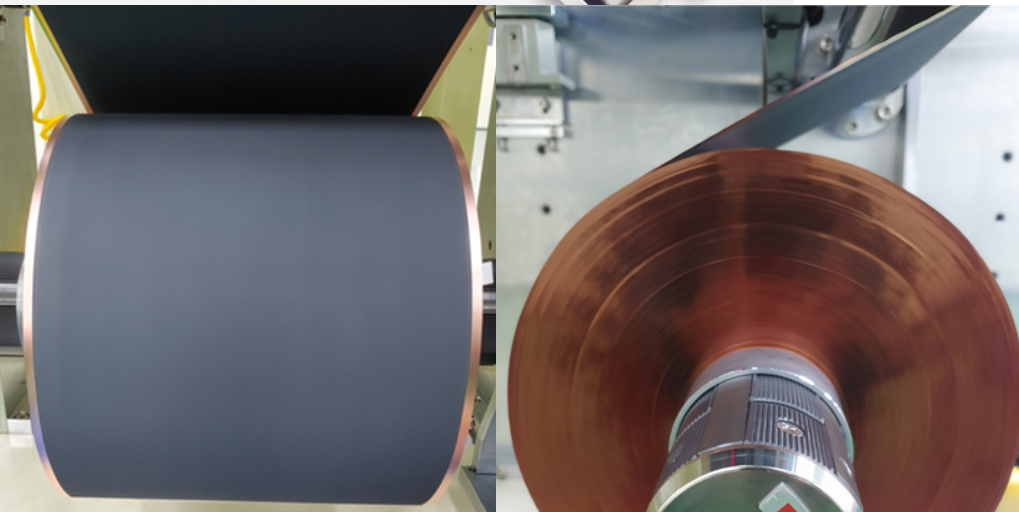


Enevate holds the largest portfolio of silicon battery patents compared to other startups and most established EV automotive and battery companies



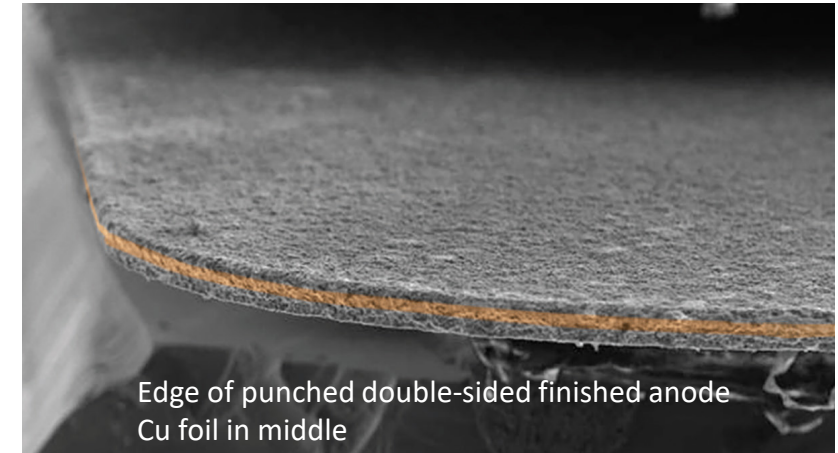
XFC-Energy Technology provides a comprehensive cell solution to the automotive industry, developed for gigafactory-scale manufacturing and lower cost than conventional Li-ion cells

- **Processes designed for high volume continuous roll-to-roll processes of over 80 meters per minute**
- **Flexible anodes that can be stacked or wound**
- **Compatible with existing factories and most cathodes**
- **Capable of over 1000 cycles**
- **Operation at -20°C and below temperatures**
- **Currently designing for 2024-2025 model year EVs**
 - 2022-2023 for other applications



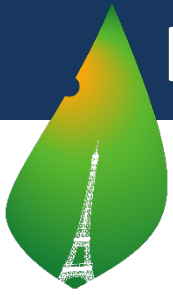
- **XFC-Energy[®] Anode Film: Pure Silicon-Dominant Micro-Matrix**

- Inexpensive silicon, low carbon footprint
- Scalable processes
- Scalable for use in pouch, prismatic, and cylindrical formats
- Can be paired with NCA, NCM811, NCMA, low-cobalt and other advanced cathodes



- **Anode is >>70% Silicon**

- ~3000 mAh/g specific capacity available (compared to graphite, 372 mAh/g max)
- 1000-2000 mAh/g utilized in cell designs
- Achieving energy densities of up to 1000 Wh/L, ~350 Wh/kg in large format cells
- High Initial Coulombic Efficiency: 93% for anode, ~90% for full cells (similar to graphite cells)



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Enevate Battery Technology has 20% smaller carbon footprint to manufacture than conventional Li-ion cells, enabling huge savings in Carbon Footprint



Up to 3 million metric tonnes (MT) less carbon per 100 thousand EV Passenger Cars



Up to 400 thousand MT less carbon per 1000 local EV Delivery Vans



Up to 2.2 million MT less carbon per 1000 long-haul EV Semi Trucks



Thank you!
www.enevate.com

