Powering Clean Mobility:
Opportunities, Challenges, and Growth Strategies for Low-Voltage Lithium Battery Adoption

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POWERING CLEAN MOBILITY

PRESENTED BY A123 SYSTEMS
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Content

Global Footprint

A123 Systems leader in lithium battery technology with a global presence in North America, Europe, and Asia. Global market presence to meet the rising demand for clean mobility and stable infrastructure battery innovations.

Pioneer in Advanced Lithium Iron Phosphate Technology

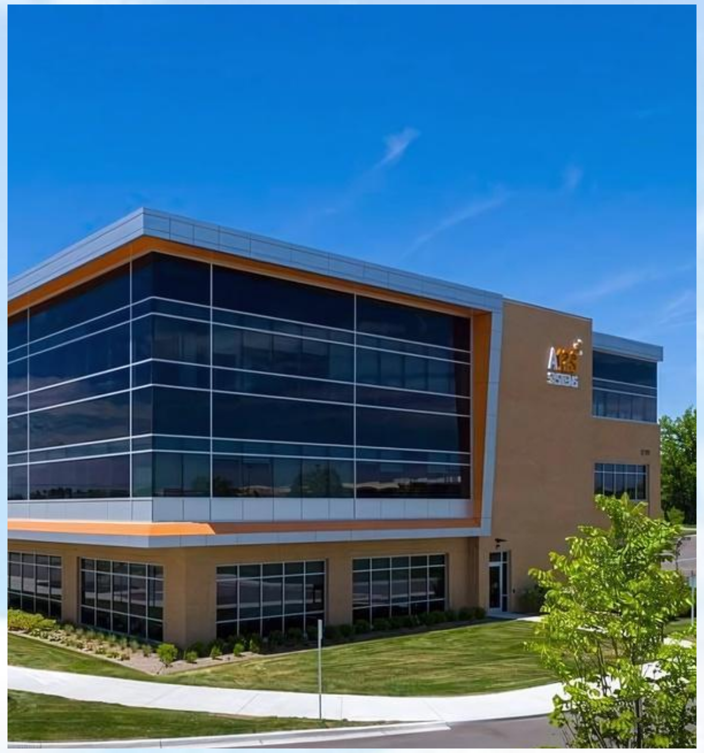
- Founded in 2001, mass production since 2006
- Wholly owned by Wanxiang Group since 2013
- 30GWh installed capacity
- 2,200+ employees across North America, Europe, and Asia
- Supplied 2M+ LFP LV (12V, 48V) battery systems
- Market leader in 12V LiSb/Aux, 24V & 48V Mild Hybrid Applications

Low-Voltage Auto, HD

High-Voltage Auto

Energy Storage Systems

High Performance (F1)



Detroit, MI, USA	Boston, MA, USA	Ostrava, Czech Republic	Hangzhou, China	Stuttgart, Germany

Decarbonization across the Energy EcoSystem

Technology
Incubator for advanced battery technologies & materials

Investment
Growth and Strategic in Long-term trusted partnerships

Manufacturing
Scalable cell to system assembly with local manufacturing solutions

Why Lithium for LV Automotive Matters

Convenience

- High performance at low temperature
- Reduced weight by 50%
- Innovative features & advanced tech
- Minimizing downtime
- **Enhancing driver confidence**

Sustainability

- Extended durability
- Reduces harmful substances per product life cycle
- **Greener energy, cleaner future**
- **Rise in new technology adopters**

Performance

- 2-4x higher energy density, up to 160Wh/Kg
- 5-10x life cysle, up to 5000 cycles
- >95% round-trip efficiency
  - High power, fast charge
  - Support regen braking, start/stop
- Enhanced usable energy
  - 95% Depth of Discharge (DoD)
  - More stable voltage under load
- **Enhanced Driver Experience**

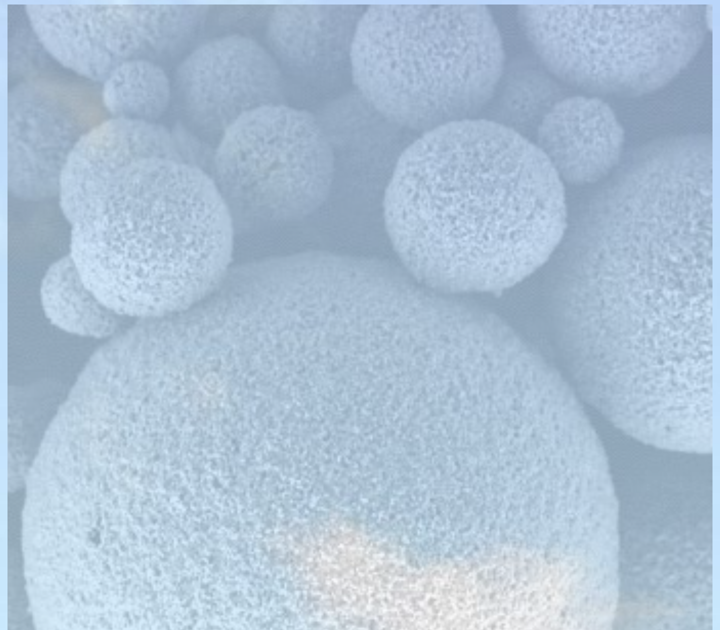
Total Cost Ownership

- Enhanced fuel economy and fuel savings
- Longer Life & Reliability
  - Fewer replacements & warranty cost
  - Reduced operating lifetime costs for OEM and vehicle owner
- **Vehicle lifetime cost reduction**

LFP batteries outperform lead-acid in every key metric relevant to OEM electrification goals

UltraPhosphate LFP Cathode Technology Advancement

Extreme Power & Low Temperature LFP Performance for 12V & 48V



Nano Morphology

- Shrinking crystallite thickness
- Shorten Li+ transfer distance for lower resistance & high C-rate discharge

Gen1 NanoPhosphate — 2006
World First Nano LFP at production scale

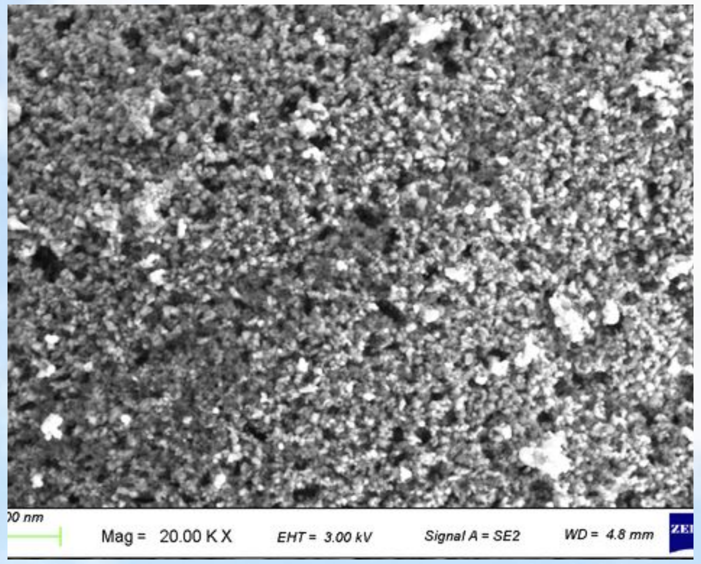
Gen2 UltraPhosphate — 2017
Ultra power performance at low temperature

Gen3 UltraPhosphate — 2023
Calendar life, Cycling optimization

Gen4 UltraPhosphate — 2026
High Power, discharge improvement

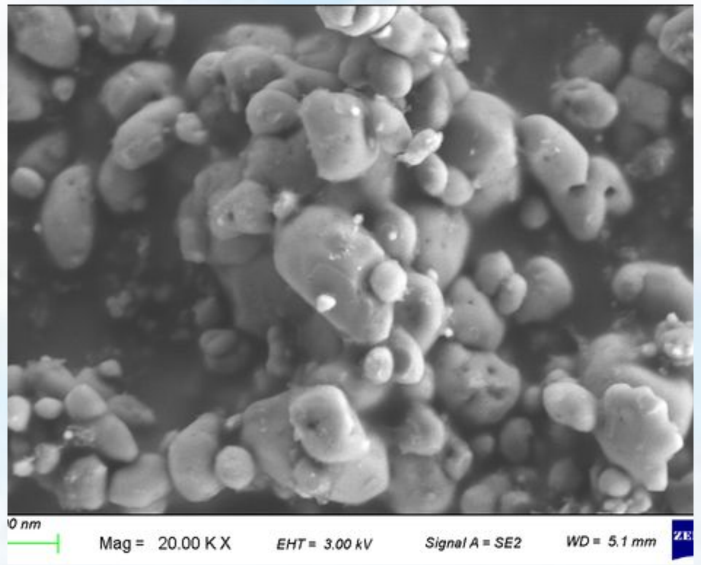
A123 UltraPhosphate™

(50-80nm)



Regular LFP

(300-500nm)



Market Driver, Trends & Opportunities for LV Lithium Adoption in NA

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Policies

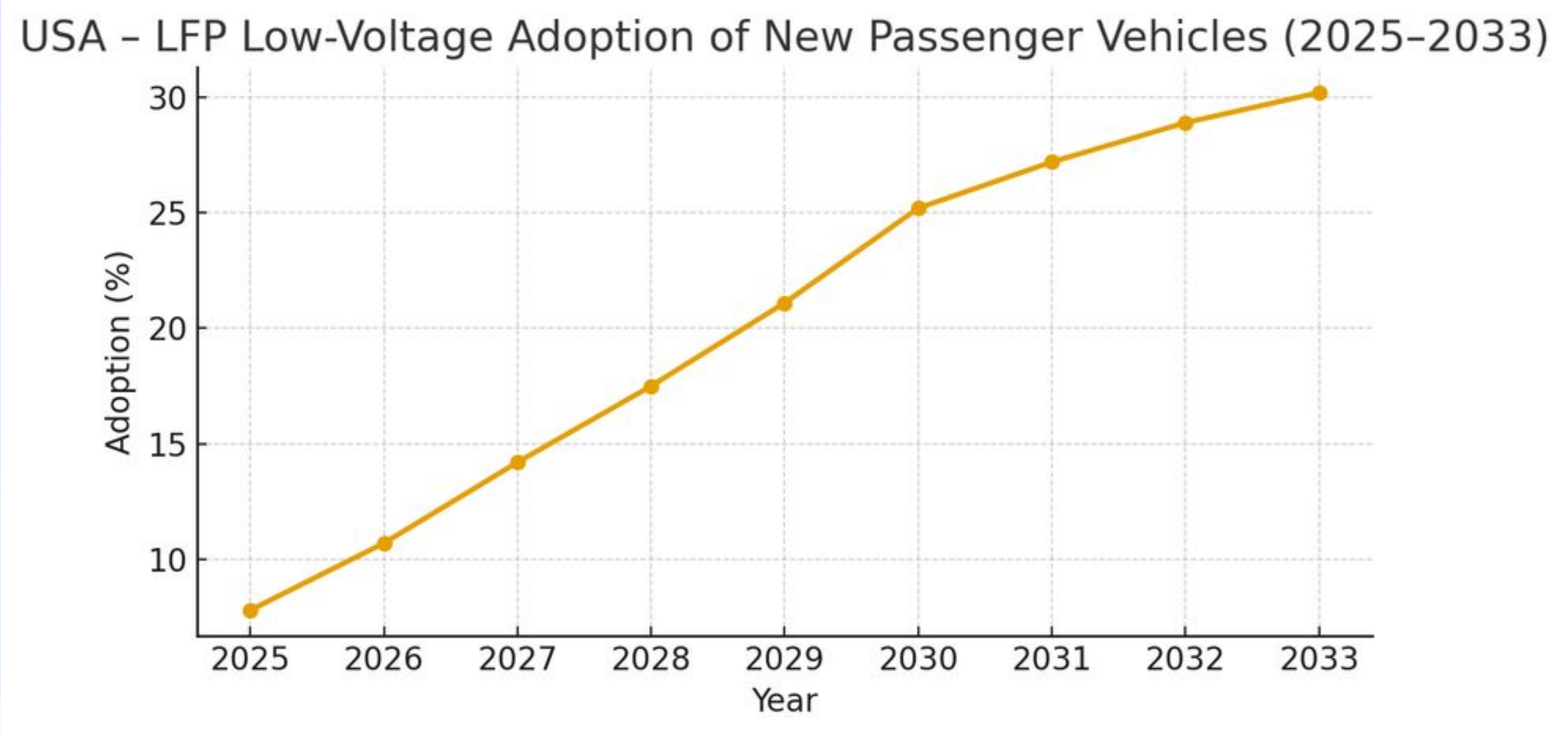
- Onshoring cell material refining, component and system manufacturing.
- Accelerated adoption as CO_2 regulations tighten.
- OEMs seek for improved efficiency and FEOC-compliant supply chains.
- Evolving recycling infrastructure and legislations to support Lithium adoption.

Industry Trends

- OEM shift to LFP.
- Switch from 12V to 48V board net.
- Decrease reliance on overseas supply chains.
- Outsource LV design; internalize HV platform.
- Lithium LV systems: lighter, improved start-stop, better customer experience.

Technology

- LFP proven technology: safe, durable, high-performance, and cost-effective.
- Rising demand for integrated LV systems with cells, BMS, and thermal control.
- R&D reduces costs, boosts durability, and improves charge acceptance, crucial for lithium's role in low-power tasks.



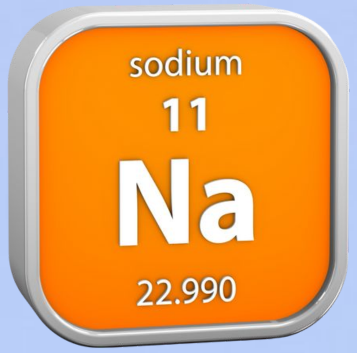
SOURCE: U.S. passenger-vehicle LFP LV adoption is an analyst estimate derived from public data: IEA Global EV Outlook (vehicle mix), EPA LDV rule (MY 2027–2032), EU Battery Regulation timeline, BNEF battery price surveys, and U.S. sales mix from S&P Global/Cox/J.D. Power. Figures reflect modeled penetration of LFP within LV (12V/48V); refine with OEM program volumes.

Key Insights

- Regulatory tightening speeds up adoption.
- OEMs use LV lithium in premium and electrified models.
- Growing demand leads to broader fleet electrification.
- LFP dominates LV until ~2030 with a 25% new vehicle adoption rate.

New technologies gradually reduce its share beyond 2030.

Promising Technology to Enhance Non Lead Adoption



Performance

- Early industrialization phase
- limited fast-charging capabilities
- Lower energy density than LFP, to maintain capacity may need more mass/volume, advantage may be offset by pack size/weight penalty
- More sensitive to impedance rise at low temperature & low state of charge
- Good Low-temperature charge capability

Supply Chain

- Early samples available; limited capacity
- Abundant sodium; promising lifecycle
- EU, India expanding; major U.S. failure
- Non-US scaling by 2028+
- FEOC Compliance; slow non-Chinese growth
- China leads in lithium, 80% market share by 2030

Commercial

- Cheaper raw materials (no Li, Ni, Co)
- Pending mass production, low volumes pricing not consistently below LFP
- Expect improvement as mass production starts (local, domestic)
- Reduced exposure to lithium price swings
- LFP Scale & learnings from past decade more

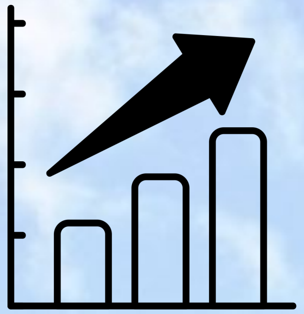
LFP batteries outperform lead-acid in every key metric relevant to OEM electrification goals

Path Forward: Status and Recommended Deployment Plan for Sodium-Ion

- Sodium early stage for automotive electrified systems, BESS early adopter.
- Automotive validation and qualification modules pending, immediate utilization higher risk
- Near term and new Program SOP ≤2028, consider LFP as the lowest-risk and lowest cost choice for LV Automotive applications.
- Pilot programs or SOP 2028+, you may consider Na-ion pilots for SLI, LV Aux (12V, 24V, 48V) where cold-start, safety, and cost stability matter more than energy density.
- Adopting new chemistries require changes to BMS, thermal management, integration, service life expectations, value chain readiness for repair and disposal.

Forging Strong Alliances

Collaborative Success Among OEMs & Suppliers



- Low-Voltage Lithium Automotive segment is quickly evolving from niche to mainstream with smart LV Aux and 48V mild-hybrid solutions.
  - Growing demand for convenience, performance, start-stop, and emissions goals.
  - LFP proven, reliable, accessible with advanced technologies evolving
    - particular technologies per use case and application

- US market complexity
- Domestic Lithium raw material, cell and system manufacturing heavy investment for supply chain
- Lack of U.S. domestic policies to foster LV electrification
- Price pressure Vs. economy of scale Vs. business commitment

- Collaborate to Compete
  - Early involvement critical stakeholder from raw material to product supply
  - Joint ramp-up strategy to align CapEx with demand
  - Leverage use cases between automotive and ESS, EVTOL, industrial

THANK YOU

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