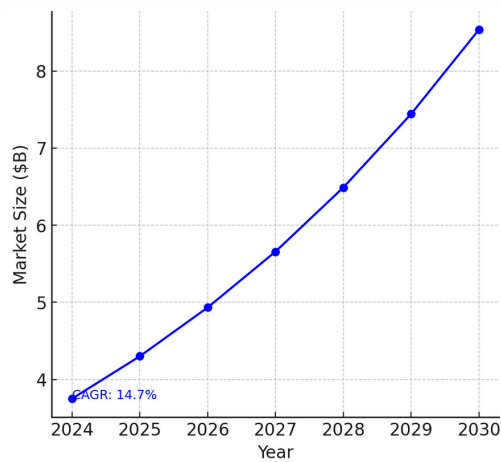# Smart Thermal Management for Battery Packs

Thermal management is critical to ensuring battery safety, performance, and longevity as electrification accelerates across industries.
With the battery market experiencing rapid growth, the demand for advanced thermal design and optimization strategies is rising.

Battery Thermal Management Market Growth
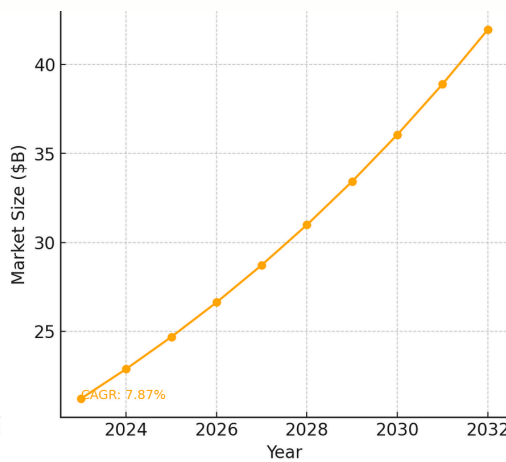### 2024-2030

Industrial Battery Market
2023-2032

Lithium-Ion Battery Demand
2023-2030

Compound Annual Growth Rate (CAGR)
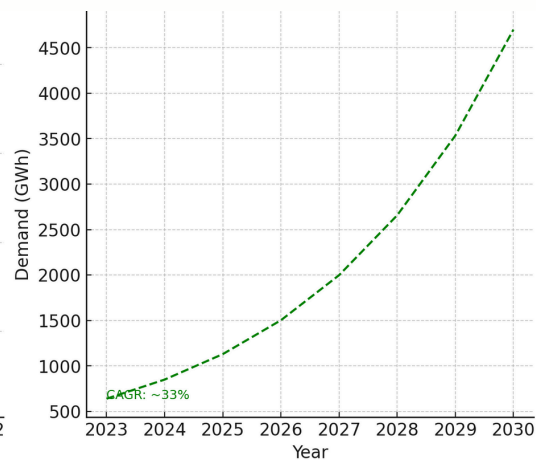
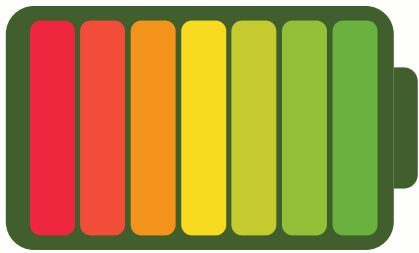**14.7%** ⬆ **7.87%** ⬆ **33%** annually ⬆

Battery Pack Thermal Management with GT-SUITE

Optimize Performance, Safety & Longevity

- Accurately predict **temperature and current distribution** at the cell level
- Analyze and compare multiple **cooling strategies** for optimal thermal management
- Reduce risk of **thermal runaway propagation** and extend battery lifespan
- Couple with electrochemical and mechanical models to **evaluate aging and health**
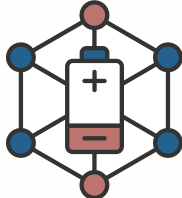
GT-SUITE Capabilities

CAD ➡ GEM3D Mesh ➡ GT-SUITE Simulation

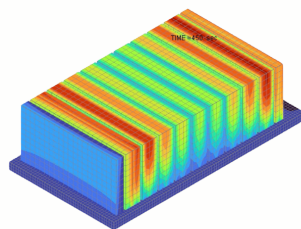### Import & Mesh Automatically

CAD
GEM3D

Model Real Battery Behavior Across Domains

- Electrochemical
- Thermal
- Mechanical

Configure Any Pack Layout and Get Localized Accuracy

- Cell discretization for localized heat generation
- Model parallel, series, or custom electrical architectures

Simulation-Driven Battery Design & Optimization

Thermal Management & Performance Insights

Understand how your battery system performs before building it

- Predict cell-level and pack-level temperature distributions
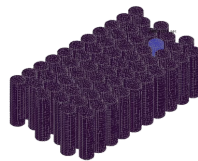
Evaluate Cooling Strategies
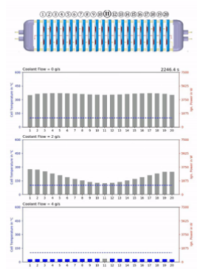- direct/indirect liquid cooling
- air cooling
- two-phase refrigerants

- Localize hot-spots and cold-spots for optimized thermistor placement

Design Optimization & Safety

Design smarter, safer and more efficient battery packs

- Optimize pack geometry and cooling topology
- Predict and mitigate **thermal runaway propagation** across cells
- Perform safety studies under abuse or fault conditions
- Use simulation to inform design trade-offs for **weight, space,** and **performance**

Use the Right Tools

GT-AutoLion:
- ✓ aging
- ✓ heat generation
- ✓ SoH predictions

GT-CONVERGE:
- ✓ detailed 3D CFD analysis of flow & heat transfer

Want to learn more about GT Battery Solutions?

Contact us:
www.gtisoft.com