

From Innovation to Impact

The BIC Story and What's Next

Les Alexander | Chief Executive Officer

First Tuesday at WestGate | Crane Naval Base Community



Agenda

Introductions

- **Battery Innovation Center Team**
 - Les Alexander
- **BIC Mission**
- **Battery Markets**
- **BIC Capabilities**
- **BIC Focus and Future**
- **Questions and Open Discussion**

Who We Are



Rapidly develop, test, and commercialize next-generation energy storage systems that are safe, reliable, and lower-cost — through a unique non-profit, public-private partnership with Industry, Government and Academia

2013

Founded

600+

Industry Partners

500+

Test Plans Executed

27+

Testing Standards

IP-secure · U.S. ITAR Facility · Non-Profit Organization · Newberry & Indianapolis, Indiana

The Origin Story

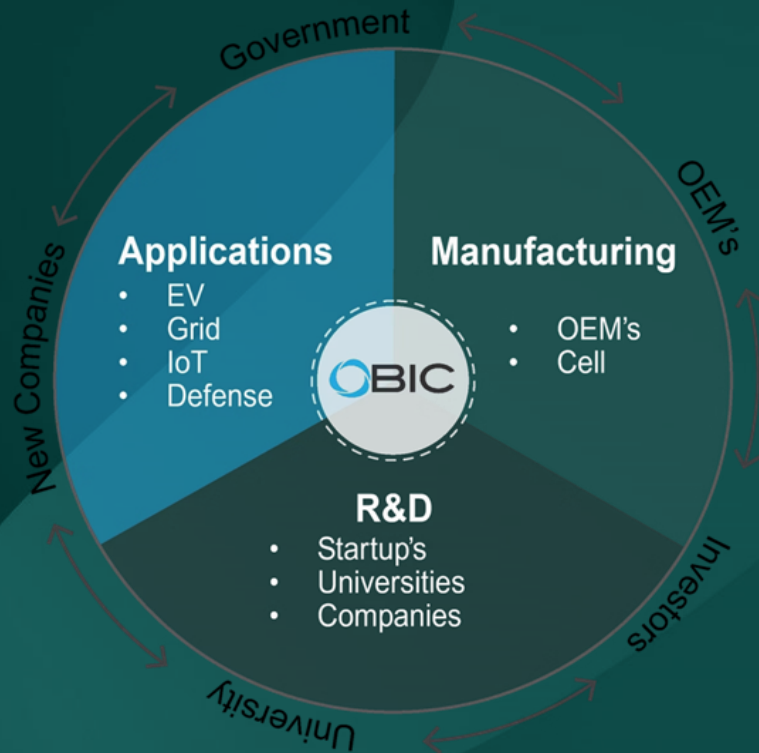


- Broke Ground in Newberry, IN**
- Facility Opened with a Goal of Driving Innovation**
- Energy Storage Short Course became an accredited 3-day training**
Accredited by Purdue University and Vincennes University
- BrightVolt and UL Became Incubators**
- Began Recurring Project-Based Grant Funding from the State of Indiana**
Focusing on accelerating the technology development and decreasing time to market of startups through project matching dollars
- Ateios Systems Became an Incubator**
Voted 2025 Manufacturer of the Year at the North American Battery Show-Detroit
- Worked with over 500 companies**
Engaging in various ways: Validating and improving their technology, Evaluating their performance, training their workforce, and more.
- Began Construction On Battery Innovation Center Indianapolis**
A domestic facility that allow companies to take their technology through to full pilot scale demonstration.
- Debuted Battery Technician Training and Battery Safety and Handling Course**
Joined Battery Workforce Challenge
- Trained over 2000 Students from across Industry and Academia**
Joined Battery Workforce Initiative

Strategic Partners



The BIC Mission is to Support the Indiana and National Battery Ecosystem From Research To Manufacturing



R&D Partners

BIC collaborates with startups, universities, and corporations to transform innovative materials and concepts into manufacturable, validated technologies.

Applications

BIC accelerates real-world validation of battery technologies for EV, grid, defense, and IoT applications through independent testing and system integration.

Manufacturing

BIC supports pilot-scale cell builds, process development, and quality validation to bridge prototype designs to full production readiness.

BIC Indiana Economic Development History



<p>Partnership with the State of Indiana</p>	<p>Business Attraction Stellantis/Samsung, GM/Samsung, Entech (\$10.2B combined capex)</p> <p>Grant History Awarded \$11M in State grants since 2013 for equipment refreshes, capital upgrades, workforce training, and strategic industry project support</p>
<p>Regional Economic Development</p>	<p>Westgate Tech Park Greene County</p>
<p>Small Business Voucher /Innovation Vouchers</p>	<p>BIC piloted the first vouchers that matured into the Innovation Voucher program statewide First recipients in 2018 were QEE Composites and Ateios</p>
<p>Battery Workforce Challenge/Battery Workforce Initiative</p>	<p>Collegiate competition preparing students for future battery manufacturing work Sponsor & partner to upskill domestic workforce</p>
<p>Li-Bridge Report</p>	<p>Recommends US DOE support select institutions' plans to bolster US battery manufacturing BIC identified as a top tier candidate for future investment</p>

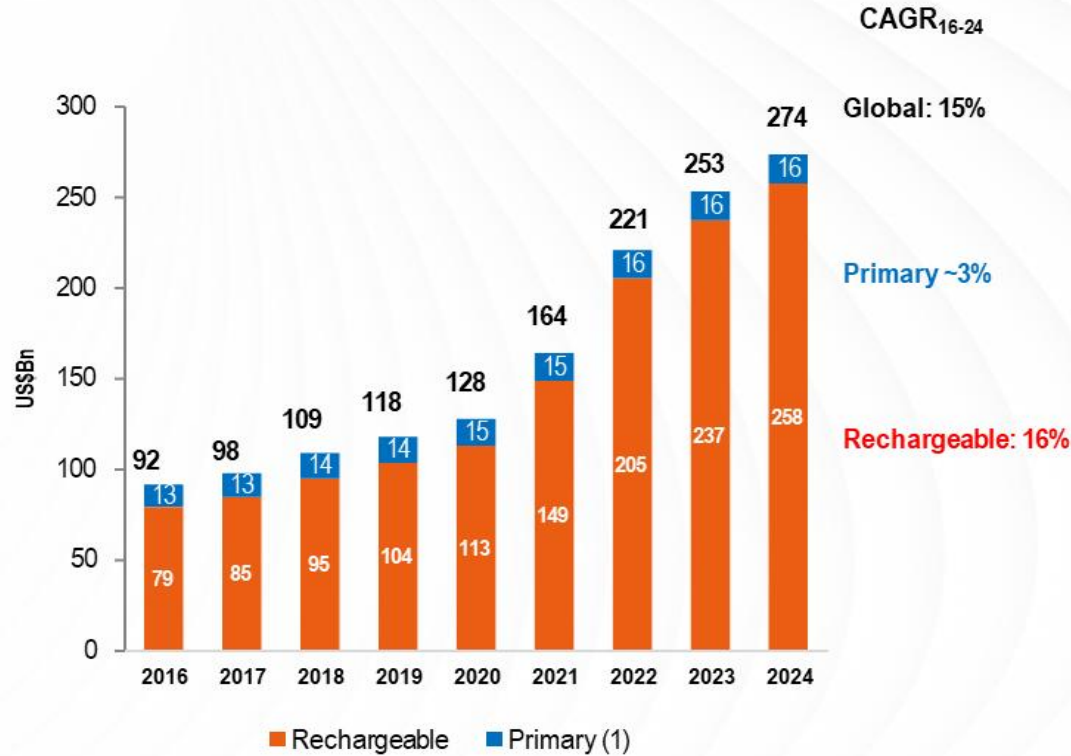


IP-secure · U.S. ITAR Facility · Non-Profit Organization · Newberry & Indianapolis, Indiana

Battery Markets



Battery market in value 2016-2024, worldwide, US\$ Bn



(1) Non rechargeable – Source: AT Kearney, Duracell, Avicenne
Based on selling price from manufacturer to retailer

April 25

Source: Avicenne Energy 2025

WORLD BATTERY MARKET OVERVIEW

Total Battery market Worldwide is >250 Bn

MACRO-TRENDS DRIVING THE BATTERY MARKET

Battery is a key technology for new concepts of mobility and energy (e.g. electric mobility, stationary storage) supported by the following trends:

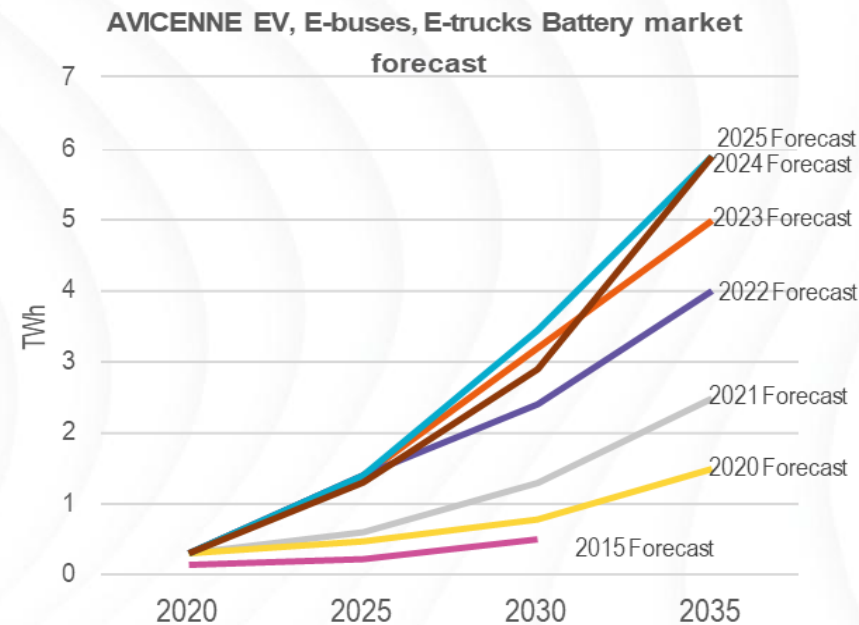
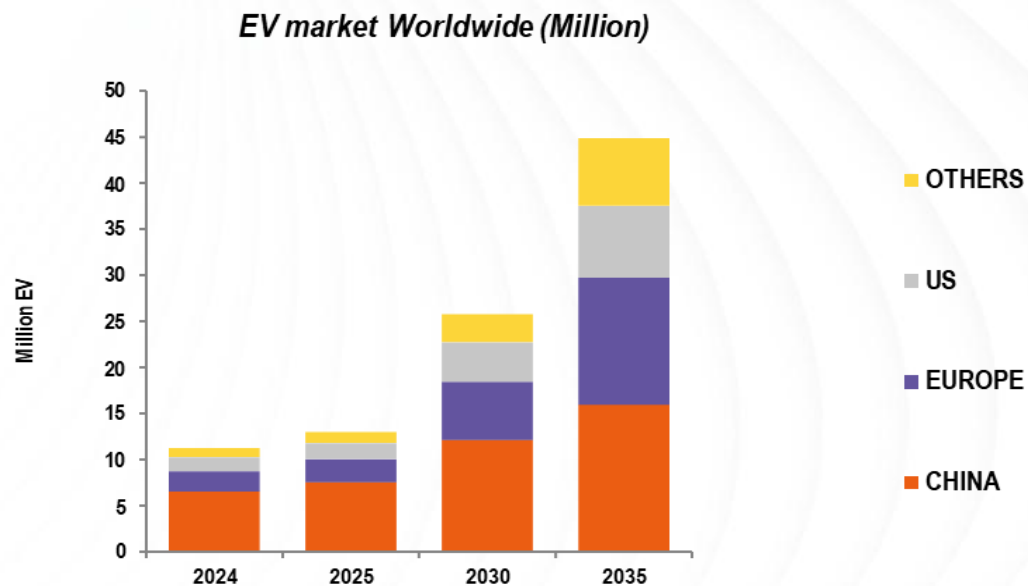
- Population increase and city growth challenging existing mobility and energy solutions
- Shift in energy production with an increasing focus on renewable energies as an alternative to fossil fuel and nuclear
- Global awareness regarding global warming pushing for adoption of green solutions (global objective of CO2 emissions reduction, government regulations and incentives, social pressure for environmental-friendly solutions)



EV forecasts worldwide

Full EV (Passenger cars & commercial vehicles) market will be ~45M worldwide in 2035

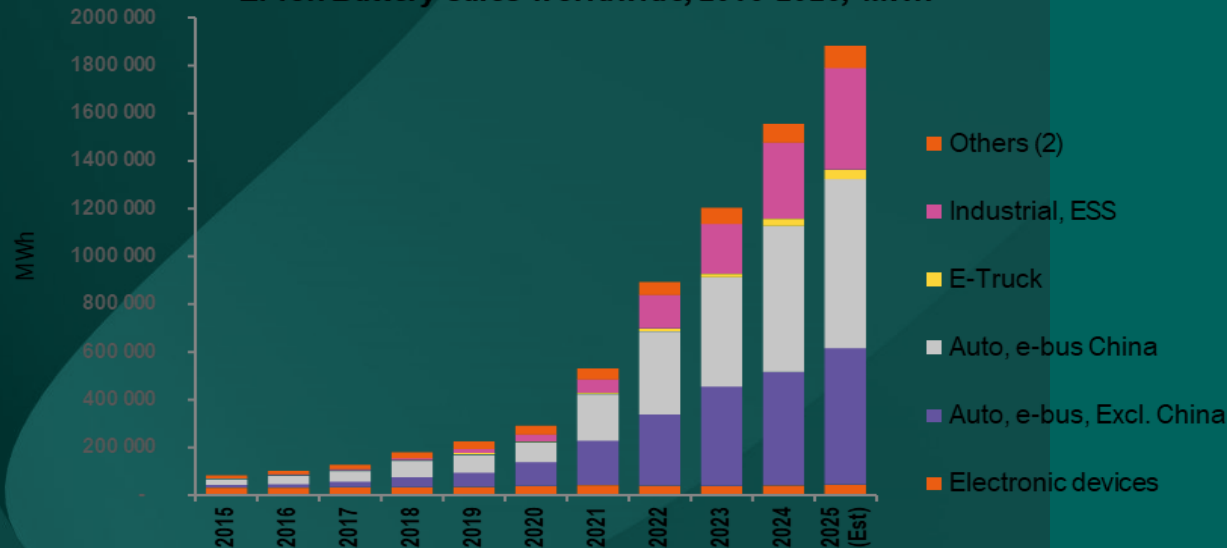
Avicenne Energy always underestimate the battery market



The Lithium-ion battery market 2000 - 2025

In 2024, EV, e-buses & e-trucks account for 72% of the li-ion battery market with a total LIB market of ~ 1 600 000 MWh

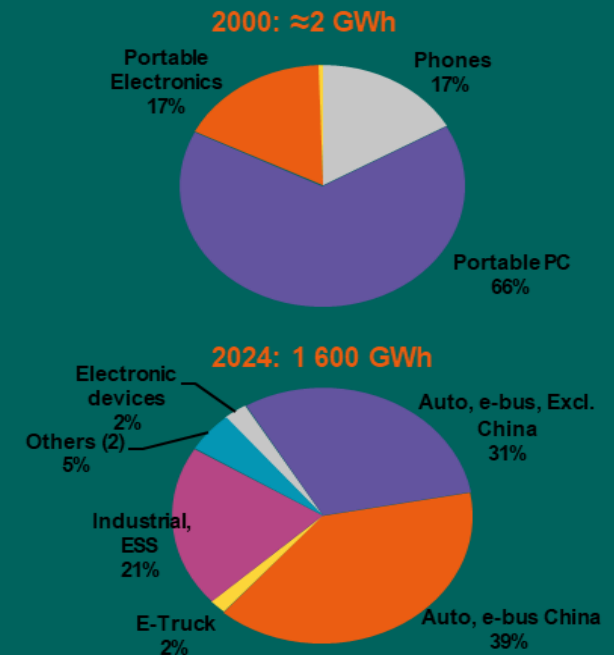
Li-ion Battery sales worldwide, 2015-2025, MWh



CAGR₂₀₋₂₅

- 20%
- 69%
- 92%
- 54%
- 41%
- 3%

CAGR 20-25: 45% per year in volume



hrs
33 1
(1) Pack level
(2) 5% medical devices, power tools, gardening tools, e-bikes...

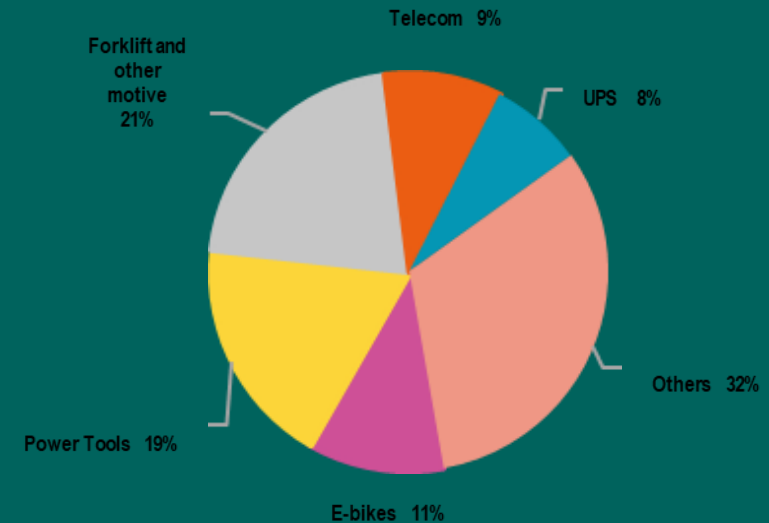
Details on the "OTHERS" applications

In 2024, the so called "other" applications represent a market of US\$46Bn¹ at pack level

- E-bikes, 3 wheelers
- Power tools including gardening tools, cordless vacuum cleaner
- Forklift, Automatic handling equipment, Motive industrials, Automated Guided Vehicles, Scrubber Dryer Machines,
- Stationary including Telecom, UPS, Back-up
- Medical
- Marine
- Aviation
- Railways
- Low Speed Electric Vehicles
- Others...



Other applications market share in 2024, % of value



¹: Pack level: Pack including cells, cells assembly, BMS, connectors – Power electronics (DC-DC converters, invertors...) not included

April 25

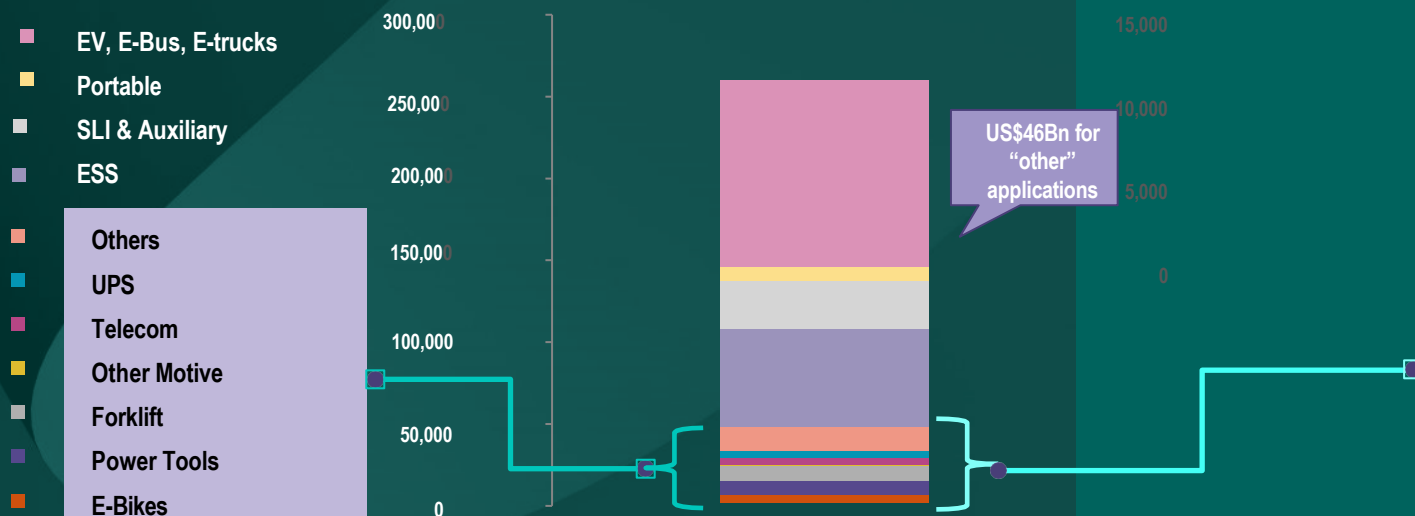
Source: Avicenne Energy 2025

© AVICENNE ENERGY

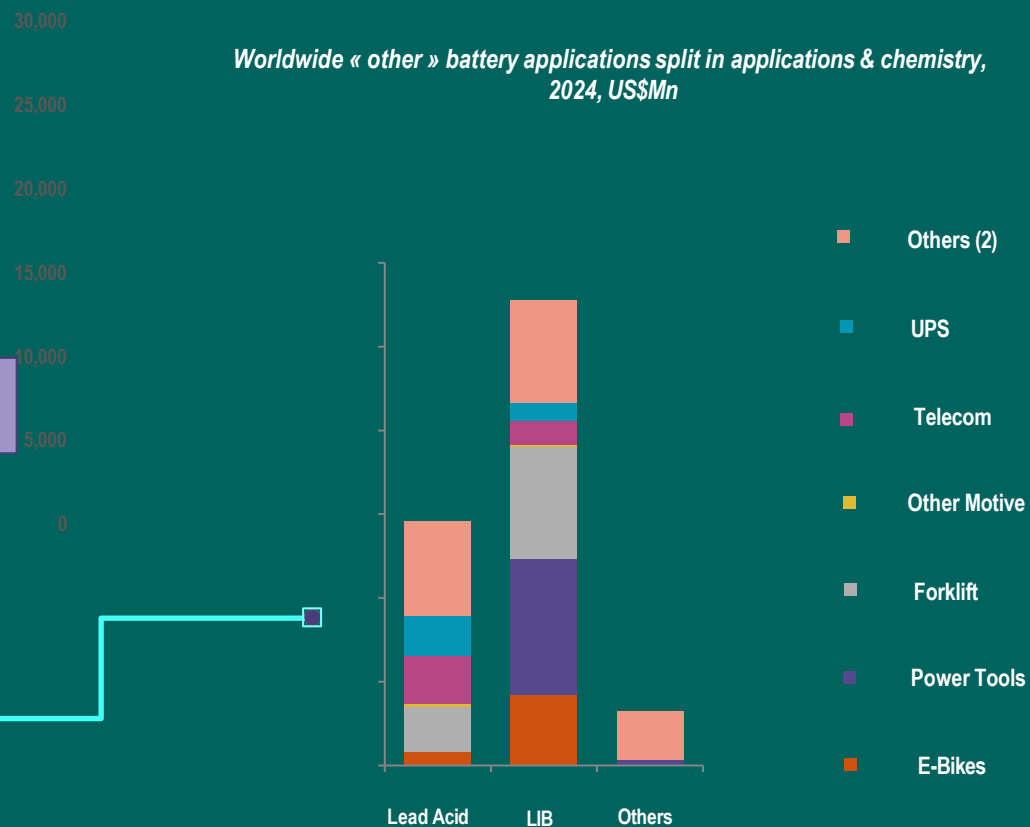
The worldwide battery market in 2024

Beyond EV, Portable, SLI market & ESS, a lot of “other” applications are growing, representing an additional market of US\$ 46Bn¹ in 2024

Worldwide battery Market split in applications, 2024, US\$Mn

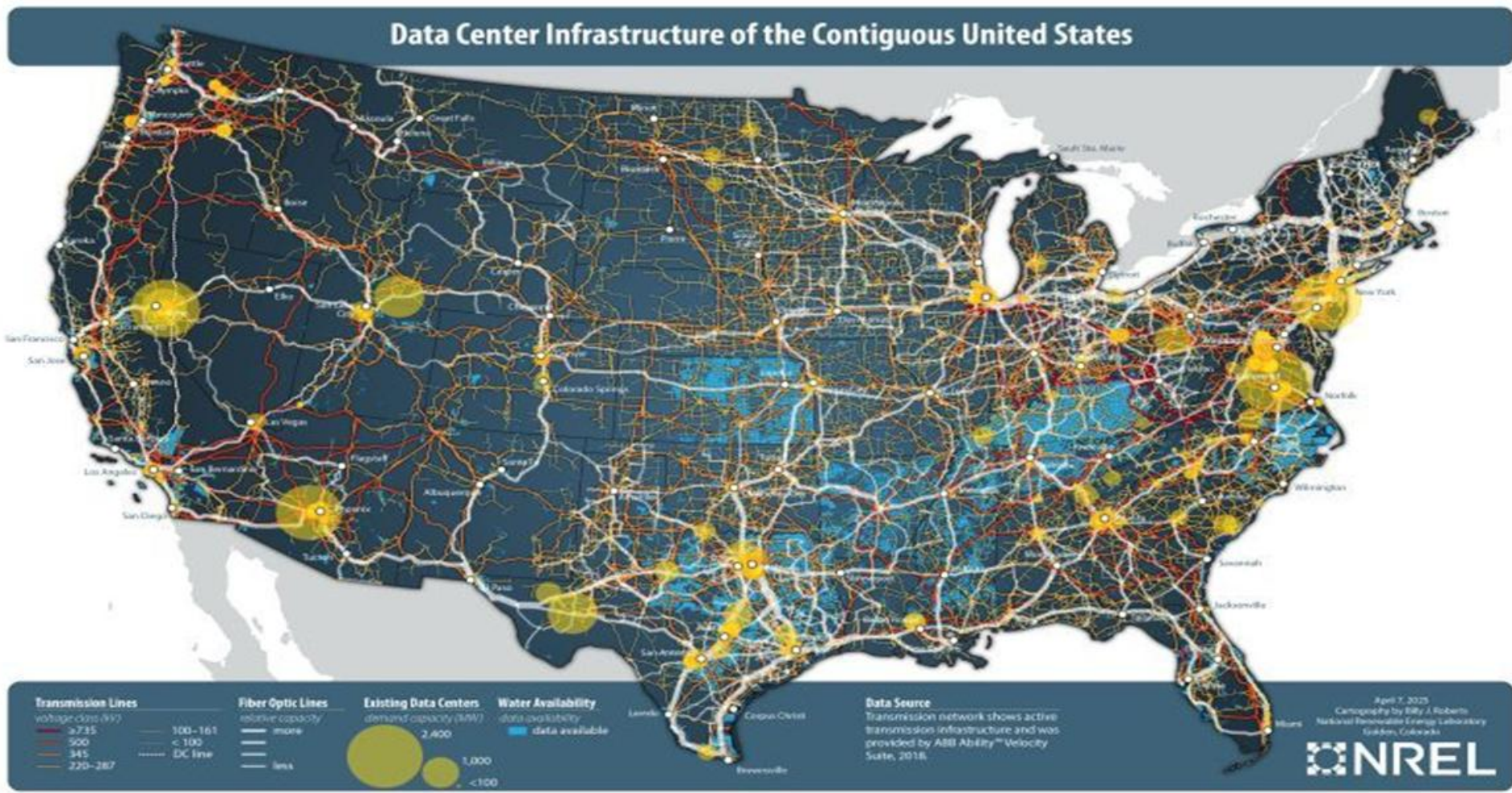


Worldwide « other » battery applications split in applications & chemistry, 2024, US\$Mn



¹ Pack level: Pack including cells, cells assembly, BMS, connectors – Power electronics (DC DC converters, invertors...) not included

² Other app: marine, train, aviation, space, medical, caravanning, Low speed electric vehicles, Golf Kart...

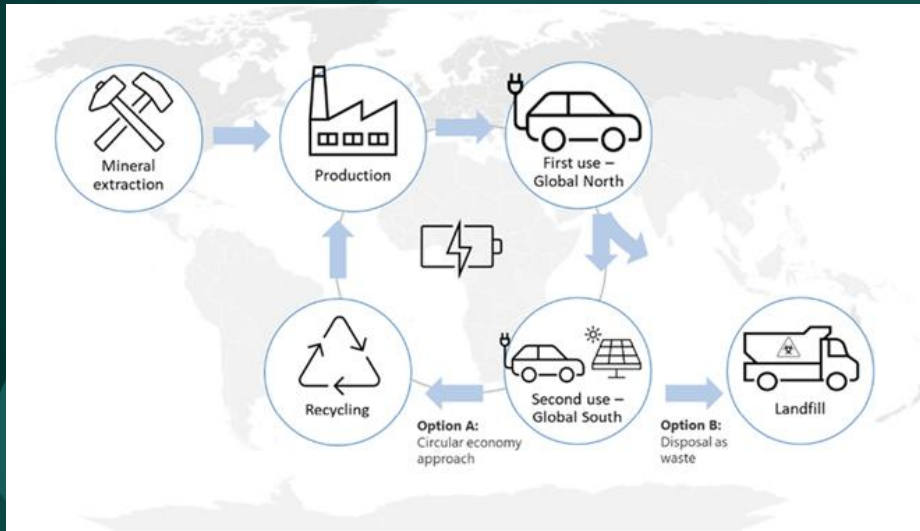


The need for Grid and Microgrid support is growing to support the Data Center Network

New Technology Trends in the Battery Industry

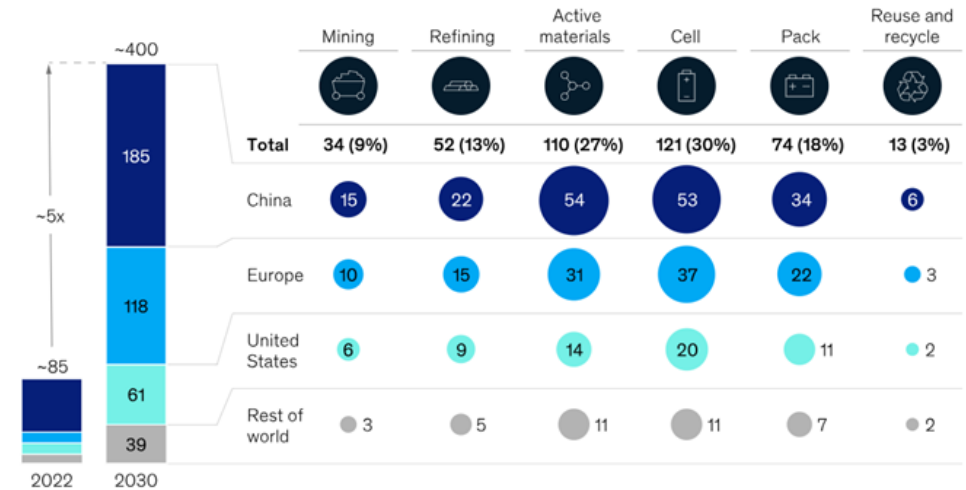


- Beyond traditional Lithium-ion: solid-state, sodium-ion.
- Improvements in energy density, cycle life, and safety.
- Sustainability initiatives: recycling, eco-friendly materials.



Our model projects that the Li-ion battery value chain will provide revenue opportunities of over \$400 billion by 2030.

Revenues, base case 2030, \$ billion



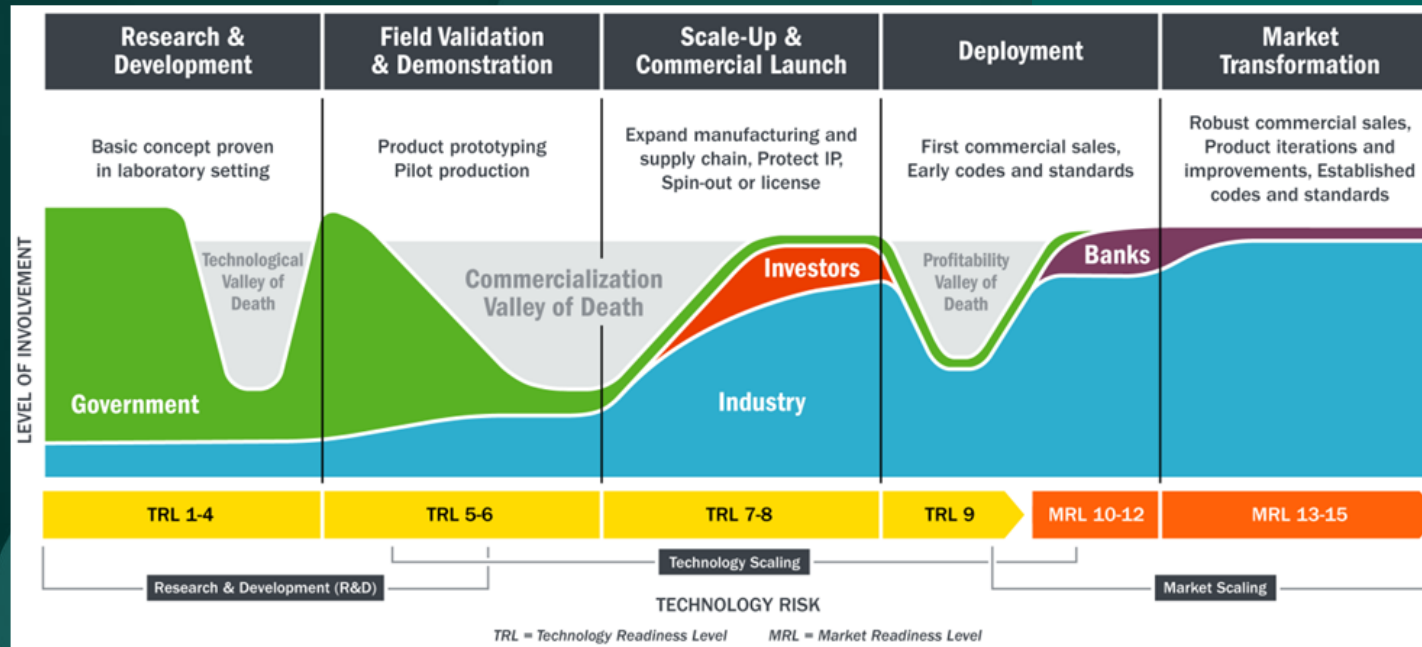
Source: McKinsey Battery Insights, 2022

McKinsey & Company

The battery industry is at an inflection point – US battery market is quadrupling by 2030, but most innovation dies crossing the commercialization valley of death.



Tech-to-market process



Where the industry is heading

- **North American cell production capacity:** ~300 GWh today → 1,200+ GWh projected by 2030.
- **The challenge is capability.** Manufacturers must engineer competitiveness through yield, automation, and process control. Cost alone doesn't win.
- **The missing piece:** a domestic, neutral, full-stack proof-of-concept infrastructure that bridges lab-scale innovation and gigafactory deployment.
- **This is the gap BIC was built to fill,** and is positioned to continue leading.

BIC combines chemistry-agnostic capability, full-stack services, and customer-neutral infrastructure. No other US facility does all three.



BIC's core capabilities



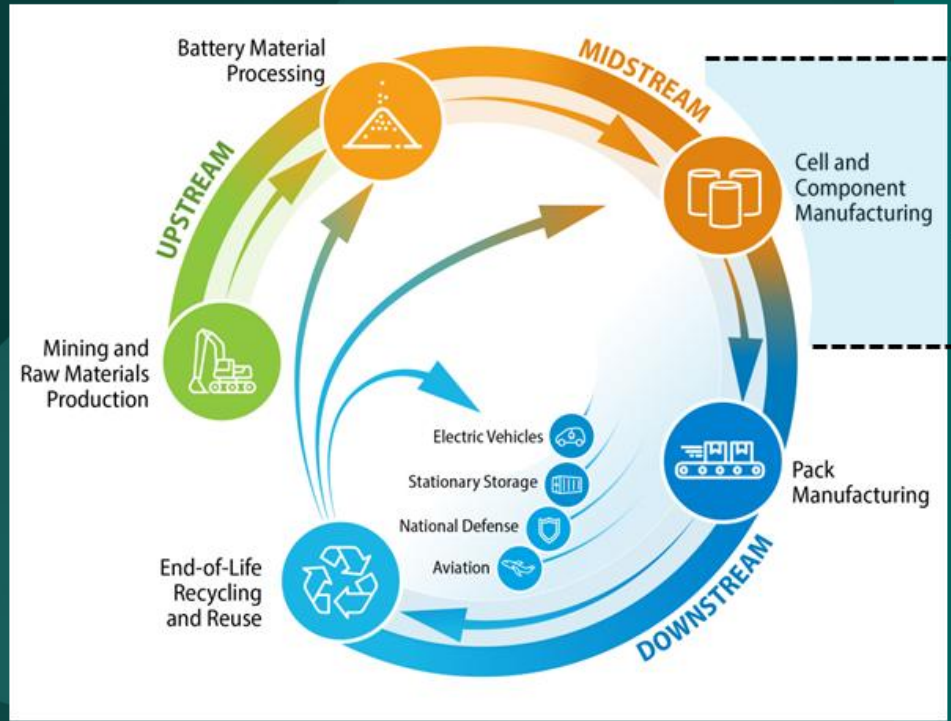
BIC's structural edge

- **Chemistry-agnostic.** LFP, NMC, solid state, sodium ion, silicon – BIC works across all of them.
- **Full-stack services.** Advanced cell development, pilot-scale manufacturing, testing and evaluation, workforce training, technical consulting.
- **DoD-grade security.** ITAR-secure. IP walled between clients. Adjacency to NSWC Crane for military-spec validation.
- **Customer-neutral.** Nonprofit. No competing commercial interests. Clients span the full ecosystem: OEMs (GM, Caterpillar, Cummins), materials companies (Dow, DuPont, Nanograf), startups, DOD programs, universities.

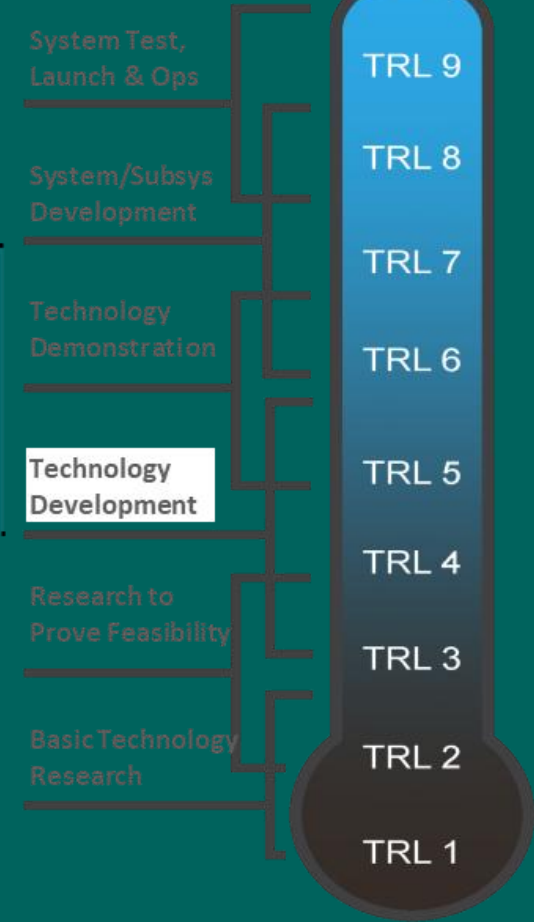
BIC operates at the critical midstream layer, covering TRL 4-7 where manufacturability is proven before capital commits. Not upstream. Not downstream.



Lithium-ion battery supply chain segments



BIC's zone



Core Capabilities



Cell Development

Slurry mixing, R2R coating, coin/pouch/cylindrical fabrication, formation cycling



Test & Evaluation

18 cycling systems, 250+ channels, abuse testing, teardowns, standards compliance at the cell, pack, and module level



Microgrid & Grid

AC simulators (180kW+), V2G, Containerized Systems, Utility Permitting Support



Workforce Training

3-day short courses, CEU-accredited, custom on-site training, Battery 101 to BMS



Engineering Advisory

Cell/pack design review, BMS consulting, failure analysis, second-life support



Industry Partnerships

No IP or Patents, No Published Papers, Startup incubation, Supplier & OEM partnerships

BIC Capabilities

Advanced Cell Development



01

Mixing & Coating

ROSS double planetary mixers up to 7.5L · DURR/MEGTEC R2R reverse comma bar coating line · Multi-stage drying ovens

02

Cell Fabrication

Coin, pouch, & 18650 cylindrical · ATOM press, TOB z-fold stacker · Ultrasonic welder, vacuum sealer

03

Electrochemical Testing

400+ ARBIN channels ($\pm 15\mu\text{A}$ to $\pm 10\text{A}$) · GAMRY 32-channel EIS systems · Thermal chambers -40°C to $+180^\circ\text{C}$

Battery Chemistries & Formats

- Lithium-ion (Li-ion)
- Lithium-sulfur (Li-S)
- Sodium-ion (Na-ion)
- Aluminum-ion (Al-ion)
- Silicon anode materials
- Graphene-enhanced anodes
- Coin · Pouch · Cylindrical
- <1% RH dry room environment
- Argon glovebox storage

Test & Evaluation

From single cells to full Battery Energy Storage Systems



18

Cycling Systems

250+

Test Channels

900V

Max Voltage

500+

Test Plans Run

Performance Testing

- Capacity & energy efficiency
- Cycle life & calendar aging
- Custom duty cycles
- Environmental conditions (-60°C to +180°C)
- Benchmarking & R&D validation

Abuse & Safety Testing

- Overcharge & external short
- Nail penetration & crush
- Thermal runaway propagation
- UL 9540A, UN 38.3, SAE J2464
- MIL, IEC, IEEE, ISO standards

Teardown & Failure Analysis

- Cell, module & full pack teardowns
- Physical & electrical diagnostics
- Root cause investigation
- High-resolution documentation
- Design improvement support

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Workforce Development



Energy Storage Short Course

3-Day Comprehensive Program

- Battery 101 — Chemistry & Fundamentals
- Cell Manufacturing Processes
- Testing & Validation Methods
- Microgrid Integration
- Battery Management Systems
- Standards & Regulations
- Second-Life Applications
- Emerging Technology Trends

\$1,500/attendee · Member discounts available · CEU Accredited

Accredited by Purdue University & Vincennes University

Tailored Custom Training

On-site or at BIC facilities. Curriculum built to your needs.

- Slurry Mixing & Coating
- Cell Fabrication (Pouch, Cylindrical)
- Module & Pack Assembly
- Electrochemical Test Setup
- BMS Function & Design
- High-Voltage Safety Protocols
- Battery Standards & Regulations
- Advanced Characterization Techniques

BIC's Expansion into EMC2 Indianapolis 2027



Expanded Capabilities

The Emerging Manufacturing Collaboration Center (EMC²) is the next phase of technology development after BIC's Newberry facility, focused on domestic advancements in battery manufacturing.

Lithium Battery Low Volume Cell Manufacturing



- Materials Mixing and Electrode Coating
- Cylindrical & Pouch Cell Manufacturing
- Cell Testing
- Cell Manufacturing Training
- Advanced Manufacturing Development

Applications



- Military
- Commercial
- Workforce Development

Partnerships:



BIC Focus and Future

Strategic Vision – What's Next



Expanded Capabilities

Scale pilot manufacturing, add solid-state and sodium-ion cell lines, expand environmental test chamber capacity.



U.S. Manufacturing Resilience

Support domestic battery supply chain development, reduce foreign dependencies for defense and commercial sectors.



Growing Partnerships

Deepen ties with Crane, DoD programs, and commercial OEMs. Expand global collaborations with Australia and India.



Innovation & Commercialization

Accelerate startup-to-market timelines, maintain IP-neutral environment, and drive TRL advancement for new chemistries.



Workforce Pipeline

Grow the battery workforce through expanded training, university partnerships, and hands-on apprenticeship programs.



Energy Resilience for Defense

Provide Crane and DoD with trusted, domestic testing and development for mission-critical energy storage systems.

Military

BIC's Drone Engagement

Support of National Defense and Drone Dominance



Indiana

- Engagement of NSWC Crane
- Establish a Battery and Test Support center at BIC
- Build out drone Supply Chain within Indiana
- Support Drone Manufacturing

National Defense

- Innovation of Drones is reshaping the battlefield
- Department of War Objective to Support Drone Industry
- Innovation will be required to maintain and increase dominance
- DOW is on a timeline
- A fully domesticated supply chain

Battery Innovation Center

- Portable Power and Energy Fundamentals
- Deep Understanding of Battery Science
- Test and Evaluation Experience
- Transition to Manufacturing
- Move-in Ready Facility and Expansion Support Drone Deployment

Portable Power and Energy Enable Drone Capability

IP-secure · U.S. ITAR Facility · Non-Profit Organization · Newberry & Indianapolis, Indiana

Why BIC Matters for Defense



Located adjacent to NSWC Crane — one of the nation's premier naval warfare centers — BIC is uniquely positioned to serve defense energy storage needs.



ITAR-Secure Facility

Full U.S. ITAR compliance for sensitive defense programs. Secure cell development, testing, and data generation.



Mission-Critical Power

From soldier-worn devices to vehicle systems and shipboard energy storage — tested to MIL and DOD specifications.



Domestic Supply Chain

Strengthening U.S. battery manufacturing independence, reducing reliance on foreign sources for critical energy tech.



Rapid Prototyping

Fast iteration from concept to tested cell — accelerating DoD and NSWC Crane program timelines.

Partner Ecosystem



Defense & Government

NSWC Crane

NAVSEA

U.S. Army

U.S. Department of Energy

Indiana EDC

Industry & OEMs

Cummins

Dupont

DOW Chemical

LG Chem

Caterpillar

Maccor

Startups & R&D

NanoGraf

Valgotech

Elegus Technologies

Soteria BIG

Feasible Inc.

Global Partners

Graphene Mfg Group (AU)

Gelion (AU)

Agnitech (India)

General Motors

LG Chem

600+ domestic partners across defense, transportation, manufacturing, and academic sectors

INTEGRATORS



OEMs



PHOTON AUTOMATION, INC.



IVY TECH COMMUNITY COLLEGE

EDUCATORS



TEN-NINE TECH

STARTUPS

Key Takeaways



1

BIC is Indiana's — and one of the nation's — premier independent battery R&D organizations, operating as a trusted, IP-neutral partner.

2

Our proximity to NSWC Crane and as an ITAR-secure facility make us a natural, reliable partner for defense energy storage programs. New Technologies for Batteries, Unmanned Systems, Hypersonics, legacy weapon systems

3

From cell fabrication to full-pack abuse testing, BIC's capabilities span the entire battery development lifecycle.

4

Our workforce training programs are building the next generation of battery engineers and technicians for defense and industry.

5

BIC's strategic expansion — through EMC2 Indianapolis — positions us to scale innovation and commercialization for domestic manufacturing. EMC2 supports National Defense goals for Domestic manufacturing.

Questions?

Les Alexander

Chief Executive Officer, Battery Innovation Center

www.bicindiana.com

info@bicindiana.com

(812) 863-2424

