PAG

POWER AHEAD GROUP

Infrastructure-Grade Energy Storage for the AI Era

MegaSIB™ BESS Platform · Next-Generation Sodium-Ion

Confidential Investor Presentation

Why PAG Is a Once-in-a-Decade Infrastructure Platform

PAG is building an infrastructure-grade sodium-ion platform to solve the lifecycle, safety, and scalability limits of lithium-based energy storage.

1

30-Year Lifecycle

Transforms battery storage into infrastructure-grade assets. No mid-life replacement. Fully financeable over decades.

2

Full-Stack IP

5 gatekeeper + 6 upstream material U.S. patents. Three-layer architecture prevents technological bypass.

3

OEM Scalability

Apple-style asset-light model. No gigafactory capex. Multi-GWh expansion via global OEM partner network.

4

$1B Revenue Path

1 GWh ≈ $320M revenue. 3–4 GWh unlocks $1B+. OEM scaling drives rapid expansion with strong margins.

MARKET OPPORTUNITY

AI Is Rewriting the Rules of Power Infrastructure

50–300 MW

continuous power
per AI data center site

3–7 Years

grid interconnection delay
forcing on-site storage

$500B+

global energy storage
market by 2030

- AI data centers are becoming industrial-scale power users — reshaping global grid infrastructure
- Instant load ramping creates grid stress and interconnection bottlenecks no utility can resolve quickly
- Energy storage is transitioning from optional equipment to mission-critical core infrastructure
- PAG is purpose-built to serve this demand with a 30-year infrastructure-grade platform

THE PROBLEM

Lithium Was Never Built for Infrastructure

Lifecycle Mismatch

Typical lithium systems last only 10–12 years, while infrastructure assets are financed over 20–30 years. Mid-life replacement is guaranteed.

Thermal Runaway Risk

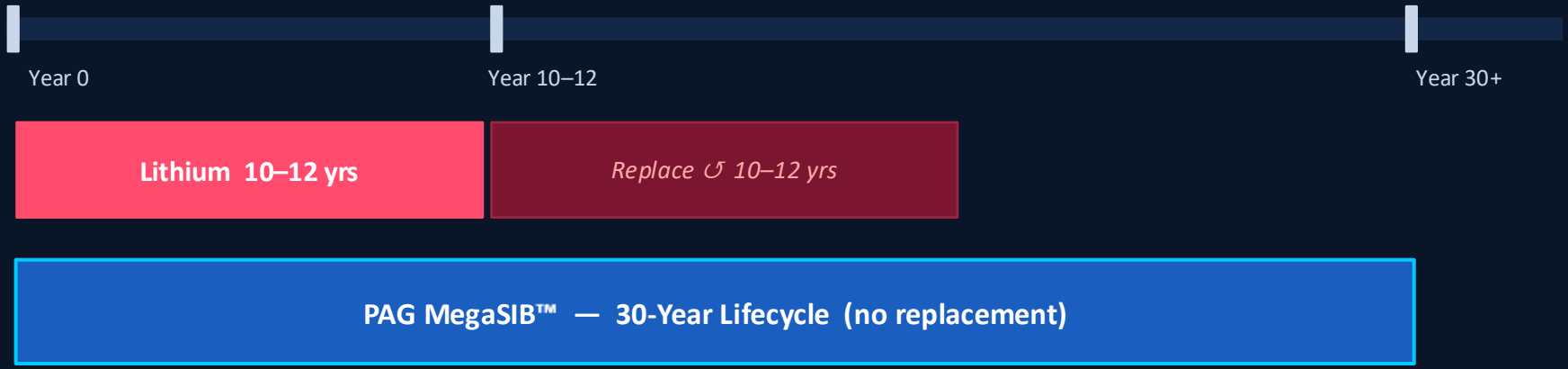
At infrastructure scale, thermal runaway risk becomes critical — limiting deployability in AI data centers, hospitals, and dense urban installations.

Replacement Burden

Mid-life replacement doubles lifecycle cost, adds downtime, maintenance complexity, and makes long-term project financing nearly impossible.

THE PROBLEM

Infrastructure Gap: Battery Life Must Match Asset Life



- Short-life storage creates refinancing and reinvestment risk at exactly the wrong time in the asset lifecycle
- Replacement events interrupt operations, reset financing structures, and weaken long-term returns
- A 30-year storage platform aligns with infrastructure financing logic — and commands premium valuation

THE SOLUTION

MegaSIB™ — Infrastructure-Grade Sodium-Ion BESS Platform

Not simply another battery product — a structural redesign engineered for 30-year infrastructure deployment.

Sodium-Ion Chemistry

Non-lithium platform with more stable supply chain and superior safety profile. No nickel, cobalt, or manganese.

Infrastructure Lifecycle

30-year conservative lifecycle, targeting up to 35 years. No mid-life replacement. Fully financeable over the asset life.

Deployment-Ready Model

Product design, IP, OEM production, and system integration all under PAG control. Ship and operate at scale.

Target Customers

AI data centers, grid-scale storage, industrial energy. Applications where lifecycle cost and safety matter most.

LIFECYCLE ADVANTAGE

Game Changer: 30 Years vs. 10–12 Years

PAG

30

years — conservative lifecycle

vs.

Lithium

10–12

years — typical lifecycle

Up to 3× lifecycle advantage | Eliminates replacement cycles | Transforms batteries into infrastructure assets

STRUCTURAL BREAKTHROUGH

Structure Determines Lifecycle — The Architecture Shift

KEY INSIGHT: STRUCTURE DETERMINES LIFECYCLE

⚠ Lithium Architecture

Small Cylindrical / Prismatic / Blade Cells

- ✕ Requires Liquid Cooling System
- ✕ High Complexity & Maintenance Cost
- ✕ Thermal Runaway Risk at Scale
- ✕ Lifecycle: 10–12 Years Only

✓ MegaSIB™ Ultra-Large Architecture

120mm × 420mm · 280Ah per cell

- ✓ **Natural Cell Spacing**
  Ultra-large cells create built-in airflow gaps
- ✓ **Precision Air Thermal Management**
  Active air cooling & heating — no liquid, no leak risk
- ✓ **Simple System, Higher Reliability**
  Fewer components, fewer failure points
- ✓ **Designed for 30-Year Lifecycle**
  Architecture aligned with infrastructure economics

PRODUCT ADVANTAGE

1 MegaSIB™ Replaces Hundreds of Conventional Cells

Ultra-large cell architecture means dramatically fewer cells, fewer connections, fewer failure points — and a much simpler system.

MegaSIB™

120 × 420 mm

280 Ah

0.84 kWh / cell

= 1 CELL

=

36× — **4680 Cells** — 46 × 80 mm

196× — **2170 Cells** — 21 × 70 mm

287× — **1865 Cells** — 18 × 65 mm

Fewer cells → fewer connections → simpler BMS → lower cost → higher reliability

Built for High-Value, Long-Life Infrastructure Customers

MegaSIB™ is positioned for customers where uptime, lifecycle cost, and safety matter more than short-term equipment price.

AI Data Centers

Supports 50–300 MW continuous loads and strict power reliability requirements. Grid delay of 3–7 years makes on-site storage essential.

Grid-Scale Storage

Renewable integration, peak shaving, and grid stabilization. 30-year lifecycle aligns with long-term infrastructure financing.

Industrial Energy

Factories, logistics hubs, and energy-intensive assets seeking long-duration, low-maintenance energy reliability.

Full-Stack Control Across the Entire Value Chain

PAG controls the key layers required to define, protect, manufacture, and deploy the MegaSIB™ platform.

01

Materials

Proprietary NFPP cathode, custom anode foil, and separators. Owned via U.S. priority filings.

02

Cell Design

Ultra-large 120×420mm cylindrical sodium-ion architecture. Full-tab design minimizes internal resistance.

03

Manufacturing

Global OEM production under PAG-controlled specifications. No gigafactory capex required.

04

System Integration

BESS design, controls (BMS + PCS), Precision Air Thermal Management, and deployment quality control.

INTELLECTUAL PROPERTY

Full-Stack IP — A Three-Layer Moat Competitors Cannot Bypass

Layer 1: System Architecture

5 Core U.S. Patents — System Design, Manufacturing & Integration

World's first platform-level co-manufacturing system for ultra-large cylindrical sodium-ion batteries — covering BESS system design, cell-to-system manufacturing, Precision Air Thermal Management, and full system integration. Gatekeeper patents controlling the underlying architecture.

Layer 2: Materials

6 U.S. Material Patents — Cathode · Anode · Separator

Proprietary NFPP cathode and hard carbon anode IP system — custom anode foil and separator formulations filed under U.S. priority. Upstream chemistry owned at the source. Replication requires infringement; no capital can buy around this layer.

Layer 3: Patent Family Expansion

5 Families × 20 Continuations = 100+ U.S. Patents — Total System Lock

Apple-style platform patent architecture: 5 gatekeeper patents expand into ~20 continuation/divisional filings each. OEMs who modify partial designs still cannot bypass the platform. No expiration gap to exploit — every angle covered, total system lock.

5	Core System U.S. Patents
6	Material U.S. Patents
5×20	Continuations per Family
100+	Total Patent Families

Why Competitors Cannot Catch Up

Three compounding barriers — each independently blocking, all three required to compete. No shortcut exists.

Barrier 1 — You Can't Build the System

5 gatekeeper U.S. patents cover every viable BESS system design at this scale

Must design around all 5 gatekeeper patents simultaneously — OEMs who modify partial designs still cannot bypass the platform. Years of litigation risk before a single unit ships.

Barrier 2 — You Can't Source the Chemistry

6 U.S. material patents lock the NFPP cathode, anode foil, and separator — owned at the source

NFPP cathode and hard carbon anode IP owned at the source — plus intelligent OCV/IR detection across production, storage, and transport. Chemistry and quality infrastructure both locked. Hardest layer to design around even with unlimited capital.

Barrier 3 — You Can't Outlast the Portfolio

5 core patents × ~20 continuations = 100+ filings — every angle covered, no expiration gap to exploit

Crack one layer, face two more. Like Apple and Tesla — PAG's portfolio is a platform standard, not a single formula. Continuation filings close every gap as the technology evolves.

Result: PAG is not a battery company competing on price — it is a platform standard owner commanding technology. Platform standard + manufacturing system + system ecosystem = long-term control.

BUSINESS MODEL

Apple-Style OEM Platform — Product Revenue + Platform Margin

PAG

Platform Owner

Owns IP
Product design
System architecture
Brand & commercialization

OEM Partners

Manufacturing

Global factories
No gigafactory capex
Multi-region capacity
Rapid scale-up

End Customers

Revenue

AI data centers
Grid operators
Industrial users
Utility companies

PAG controls IP, product design, and branding — OEM partners execute manufacturing — zero gigafactory exposure.

OEM SCALING MODEL

Multi-GWh Growth Without Heavy Capex

- OEM partners act as manufacturing extensions of PAG — producing under PAG-controlled specifications
- PAG controls product definition, IP, quality standards, and deployment consistency
- No need to fund full gigafactory buildout before commercial scale
- Multi-region production supports rapid expansion and customer localization
- Asset-light model improves capital efficiency and dramatically accelerates time to market

Capital Efficiency Comparison

Traditional (own factory)

High Capex — Slow to Scale

PAG OEM model

Lower Capex ✓

OEM Partnership Strategy: Validated Revenue Foundation

TIER 1 | CORE OEM (Active)

Status: Production Underway

✓ Joint product development and co-manufacturing in progress
✓ U.S. certifications nearly complete — all major by Oct 2026
✓ Final large-scale combustion test in progress
✓ Initial deployments proceeding under current certification scope

Revenue generation begins near-term (2026)

TIER 2 | EXPANSION OEMs (2027)

Status: Onboarding — Launch in 2027

✓ Multiple large-scale OEM partners in negotiation / onboarding
✓ Production agreements targeted to activate in 2026
✓ Parallel capacity model: no single-factory dependency
✓ PAG controls IP, QA, standards; OEM partner manufacture

Unlocks GWh-scale revenue ramp from 2027 onward

Multi-OEM platform: 100MWh → 1-2GWh → 20GWh scale without single-factory capex risk

OEM-Backed Revenue Roadmap: 100MWh to 20GWh

PHASE 1: 2026	PHASE 2: 2027	PHASE 3: 2028+
100 MWh	**1-2 GWh**	**20 GWh**
Driven by Core OEM Partner • All key U.S. certifications complete by Oct 2026 • Combustion test remaining; interim deployments approved • Real, committed revenue — not projections alone	**Expansion OEMs Activated** • Additional large-scale OEMs launch production • Parallel manufacturing capacity, no new factory required • Multi-OEM competition lowers cost, raises quality	**Full Platform at Scale** • Full multi-OEM ecosystem producing at scale • Enterprise value driven by platform control, not cell manufacturing • Comparable model: Apple controls ecosystem, OEMs execute

Revenue projections are backed by active OEM production agreements, not speculative forecasts

MARKET OPPORTUNITY

Three Large Infrastructure Demand Pools

PAG targets applications where lifecycle economics and infrastructure-grade performance command premium strategic value.

AI Data Centers

$200B+ TAM

Explosive power demand, strict uptime requirements, and grid connection delays of 3–7 years. On-site storage is becoming non-negotiable.

Grid Storage

$180B+ TAM

Renewable integration, peak shaving, grid stability, and long-duration storage. 30-year lifecycle aligns with utility asset financing.

Industrial Energy

$120B+ TAM

Factories, logistics hubs, and energy-intensive industrial assets seeking long-duration reliability at lowest total cost.

Lower Total Cost of Ownership Over 30 Years

Lifecycle Cost per kWh

Lithium (2 replacements)

~$500/kWh lifecycle

PAG MegaSIB™ — zero replacements

$320/kWh

35–40% Cost Advantage

over 30-year asset life

Why the Advantage Holds

No Mid-Life Replacement
Eliminates double capital outlay and project financing complexity.

Lower Downtime Risk
No replacement-related outages over the 30-year asset life.

Better Financing Profile
30-year lifecycle aligns with infrastructure bond and debt structures.

Precision Air Thermal Management
Eliminates liquid cooling — lower maintenance, higher reliability.

INVESTOR RETURNS

Data Center ROI: $1 Invested → $3.4 Return Over Lifecycle

Assumption: electricity price $0.10/kWh | Payback period: approximately 3–5 years | Remaining lifecycle generates long-term cash flow

$320	$1,095	3.4×	~2.2×
investment per kWh	lifetime value per kWh	PAG lifecycle ROI	lithium lifecycle ROI

Return Comparison

PAG MegaSIB™

3.4× ROI

Lithium Systems

2.2× ROI

PAG

POWER AHEAD GROUP

Structural Breakthrough

Ultra-large cylindrical architecture with Precision Air Thermal Management. 30-year lifecycle. Zero lithium.

Scalable OEM Platform

Apple-style model. Zero gigafactory capex. Rapid global expansion via controlled OEM partners.

Full-Stack IP Platform

Three-layer U.S. patent moat. System → Cell → Materials. Competitor bypass structurally prevented.

Higher Return. Lower Risk. Infrastructure-Grade.