FIRST-ROUND CAPITAL RAISE · JULY 2026

MECHANICAL BATTERY LLC

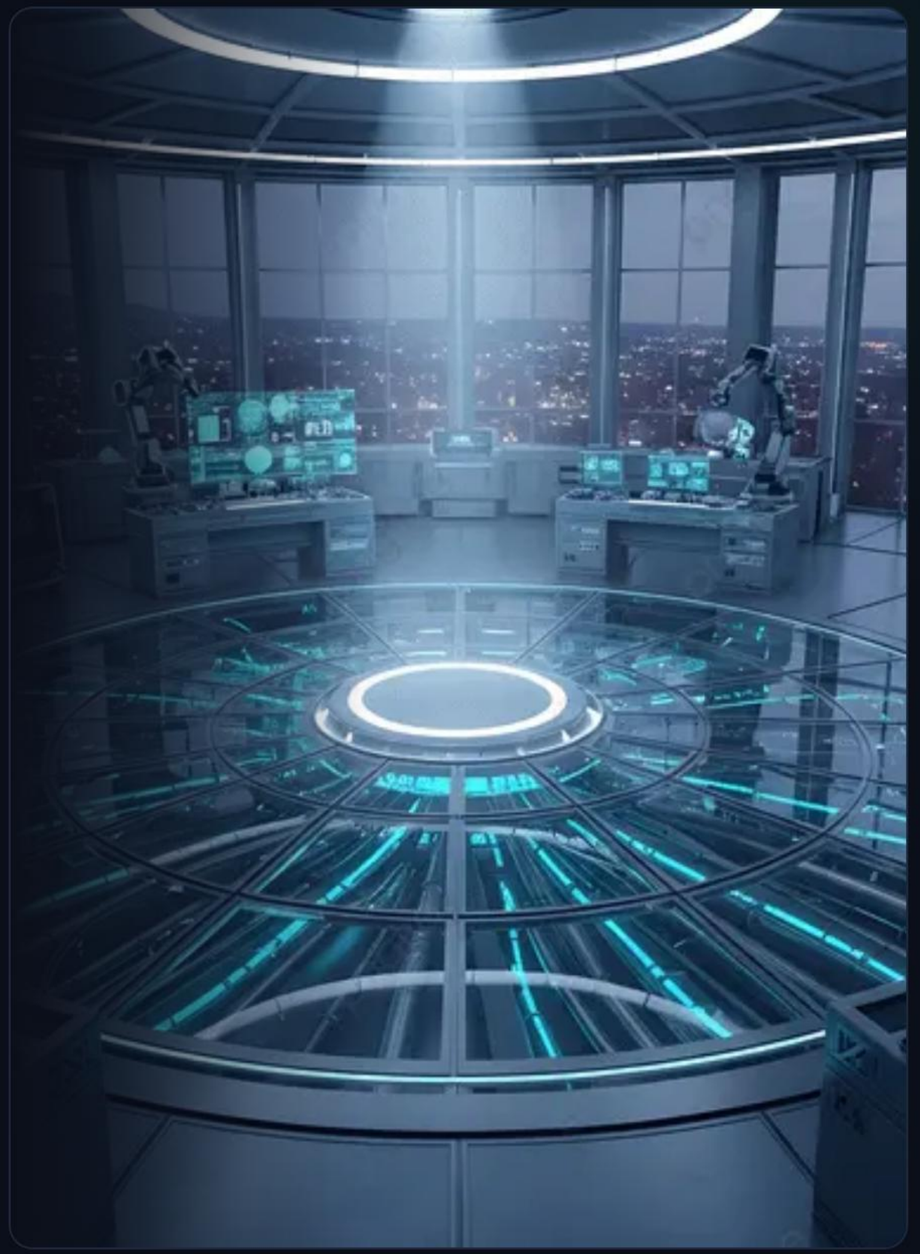
"Unlocking the massive energy still inside spent nuclear fuel through advanced plasma science."

FUNDING TARGET
$15M SAFE

TECHNOLOGY ENGINE
Eigen Physics Platform

PATENTS FILED
19 Provisional Patents

TARGET DEMONSTRATION
DOE INTEC SNF Recycling



THE PROBLEM

Spent Fuel Gridlock

90,000+ metric tons of spent nuclear fuel (SNF) sit in U.S. interim storage with no permanent repository since Yucca Mountain stalled in 2010.

- → **$2B+ Annual Cost:** U.S. spent-fuel management costs taxpayers and ratepayers over $2B/yr.
- → **Zero Commercial Recycling:** The United States has not commercially reprocessed spent fuel since 1972.

Economic & Strategic Failures

Conventional recycling technologies are financially non-viable and generate severe industrial complications.

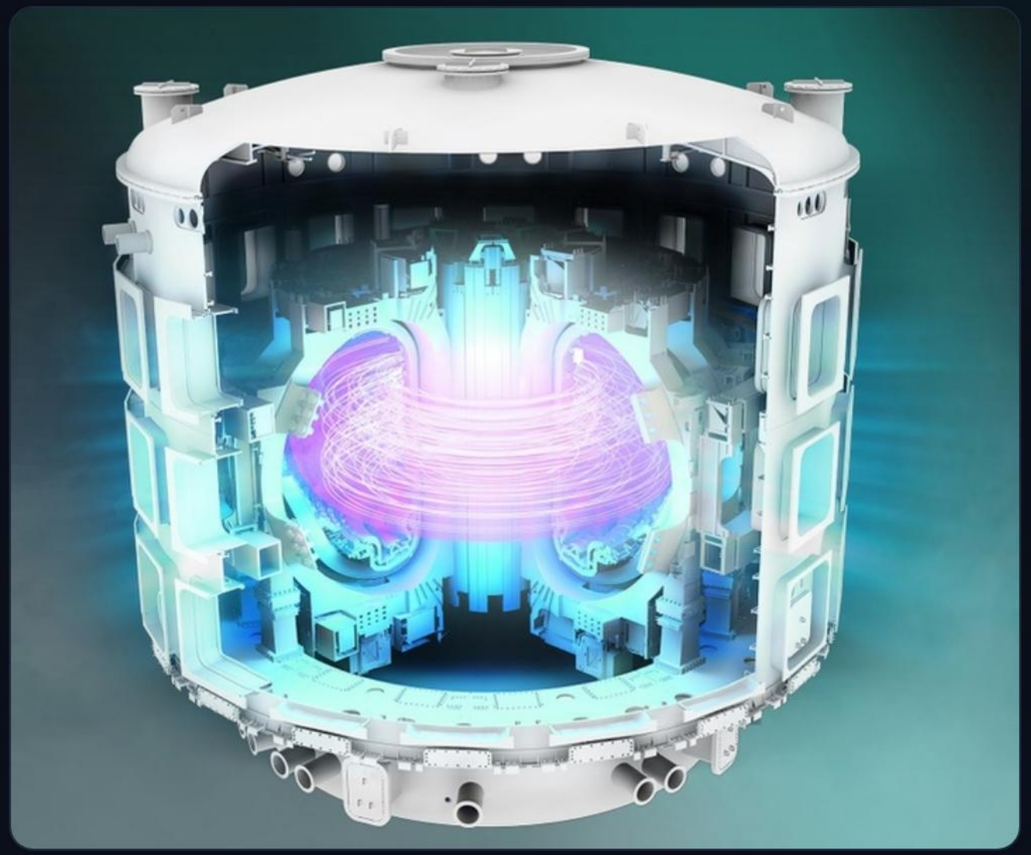
- → **Aqueous PUREX Costs:** Reprocessing costs $1,000–$2,000/kg heavy metal; a full plant costs ~$20B in CapEx.
- → **Next-Gen Reactor Demand:** Next-gen reactors require HALEU fuel with zero domestic commercial supply chain today.

THE EIGEN PLATFORM SOLUTION

One physics framework. 17 platforms. 19 patents.

The Eigen Framework is a native physics solver built on five motion primitives (rotation, pulsation, spiralization, precession, and oscillation) that captures the physics of any complex thermal, mechanical, or nuclear device.

- **Rotating Magnetic Field (RMF):** Plasma separation of spent nuclear fuel elements into high-value isotope streams with zero chemical solvents or liquid waste.
- **No Moving Parts:** High-temperature plasma centrifuge operating purely at the atomic scale.
- **Mass-Based Sorting:** Efficiently recovers HALEU, medical isotopes (Mo-99), and high-value platinum-group metals.



TECHNOLOGY DIFFERENTIATION

PARAMETER	AQUEOUS PUREX (CONVENTIONAL)	PYROPROCESSING (ELECTROCHEMICAL)	RMF PLASMA SEPARATION (MECHANICAL BATTERY)
CapEx Requirement	~$20 Billion (Large central facility)	$1–5 Billion (Centralized system)	**~$20 Million per line (Modular)**
Processing Footprint	Massive centralized footprints	Moderate localized facility	**Ultra-compact modular design**
Primary Waste Stream	High-volume hazardous liquid waste	Corrosive molten salt waste	**Dry system; solid metal collector only**
Separation Output	Mixed element groups (U/Pu)	Bulk element mixtures (U+TRU)	**Isolates individual isotopes dynamically**
Fuel Compatibility	Oxide fuel (validated)	Metal fuel primarily	**Oxide fuel (covers 95%+ of U.S. SNF inventory)**

MARKET OPPORTUNITY

Medical & Industrial

Global Mo-99 medical isotope market is $6–10B/yr alone. Direct sales from plasma separation outputs serve as an immediate near-term cash engine.

HALEU Fuel Markets

DOE has committed $700M+ to bootstrap domestic supplies. Next-gen reactors require 40–80 MT/yr by 2035—supplied directly via recycled fuel.

The Eigen SaaS Portfolio

17 distinct platform technologies mapping to $500B+ in broader markets, including industrial heating, energy storage, and defense propulsion.

OUR BUSINESS MODEL

Phase 1: Demonstrate

Build and validate the bench/commercial-scale prototype. Negotiate formal Idaho INTEC lease. Book initial medical isotope sales and platform SaaS licensing within 18 months.

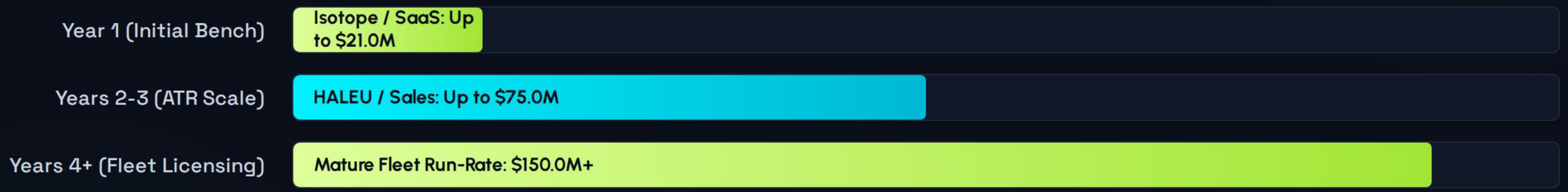
Phase 2: Scale

Deploy the full ATR-scale equipment line at the INTEC site. Secure binding commercial isotope off-take agreements and HALEU supply contracts.

Phase 3: Fleet Deployment

Implement high-margin technology licensing to electric utilities and fuel-cycle companies. Scale modular fleet deployments near commercial reactor installations.

REVENUE PROJECTIONS



Due to the complete absence of chemical reagents or consumables, Mechanical Battery expects to maintain mature gross margins of >60% across products and up to 85% on platform software licensing.

COMPETITIVE LANDSCAPE

COMPETITOR	PRIMARY APPROACH	CURRENT STAGE	KEY LIMITATIONS
La Hague (Orano)	PUREX Aqueous	Commercial Operations	CapEx exceeds $20B; massive liquid waste production.
Curio Solutions	Aqueous Voloxidation	Seed / Pilot Stage	Uses heavy chemical reagents; no isotope-level isolation.
Oklo Inc.	Molten Salt Pyroprocessing	Developmental Design	Optimized strictly for metal fuels (not oxide).
Moltex Energy	Salt Dissolution	Laboratory Demonstration	Inherently chemical-based; high corrosion risks.
Mechanical Battery	**RMF Plasma Separation**	**Prototype Demo (July '26)**	**Dry system, ~10x lower CapEx, Oxide fuel compatible.**

INTELLECTUAL PROPERTY

8 Foundation Platform Patents

Thermal Mass Pulse Power anchor patents, gyroscopic momentum cancellation mechanics, integrated single-wall stator-chambers, and rotary magnetic induction heating designs.

8 Advanced Plasma Separation Patents

Plasma Isotope Separator cyclotron orbit mode designs (Patent No. 63/955,095), plasma centrifuges, and RMF conductive fluid circulation patterns for pump-free reactor loops.

Zero Prior Art Blocking Issues Identified

Comprehensive freedom-to-operate searches spanning 21,692 related patents returned zero conflict areas, establishing an exceptionally wide, clean field of defensibility.

OUR TEAM & TEAMING PARTNERS

Ryan Vukich

Founder, CEO, and sole architect behind the Eigen computational framework.

- → **Proven Architecture:** Authored 214 core physics modules and over 229,000 lines of proprietary physics and mechanical solver code.
- → **IP Developer:** Sole inventor on all 19 provisional patents across the platform's multi-physics engines.

Signed Teaming Partners

Secured binding partnerships to immediately scale physical design and nuclear fabrication.

- → **Walsh Engineering:** Fully integrated engineering services and regulatory design support (Signed Letter of Commitment).
- → **L&H Industrial:** High-precision fabrication, industrial scaling, and mechanical manufacturing (Signed NDA).

REGULATORY PATHWAY

The INTEC Advantage

Our planned Idaho National Lab INTEC demonstration operates inside an already-permitted nuclear facility, eliminating traditional greenfield regulatory roadblocks.

Furthermore, because our proprietary RMF plasma process is entirely dry, it eliminates chemical solvent hazards, dramatically reducing NRC safety review complexity.

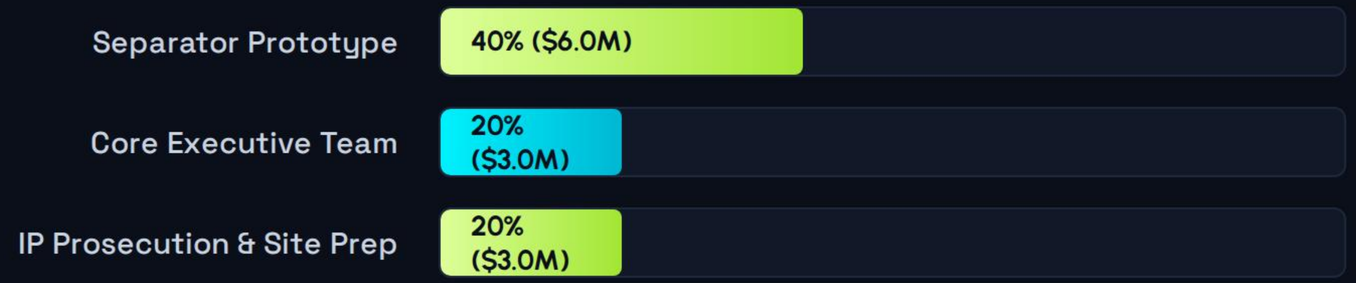
THE FUNDING ASK

$15M

POST-MONEY SAFE ROUND

18-Month Operational Runway

Securing our SAFE round unlocks massive, near-term technical and commercial inflection points.



ROADMAP & MILESTONES

Months 0–6

SAFE Close. Recruit plasma/nuclear CTO and regulatory leads. Begin structural fabrication of the Size A separator prototype; initiate NRC pre-application engagement.

Months 6–12

Commission prototype. Execute first surrogate-material separation runs. Secure first isotope supply and software SaaS licensing off-take agreements.

Months 12–18

Initiate dry-recycling demo runs at the Idaho INTEC site. Finalize characterization of recovered HALEU and launch Series A ($90–180M) scaling program.

QUESTIONS?

Mechanical Battery LLC — Pitch Deck

Ryan Vukich, Founder & CEO

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IMAGE SOURCES

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