AURORA · MHD

2026
EDITION

Heritage-Sidestep MHD Power for a Clean Firm + Defense Future

Four architectures · One platform · $4.91B expected portfolio revenue

Investor Pitch · Series A · Christopher D. Willson, Founder · CDW Research, Drumheller AB

The Problem

Two converging market gaps that legacy power architectures cannot fill

01 Clean Firm Power Gap

Hyperscalers committed to 24/7 carbon-free electricity by 2030, but no scalable clean firm option exists.

Solar+BESS doesn't reach 24/7. Nuclear takes 5-7+ years through NRC. Allam-Fetvedt requires CO_2 infrastructure. Heritage MHD failed in 1989-1993.

Result: *Hyperscalers + utilities are building gas — failing their CFE commitments.*

02 Defense MHD Capability Gap

DoD modernization roadmaps require plasma propulsion + directed-energy capabilities at densities outside chemical propulsion envelope.

Heritage MHD platforms (1980s-90s) failed due to seeded-combustion plasma slag chemistry. No production MHD program exists in the West.

Result: *DoD has identified MHD as critical strategic technology with no domestic supplier.*

The Solution

Aurora's four-architecture portfolio with heritage-sidestep IP

4	4×	$4.91B	43%
Architectures	**σ Mechanisms**	**Expected Revenue**	**Portf olio Margin**
covering all major MHD applications	*all sidestep heritage seeded-combustion*	*probability-weighted 10-year portfolio*	*blended defense + commercial*

THE AURORA THESIS

Heritage Faraday MHD failed in 1989-1993 because alkali-seeded combustion plasma produced slag chemistry that destroyed electrodes. **Aurora sidesteps this with four distinct σ mechanisms across four architectures — each one fundamentally different from heritage approaches.**

By building a portfolio rather than a single product, Aurora captures both the commercial energy market (clean firm power for hyperscalers + utilities) and the defense market (MHD propulsion + power for DoD platforms) — with shared platform technology that compounds across architectures.

Why Now

Three converging tailwinds make 2026-2030 the right window

01

Clean Energy Tax Credits

§45Y · §45V · §48E

IRA-era credits create direct revenue streams. §45Y delivers $30/MWh for clean electricity (Y1-10). §45V adds $0.60-3.00/kg for clean H_2 byproduct (A2 unique). §48E provides 30%+ ITC. Stackable with state-level CES mandates.

02

24/7 CFE Mandates

Hyperscaler · Industrial

Microsoft (2030), Google (2030), AWS (2030), Meta (2030) committed to 24/7 carbon-free electricity. No scalable clean firm option exists today. Hyperscalers paying $200-300/MWh premium to secure the few clean firm contracts available.

03

Defense Modernization

DoD · DARPA · AFRL

DoD strategic technology lists explicitly identify MHD propulsion + directed-energy as critical capabilities with no domestic supplier. DARPA + AFRL Phase 1/2 programs available 2026-2028. MCIB v9 validation in 2028 unlocks DoD program-of-record.

Heritage Sidestep: The Innovation

Four σ mechanisms that solve the 1989-1993 DOE Faraday MHD failure modes

HERITAGE FAILURE MODE

Alkali-Seeded Combustion Plasma

1989-1993 DOE Faraday MHD programs (U-25, Avco Mark V/VI, CDIF) failed because:

- Slag chemistry attack on electrodes
- Continuous Cs makeup consumption
- Coal-fired economics never closed
- Gigawatt FOAK CAPEX risk
- No path to clean firm classification

A1

σ MECHANISM

HydroSynth DBD

Atmospheric DBD plasma at 30 kV / 50 kHz · σ ≈ 200 S/m via H_3O^+

HERITAGE SIDESTEP ✓

A2

σ MECHANISM

SC-NH_3 + Dissolved Alkali

Supercritical NH_3 at 18 MPa · alkali in fluid generates σ ≥ 500 S/m

HERITAGE SIDESTEP ✓

A3

σ MECHANISM

Plasma Toroid

Sub-fusion plasma at 3-5,000 K · σ ≥ 300 S/m direct ionic

HERITAGE SIDESTEP ✓

A4

σ MECHANISM

Cesium-Vapor Electrodes

Closed-cycle N_2 + Cs vapor · ionic conduction without combustion

HERITAGE SIDESTEP ✓

The Four Architectures

Distinct applications, shared platform technology

A4 ZENITH

FLAGSHIP

8.5 MWe · **$25M turnkey** · **25.5% IRR (S1)**

Distributed clean firm hybrid storage-generator. Containerized · charged off-peak from grid · discharges firm clean power. Hyperscaler 24/7 CFE BTM. Closed-cycle Brayton MHD with cesium-vapor electrodes.

A2 MERIDIAN

UTILITY-SCALE

50 MWe · **$62M turnkey** · **22.4% IRR (S2)**

Utility-scale firm clean baseload. Multi-pass Faraday MHD with SC-NH_3 + dissolved alkali working fluid. AmmoBurst pre-conditioning + §45V H_2 byproduct revenue (architecturally unique to A2).

A3 CIRRUS

DISTRIBUTED + COMPONENT

2.89 MWe · **$23M / $16M comp** · **10.4% standalone**

Compact plasma toroid · open architecture preserves multiple pathways. Primary value: A1 Mode B/C component (1× or 9× per platform). Secondary: distributed clean firm microgrids + niche applications.

A1 CORONA

DEFENSE PRIMARY VALUE

Defense / 4 modes · **$25-340M** · **55% margin**

Corkscrew MHD accelerator with HydroSynth DBD. Four mode configurations for defense/aerospace. 2028 MCIB v9 validation gates DoD program-of-record. Defense margins 50-60%. Largest single-architecture revenue contributor.

A4 Zenith — Commercial Flagship

Distributed clean firm hybrid storage-generator · 25.5% S1 IRR

THE COMMERCIAL FLAGSHIP

8.5 MWe · 6-Month Deployment · $25M Turnkey

Charges from grid off-peak ($30/MWh). Stores energy thermochemically in ceramic regenerator + electric-preheat MOF-catalyst chemistry. Discharges firm clean power on demand at $120-200/MWh.

Container-shippable. No fuel infrastructure required. No NRC permitting. Zero direct emissions.

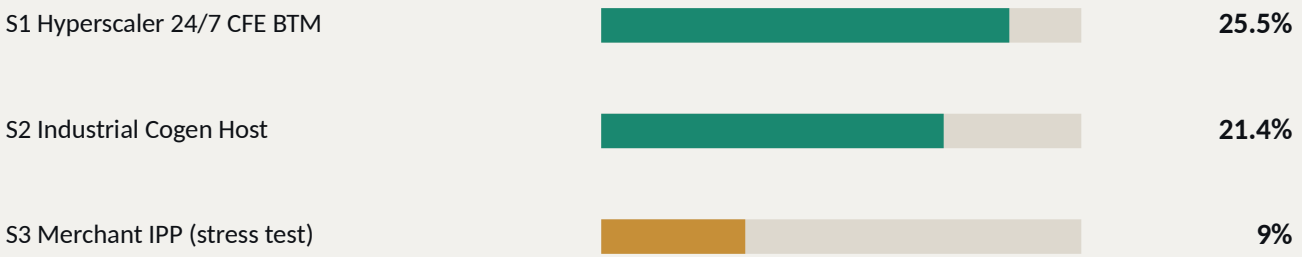
8.5 MWe
Net power

~50%
Round-trip eff.

8-12 hr
Storage duration

40 ft
ISO container

THREE-SCENARIO PROJECT IRR



A2 Meridian — Utility-Scale + H_2 Byproduct

50 MWe firm clean baseload with §45V Clean Hydrogen revenue stream

UTILITY-SCALE SPECIALIST

50 MWe · η = 0.50 · $62M Turnkey

Multi-pass Faraday MHD with supercritical NH_3 at 18 MPa + dissolved alkali — chemistry-mediated σ heritage sidestep.

AmmoBurst pre-conditioning: $NH_3 \leftrightarrow N_2 + 3H_2$ catalytic chemistry produces H_2 byproduct stream qualifying for §45V Clean Hydrogen PTC ($0.60-3.00/kg depending on tier).

Architecturally unique to A2 — no other architecture in our portfolio (or competitors') combines clean firm baseload + H_2 co-production at this scale.

§45V H_2 BYPRODUCT UPLIFT — ARCHITECTURALLY UNIQUE

S1 Premium Clean Firm: ~~18.6%~~ → **20.1% IRR** (+1.5 pts)
S2 Industrial Cogen: ~~19.8%~~ → **22.4% IRR** (+2.6 pts)
Tier upgrade (blue→green NH_3): **+2.4 pts additional**

8-STREAM REVENUE CATALOG · S1 YEAR 1

Energy contract:	$93.1M	ESG premium:	$5.6M
§45Y PTC:	$11.2M	Capacity:	$2.5M
DC avoidance:	—	Ancillary:	$1.5M
RECs:	—	**§45V H_2 NEW:**	**$1.3M**

Year 1 total: $115.1M

A3 Cirrus — Open Architecture + A1 Component

Compact 2.89 MWe plasma toroid with primary value via A1 integration

OPEN ARCHITECTURE

Compact Plasma Toroid Multiple Pathway Options

Sub-fusion plasma in toroidal geometry generates σ ≥ 300 S/m at 3-5,000 K — Aurora's third heritage σ sidestep.

Dual commercial channels: (1) primary value as power module in A1 Corona Mode B (1×) and Mode C (9× array), $16M intra-portfolio · (2) secondary as standalone 2.89 MWe distributed clean firm at $23M turnkey.

Open architecture preserves working fluid + fuel + σ optionality until 2028 MCIB v9 validation determines dominant A1 mode.

10-YEAR REVENUE BY SCENARIO (PROBABILITY-WEIGHTED)

Scenario	Standalone	A3-in-A1	Total
S1 Climate (30%)	$690M	$224M	**$914M**
S2 Defense (12%)	$230M	$816M	**$1,046M**
S3 Distributed (28%)	$1,035M	$128M	**$1,163M**
S4 Conservative (25%)	$345M	$80M	**$425M**
S5 Pivot (5%)	$184M	$0M	**$184M**
Probability-weighted	**$258M**	**$348M**	**$606M**

KEY INSIGHT

A3-in-A1 ($348M expected) > A3 standalone ($258M). Primary value flows through A1 program integration, validating cross-architecture portfolio strategy.

A1 Corona — Defense Primary Value Driver

Corkscrew MHD accelerator · 2028 MCIB v9 validation gates DoD program-of-record

MODE A · PPAC

Single-Use Strike

$80M

2026-2028 · DARPA/AFRL near-term

MODE A · MCIB v9

Volume Retrofit

$25M

Post-2028 · 70% cost reduction

MODE B

ISR/EW UAV

$65M

Mid-term · 1× A3 integration

MODE C

Multi-Mission Aircraft

$340M

Strategic · 9× A3 array

S2 DEFENSE SCENARIO — ASYMMETRIC PORTFOLIO UPSIDE

$2.8B 10-year A1 revenue in S2 Defense (12% probability)

$890M probability-weighted A1 expected value (~18% of portfolio)

S2 captures 15× Mode B + 4× Mode C deployments unlocked by MCIB v9 manufacturing retrofit. The single most important commercial outcome in Aurora's portfolio is gated entirely on MCIB v9 validation in 2028.

Portfolio Integration

Cross-architecture platform technology compounds across all four products

SHARED PLATFORM TECHNOLOGY

33-40% Portfolio Cost Savings via Cross-Architecture Reuse

- **Aurora NeuroControl (AI/ML plasma control)**

100% reuse · transferred from tokamak fusion

- **Plasma diagnostic suite**

100% reuse across all 4 σ mechanisms

- **HTS magnet platform (5-15 T REBCO)**

Shared across A1, A2, A3 — A4 uses smaller variant

- **AmmoBurst MOF catalyst (NH_3 chemistry)**

A2 + A4 integration · industrial decarbonization pivot path

- **MCIB v9 manufacturing platform**

Stage 4 Aurora capability · enables 70% A1 cost reduction

A3 → A1 INTEGRATION

A3 plasma toroid sold to A1 program

A1 Mode B uses 1× A3 ($16M intra-portfolio) · Mode C uses 9× A3 array. A3-in-A1 captures defense margins (55%) vs commercial distributed margins (32%) for standalone A3.

PIVOT RESILIENCE

Single-architecture failures don't kill the portfolio

If A2 fails (S5 Pivot, 5%), AmmoBurst MOF catalyst pivots to industrial decarbonization. If A3 plasma underperforms, plasma diagnostics suite remains valuable for A1 + fusion-adjacent applications. Shared platform tech retains value independent of any single architecture.

Market Sizing & Competitive Position

Aurora competes in $200B+ TAMs across both clean energy + defense

$120B/yr

TAM

Clean Firm Energy

US clean firm power CAPEX 2025-2035. Hyperscaler 24/7 CFE drives premium pricing. Aurora target SAM: ~$8B/yr at 7% market share with A2 + A4 deployments by 2032.

$80B/yr

TAM

Defense MHD/DE

DoD modernization spending on plasma propulsion + directed-energy capabilities. Aurora target SAM: ~$5B/yr in A1 platform deployments + sustainment services post-2028 MCIB v9.

$45B/yr

TAM

Distributed Storage

Distributed clean firm + storage market. A4 hybrid storage-generator competes with Li-BESS, microreactors, hydrogen. Aurora target SAM: ~$3B/yr with A4 + A3 standalone.

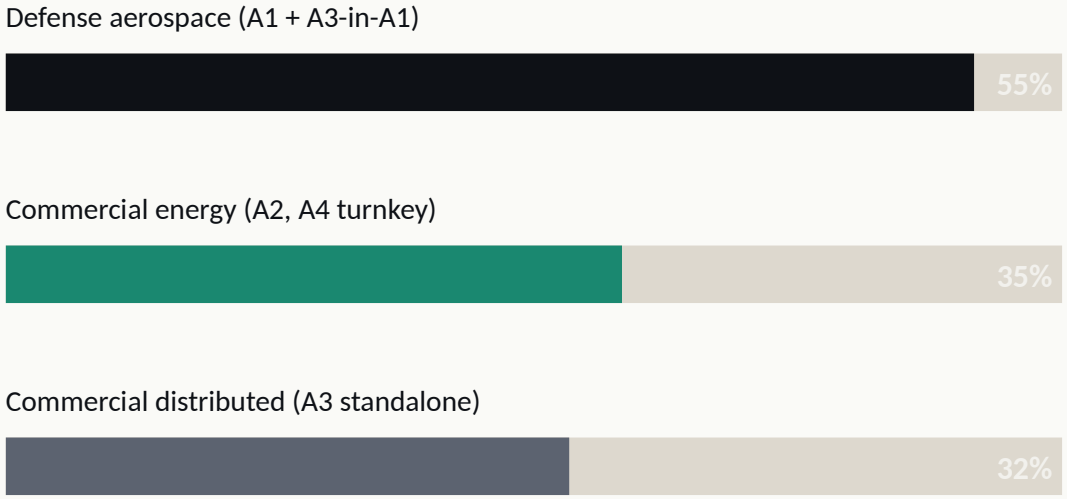
COMPETITIVE POSITIONING — CLEAN FIRM CATEGORY

Solution	CAPEX/kW	Time to deploy	Clean firm?	Note
Aurora A2 (50 MWe)	$1,964/kW	24 mo	✓ §45Y	+§45V H_2 co-product unique
Allam-Fetvedt (50 MW)	$2,000-3,000/kW	36-48 mo	✓ with CCUS	Requires CO_2 infrastructure
NuScale SMR (60 MW)	$5,000-10,000/kW	60-84 mo	✓ nuclear	Long permitting · NRC dependency
CCGT 50 MW	$1,000-1,200/kW	18 mo	✗	Not clean firm · gas dependent

Business Model & Margins

Aurora is the seller of turnkey systems; defense margins compound commercial

AURORA GROSS MARGIN BY CATEGORY



Defense margin (55%) is 1.6× commercial energy margin (35%). A1 + A3-in-A1 contribute 51% of portfolio margin from 40% of revenue.

PORTFOLIO REVENUE × MARGIN

DEFENSE	COMMERCIAL
40% of portfolio revenue	**60%** of portfolio revenue
51% of portfolio margin	**49%** of portfolio margin

STRUCTURAL ADVANTAGE

Defense's higher margin (55%) compresses Aurora's break-even threshold and de-risks portfolio economics. Even in S5 Pivot scenario, defense baseline ($180M) sustains operations.

Financial Projections

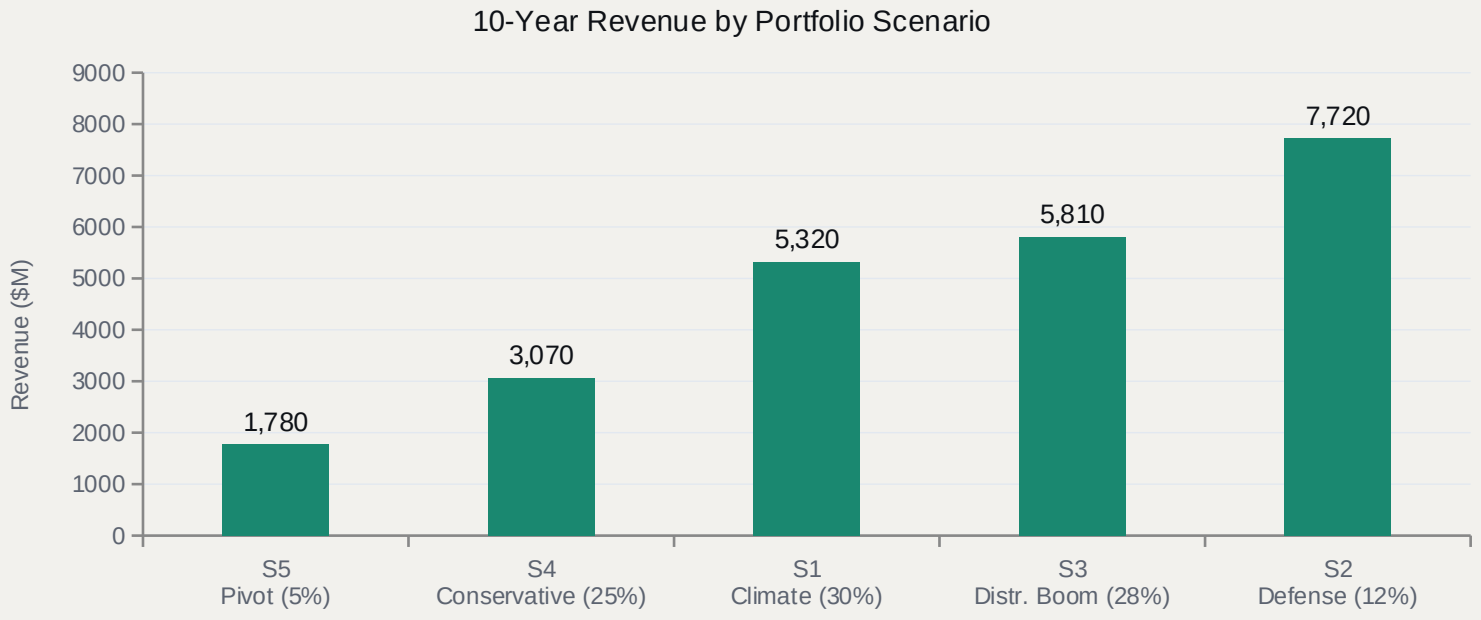
5-scenario portfolio roll-up · 10-year cumulative · probability-weighted

$4.91B
Expected 10-yr revenue

$2.10B
Expected 10-yr margin

43%
Blended gross margin

$7.7B
Best-case (S2 Defense)



KEY INSIGHTS

75% probability mass
above $3B (S1+S3+S4)

12% chance of $7.7B
S2 Defense asymmetric upside

5% downside cap
S5 Pivot floor at $1.78B

$1B mid-range CAPEX
yields 12% portfolio IRR

Funding Ask

Series A · $20-32M Stage 1 · 2026 deployment

SERIES A

$20-32M

Stage 1 (2026)

- **12-month runway**
- 15-18 FTE engineering team
- Pre-hardware validation across all 4 architectures
- DARPA/AFRL Phase 1 + DOE Stage 1 program engagement
- IP filings + Stage 4 Aurora manufacturing platform foundation

USE OF PROCEEDS

Engineering & R&D *15-18 FTE · cross-architecture pre-hardware validation*	55%	$11-17.6M
IP & Patent Prosecution *DI-A1 through DI-A4 portfolio · international filings*	12%	$2.4-3.8M
Manufacturing platform *MCIB v9 retrofit foundation · Stage 4 Aurora capability*	18%	$3.6-5.8M
Government program eng. *DARPA/AFRL/DOE proposal + early-stage execution*	10%	$2.0-3.2M
Operations & Admin *Drumheller AB facility · clearances · compliance*	5%	$1.0-1.6M

Roadmap

Stage 1 (2026) → MCIB v9 Validation (2028) → Mode C (2032+)

2026	2027-28	2028	2029-31	2032+
STAGE 1	STAGE 2	GATING EVENT	STAGE 3	STAGE 4
Pre-Hardware Validation	**FOAK Builds**	**MCIB v9 Validation**	**Volume Production**	**Mode C + Sustained Volume**
• All 4 architectures component-level test • DBD electrode + plasma toroid + AmmoBurst characterization • DARPA/AFRL/DOE Phase 1 engagement • IP filings (DI-A1 through DI-A4)	• A4 Zenith FOAK at hyperscaler BTM site • A1 Mode A PPAC FOAK (DARPA/AFRL) • A3 standalone deployment validation • MCIB v9 retrofit qualification	• MCIB v9 manufacturing retrofit validated • Mode A unit cost: $80M → $25M (70% reduction) • DoD program-of-record decision triggered • Aurora portfolio commercial-ready	• A4 Zenith 5-10 units/year • A2 Meridian FOAK + 2-3 units/year • A1 Mode A MCIB v9 volume • A3 Mode B/C integration validated	• A1 Mode C 9× A3 array deployments • A2 utility-scale volume + NH_3 supply chain mature • FMS Allied defense (5-Eyes/NATO) • Aurora portfolio scaled to $1B+ annual revenue

Why Aurora Wins

Five structural advantages over single-architecture competitors

01

Heritage Sidestep IP

Four distinct σ mechanisms across four architectures — each one solves the 1989-1993 DOE Faraday MHD failure modes that ended legacy programs. Patents pending across DI-A1 through DI-A4.

02

Portfolio Resilience

Single-architecture failures don't kill the portfolio. Shared platform technology (Aurora NeuroControl, plasma diagnostics, HTS magnets, AmmoBurst MOF) retains value independent of any one architecture.

03

Defense × Commercial

Defense margins (55%) compound commercial energy revenue (35% margin). 40% of revenue / 51% of margin from defense. Single-vertical competitors can't match this structural advantage.

04

MCIB v9 Manufacturing

Aurora-internal vertical integration delivers 70% A1 unit cost reduction at volume. Stage 4 manufacturing platform unlocks DoD program-of-record adoption + cross-architecture cost-down.

05

Tax Credit Stack

§45Y (clean electricity), §45V (clean H_2 — A2 unique), §48E (ITC). All four architectures qualify §45Y. A2's H_2 byproduct adds $0.60-3.00/kg uplift — architecturally exclusive revenue stream.

AURORA · MHD

Heritage-Sidestep MHD Power for a Clean Firm + Defense Future

$4.91B expected portfolio revenue · 43% blended gross margin · Stage 1 Series A 2026

CONTACT

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Aurora MHD Investor Pitch · 2026 Edition

Heritage failures end. Aurora begins.