MetOx International

Domestic high-temperature superconducting wire, scaling for the grid-and-fusion era

Explainer · June 1, 2026

U.S. manufacturer of second-generation high-temperature superconducting (HTS) wire for grid, fusion, AI, and medical markets

COMPANY	MetOx International, Inc.	**HEADQUARTERS**	Houston, Texas, USA
OWNERSHIP	Private	**CEO**	Bud Vos

ABSTRACT

MetOx International manufactures second-generation high-temperature superconducting (HTS) wire, a thin, layered tape built around YBCO (yttrium barium copper oxide) that carries large currents in a tiny cross-section with near-zero resistance. The distinctive bet is industrial: MetOx is moving HTS from specialty lab output toward commercial-scale, domestic production, anchored by a $193.7 million facility planned for Chatham County, North Carolina, in the Research Triangle region. The mechanism behind the thesis is a proprietary manufacturing process the company says lets it produce its branded Xeus™ wire at volume, with the marketed promise of transmission cables up to ten times more efficient than copper. If demand from grid expansion, magnetic-confinement fusion, hyperscale data centers, and medical imaging materializes as projected, a credible American HTS supplier fills a real supply-chain gap. The implications: MetOx is a manufacturing-scale-up story first, a deep-tech story second, and a demand-timing bet third, with customer traction still unproven.

Keywords: HTS wire; YBCO; superconductors; fusion magnets; grid transmission; domestic supply chain; Xeus; energy transition

1. Snapshot

MetOx International, Inc. is a Houston-based developer and manufacturer of second-generation HTS wire built on YBCO, a ceramic compound that superconducts (carries current with no resistance) at relatively high cryogenic temperatures. The company is scaling from its Houston base toward volume production, anchored by a planned $193.7 million facility in Chatham County, North Carolina, expected to create 333 jobs. Bud Vos is CEO. Leadership has been reinforced with semiconductor-industry weight: Keyvan Esfarjani (former Intel) was appointed Executive Chairman in March 2026, and Richard Gottscho, a semiconductor veteran, joined the board in April 2026. MetOx raised $40 million in 2024 Series B financing, structured as two distinct closings (detailed below). Founding year is disputed across secondary sources (ranging from the late 1990s to 2002), and no authoritative primary record resolves it. Other key unknowns: revenue, named customers, production volumes, and gross margins are not reliably established in public materials.

2. Thesis: Why This Company, Why Now

The bet is that HTS wire is shifting from a niche, import-dependent specialty material into a strategic industrial input, and that a domestic manufacturer who solves the scale-up problem captures outsized value. MetOx positions its proprietary process as the thing that makes commercial-scale HTS production viable, putting it at the front of the energy transition and closing a U.S. supply gap.

The AI linkage is real but indirect. Hyperscale data centers and AI compute strain the grid, and HTS cables move far more power through far less space than copper, which is why grid expansion and AI-scale data centers sit explicitly among MetOx's target markets alongside fusion magnets and medical systems. Crucially, these are stated target applications, not documented deployments. The reachable near-term market is narrower than the headline TAM: fusion magnet programs and select grid pilots are the credible early buyers, while AI-data-center HTS adoption remains aspirational. Demand timing, not technical possibility, is the live question.

3. The Core Idea in Plain English

Think of conventional copper wire as a garden hose with a slow leak along its entire length: current flows, but resistance bleeds off energy as heat at every meter. HTS wire is closer to a frictionless pipe, where current moves with near-zero resistance, so almost no energy is lost as heat and the same cross-section carries dramatically more current. The old world runs high-voltage transmission lines across long distances to compensate for resistive losses; the new world threads superconducting cables through existing conduits at a fraction of the footprint. MetOx's specific contribution is not inventing the physics but manufacturing the wire, its branded Xeus™ product, at commercial scale and on American soil, where no scaled domestic supplier currently exists.

4. The Technical Space

Second-generation HTS wire is one of materials science's harder manufacturing problems. The product is not a wire in the household sense but a multilayer coated conductor: a thin metal substrate onto which a stack of buffer layers and a microns-thin YBCO superconducting film are deposited, then capped with stabilizing layers. The manufacturing challenge is fundamentally a precision thin-film deposition problem at industrial throughput, closer to semiconductor fab than to traditional wire drawing. The physics is settled; the challenge is making kilometers of it with the crystal alignment intact, because YBCO only carries high current when its grains are near-perfectly oriented. A single defect over a long length kills performance.

What "good" looks like turns on a few dimensions. First, critical current: how much current a given tape width carries before it stops superconducting. Second, yield and uniformity over length, the difference between a lab coupon and a sellable reel. Third, cost per kiloamp-meter, the metric that decides whether HTS beats copper economically rather than just technically. Fourth, throughput, since fusion and grid buyers need volume, not samples. The durable players are those who hold quality while pushing length and lowering cost simultaneously, which historically almost no one has done cheaply.

5. How Their Technology Works (and What's Proprietary)

MetOx builds coated-conductor HTS tape around a YBCO superconducting layer, sold under the Xeus™ brand. The wire is engineered to move large current with near-zero resistance at cryogenic temperatures, which is the property that lets HTS-based transmission cables be marketed as up to ten times more efficient than copper, a claim attributed to the company and to government press material rather than to independent benchmarks. In stack terms, MetOx sits at the materials layer: it is the input supplier whose wire becomes someone else's cable, magnet, or coil. The dependency chain runs from substrate and precursor chemistry through deposition and into reel-level finishing.

The proprietary claim rests on the manufacturing process. MetOx asserts that its process enables HTS wire production at commercial scale, which is precisely the bottleneck the whole industry has struggled with. If that process genuinely delivers higher throughput or better cost-per-performance than rival deposition methods, it is a real and hard-to-copy edge, because coated-conductor production is notoriously sensitive to subtle process control that does not transfer easily even with capital.

The honest caveat is that the corpus offers no verified critical-current figures, yield data, or independent benchmarks. The efficiency story is more accurately near-zero resistance than the looser "zero loss" promotional framing. So the proprietary mechanism is plausible and category-appropriate, but its magnitude is unproven from outside. A well-funded competitor or national lab pursuing the same deposition route could in principle close a process gap; what they cannot quickly replicate is accumulated process know-how, if MetOx truly has it.

6. Business and Go-to-Market

MetOx is a materials manufacturer, so the commercial model is fundamentally selling wire by volume into downstream integrators, not a software-style recurring engine. The strategic move is vertical scale-up: the $193.7 million Chatham County facility is the centerpiece, intended to push from specialty output toward the throughput that grid and fusion customers require. Pricing, packaging, and unit economics are not publicly disclosed, which matters because cost-per-kiloamp-meter is the variable that determines whether HTS displaces copper at scale or stays confined to applications where nothing else works.

On funding, MetOx raised $40 million in 2024 Series B financing, but the simplified telling collapses two distinct rounds. The structure was a $25 million Series B Extension led by Centaurus Capital and New System Ventures, plus a separate $15 million closing with a different syndicate that included Duquesne Family Office, Piedmont Capital, Crosscut Ventures, New System Ventures, and John Doerr's family office. That mix of infrastructure-oriented family offices, a climate-tech investor, and energy-sector capital is consistent with a company that has demonstrated technical credibility and is now raising for scale capital.

The traction gap is the headline diligence issue. No named customers or live commercial deployments are documented in AI, data-center, or fusion segments. The target markets are articulated clearly; the order book is not visible. For a capital-intensive manufacturer, that turns the scale-up into a build-ahead-of-demand wager.

7. Competitive Landscape and Moats

MetOx competes in the small global club of coated-conductor HTS wire makers, with adjacent pressure from integrators and national-lab-linked efforts. The company's distinct position is its pitch as the domestic, commercial-scale American supplier closing a U.S. HTS gap, which is as much an industrial-policy posture as a product one.

Scale-and-supply position is the central asserted moat. A $193.7 million domestic plant, if it delivers throughput at quality, creates a hard-to-replicate manufacturing base, since coated-conductor lines take years and deep process expertise to bring up. This is the most credible moat, but it is contingent on execution that has not yet happened, and it is the kind of position other scaled HTS makers could also pursue.

Domestic and policy positioning is real but narrow. Being the U.S. supply-chain answer matters to fusion, defense, and grid buyers who care about provenance, and that buyer preference is a genuine, if policy-dependent, advantage that MetOx is leaning into more aggressively than most.

Accumulated process and field data is a potential moat, not a demonstrated one. If MetOx ships meaningful volume, manufacturing yield data and application-specific tuning compound into a switching-cost asset rivals cannot shortcut. Until volume and qualified customers exist, this remains prospective.

The platform risk is straightforward: a better-capitalized entrant or a national-lab-backed program could fund a competing line, and demand timing in fusion and AI grids could slip, leaving capacity ahead of orders.

8. Risks and Open Questions

The picture turns on a few unknowns, each of which a founder should be able to answer directly.

- **Performance proof:** What are the verified critical-current and yield-over-length figures for Xeus™ wire, independently benchmarked rather than vendor-stated? The "ten times more efficient" claim needs hard numbers behind it.
- **Demand reality:** Which named customers or binding offtake agreements exist across grid, fusion, or medical segments, and what is the order backlog versus the planned North Carolina capacity?
- **Unit economics:** What is the cost-per-kiloamp-meter at scale, and at what point does HTS beat copper economically rather than only technically?
- **Capital, timeline, and policy:** Does the $40 million Series B plus the North Carolina commitment fully fund the facility to qualified production, or is another raise required? The construction timeline is contested in available sources (the corpus states a 2026 start with no confirmed completion milestones), and the status of any DOE grant negotiation is unresolved and unverified in primary sources; if federal energy support shifts, the demand and funding picture changes.
- **Execution risk:** Coated-conductor scale-up is where many HTS efforts have stalled; what evidence shows MetOx can hold quality while pushing length and throughput?

The combined technical, commercial, and dependency risks all point to the same gap: a credible scale-up narrative running ahead of disclosed proof.

9. Bottom Line

MetOx is a genuine domestic HTS manufacturing scale-up with credible leadership and a real supply-chain rationale, but it is still a build-ahead-of-demand bet with unproven customer traction. It works if the proprietary process delivers commercial-scale yield at a cost that beats copper where density matters, and the North Carolina plant becomes a hard-to-copy manufacturing base. The single thing to watch next is the conversion of stated target markets into named, binding offtake, especially in fusion and grid, before the $193.7 million capacity comes online.

10. For the Nerds

The differentiation lives or dies in deposition process control. Second-generation coated conductors require near-epitaxial YBCO growth on a textured buffer stack, and the deep technical question is which deposition route MetOx uses and how it holds critical-current uniformity over kilometer lengths. Critical current does not scale linearly: grain-boundary misalignment of even a few degrees collapses supercurrent, so the real proprietary asset is whatever process discipline keeps texture and oxygenation consistent reel after reel.

A subtler frontier dependency is in-field performance and mechanical strain tolerance. Fusion magnets and grid cables stress the tape thermally and mechanically, and HTS performance degrades under strain and in high magnetic fields unless the conductor architecture is engineered for it. The open question the corpus cannot answer is whether MetOx's wire is optimized for the high-field fusion magnet regime, the grid-cable regime, or both, because those targets pull conductor design in different directions. That architectural choice, more than the headline efficiency number, determines which of its target markets it can actually win.

WHERE SOURCES DISAGREE

Status of the $80M DOE "Project Arch" grant

Analyst-C's cross-exam reports the corpus shows MetOx was "selected to negotiate" $80M (not awarded), with explicit uncertainty about survival under a new administration. Analyst-B's brief omitted it entirely, and the named $80M figure and "Project Arch" detail do not appear in the formal evidence corpus (only in cross-exam assertions)

Unresolved: the underlying corpus does not contain the $80M/Project Arch text the cross-exam cites, so the panel cannot verify either the amount or its conditional status

North Carolina facility construction timeline

One analyst flagged the timeline as undocumented; the cross-exam claims the corpus specifies a 2025 construction start, 2027 hiring, and 2029 completion

Unresolved: the formal evidence corpus only states construction is "slated to begin in 2026" and gives no completion milestones, directly conflicting with the 2025/2027/2029 figures asserted in cross-examination

Materiality of the Zinc Nacional connection

Analyst-B argues Zinc Nacional is a "primary shareholder and partner" in MetOx, making its environmental record a real ESG/reputational risk. Analyst-C argues it is simply a different entity that should be cut to avoid confusion

Unresolved: the evidence corpus explicitly treats Zinc Nacional as an unrelated entity and contains no document establishing any ownership or partnership link to MetOx

Company founding year

Sources give 1998 (LinkedIn), 2002 (EquityZen), and "late 1990s" (Deep Tech Week)

Unresolved: the discrepancy spans multiple secondary sources with no authoritative primary record to reconcile them

Production capacity in km/year

A "2,000 km/year" Houston ramp appears in secondary profiles; no primary engineering data confirms current or target output for either facility

Unresolved: the figure originates only from promotional/secondary sources and the corpus's own open questions confirm capacity is undocumented in primary materials

Exact efficiency characterization ("zero" vs. "near-zero" loss)

Promotional and government press material says "zero heat generation or energy loss"; technical descriptions say "near-zero resistance."

Unresolved: sources conflict and no independent or peer-reviewed verification of the performance specs exists in the corpus