# MetOx International

## Domestic high-temperature superconducting wire, built for the grid-and-compute era

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**ABSTRACT**

MetOx International is a Houston-based manufacturer of second-generation high-temperature superconducting (HTS) wire, branded Xeus™, fabricated from YBCO thin films. The company traces its roots to University of Houston research and is now scaling from a venture-backed materials startup into an industrial supplier, anchored by a planned ~$193.7 million factory in Chatham County, North Carolina. Its core technical bet is a proprietary one-pass MOCVD deposition process that lays down buffer and superconductor layers in a single step, complemented by PVD and electrochemistry. The timing is driven by a structural surge in electricity demand: grid transmission upgrades, AI and hyperscale data centers, fusion-magnet programs, and high-field MRI all want more current through less space. If MetOx executes, it becomes a rare domestic node in an HTS supply chain otherwise concentrated abroad. The open questions are capacity, customers, and whether federal support converts into disbursed dollars.

*Keywords:* high-temperature superconductors; YBCO; MOCVD; HTS wire; fusion magnets; AI data centers; grid; domestic supply chain

### Fact Box

› **Company:** MetOx International, Inc.

› **Headquarters:** Houston, Texas, USA

› **Ownership:** Private

› **Total raised:** ~$40M (2024 Series B extension); separate earlier round led by Koch Disruptive Technologies (Dec 2023)

› **CEO:** Bud Vos

### 1. Snapshot

MetOx International, Inc. is a U.S. commercial manufacturer of second-generation HTS wire (branded Xeus™) made from YBCO thin films, headquartered in Houston, Texas. The company originated from University of Houston research and was co-founded in 1998 by Dr. Alex Ignatiev, who serves as Chief Science Officer (note: the founding year is contested, with one investor source listing 2002). The leadership team has expanded for industrial scale-up: Bud Vos is President and CEO, former Intel EVP Keyvan Esfarjani was named Executive Chairman (announced around March 2026), and semiconductor veteran Dr. Richard Gottscho joined the board (around April 2026); both appointments are well-attested but the precise dates could not be independently corroborated. MetOx is venture-backed and federally supported. Not publicly known: revenue, valuation, current production capacity, named customers, headcount, the precise corporate-entity structure across its related MetOx names, and the final status of the DOE "Project Arch" funding.

## 2. Thesis: Why This Company, Why Now

The bet is that electricity demand is outrunning the physical infrastructure that carries it, and that HTS wire is one of the few technologies that moves dramatically more power through a given cross-section. MetOx is positioning as a domestic manufacturer of that wire at a moment when three demand curves are bending upward at once: grid transmission and distribution upgrades, AI and hyperscale data centers drawing unprecedented load, and fusion-energy programs (the push to build commercial magnetic-confinement reactors) that need enormous quantities of HTS to build magnets, alongside high-field and MRI magnets.

The AI linkage is direct, not incidental. Hyperscale buildout concentrates load in ways legacy copper infrastructure struggles to serve, and superconducting cable can deliver high current in tight footprints. The reachable near-term market, though, is narrower than the headline TAM: fusion remains pre-commercial and grid procurement is slow and utility-gated. What is concrete is supply-chain urgency, federal interest in onshoring HTS, and a North Carolina factory commitment to back it.

## 3. The Core Idea in Plain English

MetOx makes a flexible metal tape coated with ceramic layers that, when cooled, carry electricity with essentially no resistance, letting a thin ribbon carry the current of a much thicker copper cable.

The analogy: think of a multi-lane highway compressed into a single express lane that moves the same traffic. Old world, you widen the road by adding copper, which means more metal, more space, and more loss. New world, you change the material physics so the same lane carries far more throughput. A second framing that maps well is optical fiber versus copper telephone wire: fiber carries vastly more through the same conduit, but only via a fundamentally different manufacturing process. The catch both analogies must respect is that the express lane only works when refrigerated, so the system carries cryogenic overhead. The qualitative shift is from scaling by bulk to scaling by materials engineering.

## 4. The Technical Space

The category problem is current density: how much electrical current you can push through a conductor of a given size without unacceptable loss or heat. Second-generation HTS, or "2G," wire solves this with rare-earth barium copper oxide (REBCO/YBCO) deposited as a thin film on a metal substrate. The wire only superconducts below a critical temperature, but "high-temperature" means it works at liquid-nitrogen temperatures rather than the far colder liquid-helium regime, which makes cooling more practical.

The standard approaches divide along two axes. For substrate texture, the field uses ion-beam assisted deposition (IBAD) or rolling-assisted biaxially textured substrates (RABiTS) to create the crystallographic template. For the superconductor layer, the routes split between vapor-based methods such as MOCVD (metal-organic chemical vapor deposition) and PLD (pulsed laser deposition), and solution-based routes like MOD. Each trades off throughput, yield, and the critical-current performance of the finished tape.

What "good" looks like reduces to four dimensions. First, high critical current per unit width, often in applied magnetic fields. Second, long, defect-free piece lengths, because joints add loss and failure points. Third, manufacturing yield and cost per kiloamp-meter, the metric that determines whether HTS can scale industrially, alongside low AC losses for cable duty. Fourth, mechanical robustness, since fusion and grid magnets wind the tape under stress. The category's hard truth is that lab-grade tape is well understood; cheap, kilometer-scale, reliable tape is the unsolved industrial problem.

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

MetOx's central technical claim is a proprietary one-pass MOCVD process that deposits both buffer and superconductor layers, complemented by PVD and electrochemistry within the overall stack. The architecture reflects a multidisciplinary thin-film and materials approach rather than a single hero step, and the company sits squarely at the materials-manufacturing layer of the value chain: it makes the wire that magnet builders, cable makers, and system integrators consume.

The components decompose roughly as follows.

› **Substrate and buffer.** A flexible metal tape provides the mechanical backbone, and buffer layers create the crystallographic template the superconductor needs to grow with the right alignment. Getting this right is what allows long lengths to perform consistently.

› **One-pass MOCVD deposition.** The differentiating claim is laying down buffer and superconductor in a single MOCVD pass rather than multiple discrete steps. If real and yield-stable at length, this is a throughput and cost lever, which is exactly where the industrial bottleneck lives.

› **Finishing layers.** PVD and electrochemical steps round out the stack, adding the stabilizer and protective architecture that make the tape usable in real magnets and cables.

The honest read on defensibility: the underlying YBCO/MOCVD physics is published and practiced by several manufacturers, so the category is not proprietary. What could be genuinely proprietary is MetOx's specific process recipe, equipment configuration, and the accumulated know-how that turns single-pass deposition into reproducible high-yield output. That is real but partly tacit, and a well-funded competitor or a national-lab-backed rival could pursue similar one-pass approaches. The proof is in cost per kiloamp-meter at scale, which is undisclosed.

## 6. Business and Go-to-Market

The model is fundamentally a hardware-manufacturing business: MetOx makes and sells HTS wire, with margins tied to deposition yield, throughput, and materials cost rather than to software economics. The go-to-market is sales-led and project-based, oriented to a small set of demanding buyers in fusion, grid, and magnet applications, with "pilot projects" referenced as early traction.

Capital and traction are clearer than commercial detail. MetOx raised roughly $40 million in Series B-related capital during 2024: a $25 million extension in September 2024 led by Centaurus Capital and New System Ventures, and a closing $15 million tranche in November 2024 that included Duquesne Family Office, Piedmont Capital, Crosscut Ventures, New System Ventures, and John Doerr's family office. A separate, earlier round led by Koch Disruptive Technologies closed in December 2023 and should not be folded into the 2024 figure.

The marquee commercial signal is the planned North Carolina facility in Chatham County: a ~$193.7 million investment expected to create 333 jobs, announced by Gov. Roy Cooper on December 17, 2024, and facilitated by a JDIG awarded to a newly created MetOx subsidiary. The recruitment of Keyvan Esfarjani, a former Intel EVP, as Executive Chairman reads as a deliberate move toward semiconductor-grade manufacturing scale-up discipline, the right hire profile for a company transitioning from process development to volume production. No named customers, contracts, or revenue-by-application breakdown are public, so unit economics remain unverifiable.

## 7. Competitive Landscape and Moats

MetOx competes in 2G HTS wire against a small global field. The most directly comparable peer is SuperPower, the other notable U.S.-rooted REBCO manufacturer, with adjacent players including AMSC and the Japanese suppliers Fujikura and Sumitomo, plus Europe's THEVA. No comparative performance or share data exists in the public record to rank them, so these are named for context only.

**Where MetOx wins versus SuperPower.** Its pitch is a domestic, federally aligned supply chain at industrial scale, backed by a fresh greenfield factory and recent capital. For buyers worried about onshoring and security of supply, a U.S. manufacturer scaling new capacity is strategically attractive.

**Where it loses.** Established peers have shipped wire to real programs for years and carry track records on long-length performance and yield that MetOx, as a scaling entrant, has not publicly matched. No comparative data exists to adjudicate this, so the edge is positioning, not proven superiority.

On moats, three are worth weighing.

› **Domestic supply position.** Real and timely: onshoring sentiment and federal support give MetOx a structural advantage with U.S. buyers, if it delivers. Building a competing U.S. line takes years and hundreds of millions of dollars.

› **Process know-how and field data.** Potentially durable. Accumulated manufacturing data on what makes one-pass deposition reproducible at length, plus long-length Ic maps and defect statistics, compounds with volume, but only once volume exists.

› **Capacity as a moat.** Asserted, not yet proven. The North Carolina plant could create a scale advantage, but nameplate capacity is undisclosed and competitors are also expanding.

The platform risk: a deep-pocketed rival or a national-lab program could close a process gap, turning differentiation into parity.

## 8. Risks and Open Questions

The picture turns on execution, capacity, and whether federal money lands. MetOx has material DOE support: it was selected to negotiate up to roughly $80 million for an advanced HTS manufacturing facility in the southeastern U.S., referred to as "Project Arch." That should be read in the hedged framing, not as disbursed cash, and it is unresolved whether Project Arch is the same undertaking as the Chatham County plant.

The questions I would put to the founders:

- What is current Houston output and projected North Carolina nameplate capacity in kilometers or kiloamp-meters per year, with the timeline to reach it?
- What is your cost per kiloamp-meter today, and where does the one-pass MOCVD process put it at scale versus established peers?
- Is the ~$80M DOE Project Arch finalized and obligated, and is it the North Carolina facility or a separate project?
- Who are the named pilot customers, and what is the sales mix across grid, fusion, and data-center applications?
- How exposed is the demand model to AI-capex cyclicality and slow utility procurement if either softens?

## 9. Bottom Line

MetOx is a credible attempt to build a domestic HTS wire supplier at industrial scale, riding real demand from grid, AI compute, and fusion. The single biggest reason it could work is timing: onshoring pressure plus a genuine current-density problem that copper cannot solve, paired with capital and a committed factory. The single biggest reason it might not is that the hard part, cheap and reliable kilometer-scale tape, is undisclosed and unproven against entrenched peers. The thing to watch next: whether the DOE Project Arch money finalizes and the North Carolina plant produces verifiable, qualified wire at competitive cost.

## 10. For the Nerds

The differentiation hinges on whether one-pass MOCVD holds its critical current uniformly over long lengths, especially in-field. REBCO's performance is dominated by flux pinning, the engineered defect landscape that keeps magnetic vortices from moving and dissipating energy, and by grain alignment templated through the buffer stack (typically something in the lanthanum zirconate / cerium oxide / yttria-stabilized zirconia family). A single-pass deposition that simultaneously nails buffer texture and superconductor pinning is genuinely hard, because the process windows for the two layers normally differ. If MetOx has co-optimized them, that is a real edge; if the single pass trades pinning microstructure for throughput, in-field critical current suffers exactly where fusion magnets need it most.

What fusion programs actually need is high critical current in high applied fields, in the 12–20 tesla range, which requires artificial pinning centers, typically $BaZrO_3$ or $BaHfO_3$ nanocolumns introduced during YBCO growth. Whether a one-pass process is compatible with controlled pinning-center introduction at production throughput is the deeper open question, alongside anisotropy and minimum-bend behavior under winding stress and AC-loss management in cabled architectures. That gap between spool-grade and magnet-grade performance, not the headline superconductivity, is where the technical bet is ultimately won or lost.

## WHERE SOURCES DISAGREE

**Founding year: 1998 or 2002?**

RocketReach and multiple corpus-3 sources say 1998. EquityZen lists 2002

*Unresolved: no primary company or UH spin-out document fixes the date, and analysts' lean toward 1998 was corroboration-weighting, not new dispositive evidence*

**Is DOE "Project Arch" the same project as the Chatham County, NC facility?**

One reading treats the ~$80M DOE southeastern-U.S. facility and the $193.7M NC plant as the same undertaking. The other treats them as related-but-distinct

*Unresolved: job counts (200+ vs. 333), geography ("southeastern U.S." vs. "Chatham County"), and a separate JDIG subsidiary do not line up cleanly*

**Status of the ~$80M DOE money.**

Some sources say "selected to negotiate up to $80M"; a MetOx release calls it a "grant awarded."

*Unresolved: no final DOE award/obligation document appears in the corpus*

**Is Houston "North America's largest dedicated HTS wire plant"?**

Company and investor materials repeat the superlative. No third-party benchmark against competitors (SuperPower, AMSC, THEVA) exists

*Unresolved: the claim is unverified marketing, neither independently confirmed nor falsified*

**Current and projected production capacity (km/year).**

Company target language cites large-scale output; primary documents give no current figure

*Unresolved: actual Houston output and definitive NC nameplate capacity are undisclosed across all bundles*

**Legal relationship among "MetOx International, Inc.," "MetOx Technologies / Metal Oxide Technologies," and the new NC subsidiary.**

DOE/UH materials use "MetOx Technologies Inc."; NC and funding releases use "MetOx International, Inc."; the JDIG goes to a newly created company

*Unresolved: no corporate filings clarifying the entity structure were surfaced*