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Capital at Scale

Rebuilding the Physical Economy

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A collaboration between Altes Capital and Green Alpha Investments

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Investing in the Reconstruction of the Physical Economy

For the past two decades, the most valuable companies in the world were largely asset-light. Software scaled without factories. Platforms grew without permits. Capital flowed toward businesses that could expand quickly with relatively little physical infrastructure.

But the next phase of economic growth may depend on something different.

Electricity systems, industrial supply chains, and manufacturing capacity were largely built decades ago for a different economic structure. Today those systems face new pressures at the same time: electrification, artificial intelligence infrastructure, supply-chain reshoring, and renewed industrial policy.

Unlike software, physical systems cannot scale overnight. Transmission lines take years to permit and build. Large equipment has multi-year lead times. Industrial facilities require capital, regulatory approvals, and operational expertise before they produce their first unit.

This mismatch between rapidly rising power requirements and slowly expanding infrastructure is creating one of the defining capital opportunities of the coming decade: the rebuilding of the physical economy.

SECTION 1

The Return of the Physical Economy

For more than a decade, U.S. electricity generation was essentially a flat line. Now, that stability is breaking.

The shift isn't abstract. New sources of demand — AI infrastructure, electrification, and reindustrialization — are arriving faster than the system was built to handle.

The grid was designed for gradual change, not a sudden surge in energy-intensive activity. And physical infrastructure does not adjust on demand. It moves through permitting cycles, equipment lead times, and construction timelines that stretch over years.

At the same time, the dominant investment model of the past two decades largely avoided these constraints. Software scaled without factories. Platforms grew without permits. Capital concentrated in businesses that could expand quickly without relying on physical systems.

That model still works. But it cannot rebuild the systems the economy runs on.

Four forces are now colliding at once: the rebuilding of energy systems, the rise of AI-driven infrastructure, the reconfiguration of global supply chains, and the return of domestic manufacturing. Each is a large capital story on its own. Together, they are placing sustained pressure on infrastructure that was largely built for a different era.

Infrastructure is governed by timelines that capital cannot accelerate.

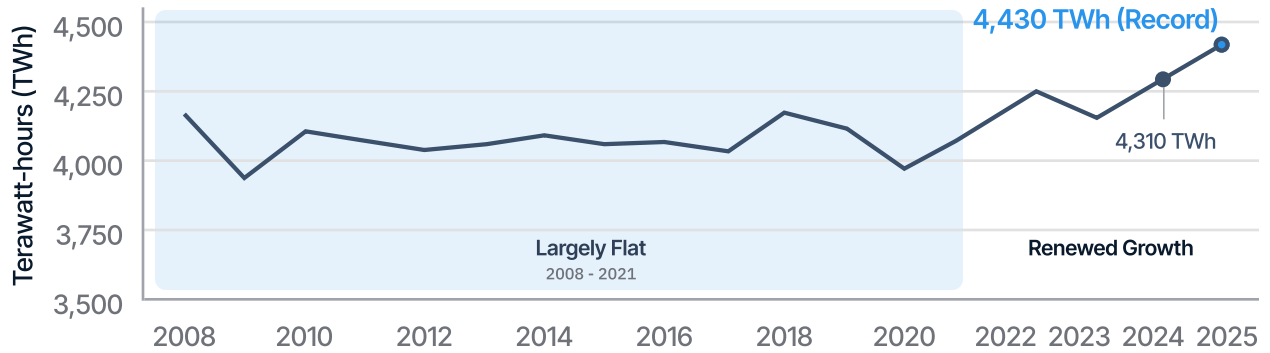
That constraint is now visible in the data. After years of little to no growth, U.S. electricity generation rose to 4,310 TWh in 2024 and reached roughly 4,430 TWh in 2025.¹ The system is beginning to respond — but slowly, and within hard limits.

This is the central tension. The economy is moving faster. The infrastructure it depends on is not.

¹ U.S. Energy Information Administration, "U.S. electricity generation in 2025 hit a record, again" (March 5, 2026), eia.gov/todayinenergy/detail.php?id=67284.

Figure 1

U.S. Electricity Generation

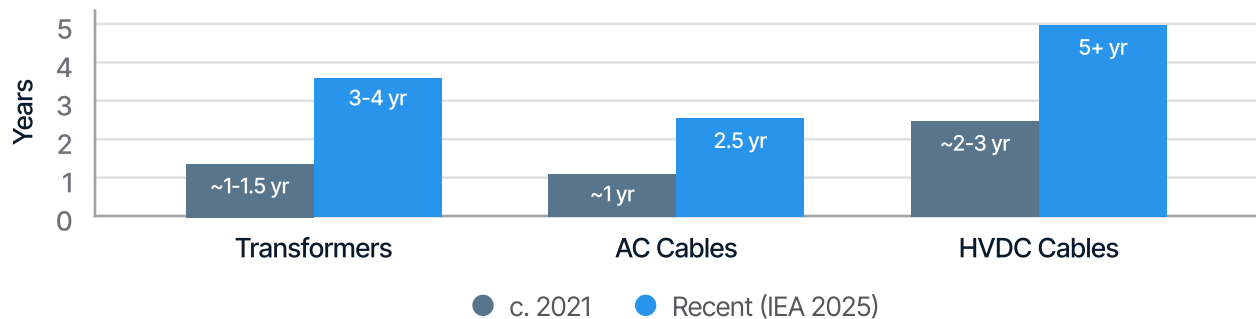


Source: EIA, Electricity Data Browser / Monthly Energy Review historical net generation series; “U.S. electricity generation in 2025 hit a record, again” (March 5, 2026).

Transmission development timelines in the United States can exceed a decade in many cases, reflecting permitting and siting constraints.² Large power transformers can require years to procure.³ Interconnection queues have grown to a scale comparable to the existing U.S. generating fleet.⁴ The backlog reflects how much new generation capacity is seeking to connect to a system whose interconnection process cannot move fast enough.

Figure 2

Global Procurement Lead Times



Source: IEA, Building the Future Transmission Grid (2025); IEA, Electricity Grids and Secure Energy Transitions (2023)

² Princeton University, Net-Zero America — Transmission & Infrastructure Analysis (2021), <https://netzeroamerica.princeton.edu/img/NZA-TransGrid.pdf>

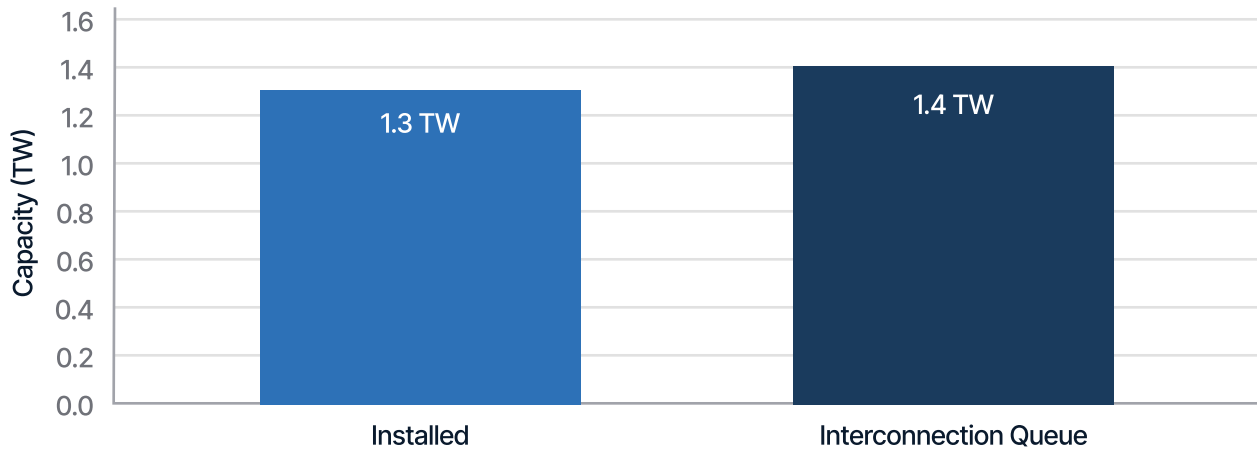
³ International Energy Agency, Building the Future Transmission Grid (2025), [iea.org/reports/building-the-future-transmission-grid](https://www.iea.org/reports/building-the-future-transmission-grid).

⁴ Lawrence Berkeley National Laboratory, Queued Up: 2025 Edition — Characteristics of Power Plants Seeking Transmission Interconnection as of the End of 2024, emp.lbl.gov/queues. Comparison reflects queued generation capacity only (~1.4 TW), excluding ~0.9 TW of storage capacity.

Figure 3

U.S. Installed Generation Capacity vs. Queued Generation Capacity (TW)

As of end 2024 (EIA, LBNL 2025 edition)



Source: EIA (2024), LBNL, Interconnection Queue (2025)

Note: Queue reflects generation capacity (nameplate); excludes storage for comparability.

The same pattern appears across the physical economy. Manufacturing buildouts run into labor and equipment constraints. Critical materials projects take years to develop regardless of price signals. In each case, timelines are set by physical and regulatory realities, not by capital availability.

The scale of what is required makes the constraint clear. The International Energy Agency estimates that global electricity networks will require roughly 80 million kilometers of new or upgraded lines by 2040 — roughly equal to the entire existing grid.⁵

That is not a capital cycle. It is a buildout measured in decades.

Electricity demand can rise quickly. Infrastructure cannot.

⁵ International Energy Agency, Electricity Grids and Secure Energy Transitions (2023), <https://www.iea.org/reports/electricity-grids-and-secure-energy-transitions>.

SECTION 2

The Investment Framework

Rebuilding the physical economy may become one of the largest investment stories of the next decade.

Altes and Green Alpha came to this collaboration from different directions — one through private markets, the other through public equities — but they share the same analytical starting point: the physical economy is being rebuilt, the process will take decades, and most portfolios are not positioned for it.

The partnership exists because the opportunity has a natural structure. Private capital builds and scales the physical platforms. Public equities hold them once they are proven. An allocator with exposure to both is participating in the same thesis at different stages of its development. The common logic underlying both approaches is simple: in capital-intensive physical systems, we believe the companies that get there first and build real operational depth become structurally difficult to displace. Each project lowers the cost of the next one. Each customer makes the next one easier to win. Costs fall with experience. Relationships with regulators deepen over years. The capital required to enter these markets is the same feature that protects those already inside — the opposite of software, where a new competitor can launch overnight.

Table 1

Allocator Architecture: One Conviction Across the Capital Stack

Coherent Public + Private Allocation - Companies with operational depth are structurally difficult to displace

Structural Forces	Shared Framework	Private Expression (Altes)	Public Expression (Green Alpha)	Allocator Architecture
Energy transition AI infrastructure demand Supply chain fragility Industrial policy alignment Reindustrialization of advanced economies	Physical-economy thesis Capital-intensive businesses with compounding operational moats. Economics, not labeling.	Focus: U.S. Reindustrialization Growth equity in capital-intensive, AI-enabled platforms at scaling inflection Reaches opportunities before public markets. Requires operational depth to price.	Focus: The Next Economy Liquid equities capturing scaled operators with structural demand. Learning-curve economics screen. Already operating in the emerging economy.	One conviction across the capital stack. Coherent public + private allocation. Sequential Exposures - full arc of rebuilding the physical economy.

Most investment portfolios underestimate how durable that advantage is because most portfolio construction frameworks weren't built to capture it.

We believe the barriers are the moat. High capital requirements, long permitting timelines, and operational complexity may look like obstacles from the outside. To the companies that have already cleared them, they are a competitive shield. A company that has survived a ten-year transmission permitting process is not starting from scratch the next time. That experience — the data, the relationships, the knowledge of what went wrong before — compounds with every project.

The same holds for a public company with a large installed base of grid technology. It is not just bigger than its competitors; it is smarter, and the gap widens every quarter.

We believe an allocator without deliberate exposure to this category — across both the private build-out and the public compounders — is not just underweight an opportunity. They are underexposed to a structural shift that is already well underway. Capital that can build physical systems will matter more.

SECTION 3

Private Markets — U.S. Reindustrialization

Altes

Private markets reach these opportunities before public investors do — but only if the investor has the operational expertise to underwrite them.

The categories at the center of U.S. reindustrialization are capital-intensive, technically complex, and sensitive to variables that do not appear in a standard financial model. We believe this creates a durable inefficiency: most private capital can write a check, but few investors can accurately price what they are buying.

The reindustrialization of the U.S. economy — rebuilding domestic energy infrastructure, manufacturing capacity, and supply chain resilience — represents one of the defining capital opportunities of this decade.

Altes operates across three areas that are structurally linked, not just thematically adjacent. Grid buildout drives demand for advanced manufacturing. Advanced manufacturing drives demand for critical materials. Critical materials constrain everything else.

Grid Buildout

Grid modernization, energy storage, next-generation power. This is the single largest capital requirement in the thesis — and the one where the gap between what is needed and what is being built is most visible. The grid being built is not a replica of the one it is replacing. It is designed to carry distributed generation, large-scale storage, and load profiles the old infrastructure was never built to handle. Private capital with long time horizons and real operational expertise is how a meaningful portion of that shortfall ultimately gets built.

Advanced Manufacturing

Advanced manufacturing increasingly relies on AI and software embedded in capital-intensive operations, including factory automation, predictive maintenance, and industrial process optimization. The gap between what the best industrial operators are achieving with these tools and what the average company has deployed remains large — and will take years to close. That is a long runway.

Critical Materials

Supply-chain reshoring, industrial decarbonization, and platforms serving bottlenecks in critical materials. Governments are pushing this shift along. Semiconductors, batteries, and advanced materials are increasingly being built closer to home. The shift did not start with any single policy.

It began with COVID, accelerated through chip and rare-earth shortages, and is now embedded in the long-term plans of large industrial companies that are unlikely to reverse course. The decarbonization story follows the same logic. The industrial processes being displaced are not losing ground because of mandates — in a growing number of sectors, cleaner industrial processes are becoming increasingly cost-competitive. Private investors with real operating depth in this area remain relatively rare.

**What changes with policy is the
pace and the incentive structure.
What does not change is the need.**

The question of policy risk comes up in every conversation about this thesis, and it deserves a direct answer. Industrial policy over the past several years accelerated the timeline — concentrating into five years investment that might otherwise have been spread across twenty. But the underlying demand is not a policy artifact. Across both Republican and Democratic administrations, energy security, supply chain resilience, and domestic industrial capacity have become increasingly prominent priorities.

What distinguishes Altes’s underwriting is what gets treated as a real variable versus what gets noted and skipped over. Resource availability, operational risk, insurance, and regulatory durability — these are priced into the deal, not simply disclosed. The investment is designed around the regulatory environment that will exist over the asset’s entire life, not just the one that exists at signing. The gap between those two things is where a great deal of infrastructure investing quietly goes wrong.

This mismatch creates opportunity. For large infrastructure platforms, the binding constraints are often permitting, siting, and supply chains rather than capital. The scarcer resource is qualified operators who can build and run complex physical assets, and investors with the technical depth to underwrite them accurately.

The deals that get mispriced are not the ones where the financial model is wrong. They are the ones where no one at the table understands what it actually takes to procure a high-voltage transformer in a constrained supply environment, what a permitting delay costs at each stage of a critical materials project, or how the economics of a defense supply chain shift when a prime contractor changes sourcing requirements.

That knowledge does not come from covering these sectors. It comes from operating in them. For investors seeking meaningful exposure to this category, the question of who is doing that underwriting on their behalf is not a secondary consideration.

SECTION 4

Public Markets — The Next Economy

Green Alpha Advisors

Green Alpha has invested exclusively through the Next Economy™ framework since 2008. The thesis rests on a clear premise: systemic risks — including climate

disruption, resource degradation, disease burden, and inequality — are both the largest threats to long-term portfolio value and the largest sources of investable structural demand. The framework is not built on screening or overlays. It identifies companies whose economics improve as the problems they solve become harder to ignore.

Public equity markets are good at pricing near-term earnings. They are structurally less good at pricing companies whose competitive position compounds over years.

That gap — between what quarterly earnings reflect and what structural demand curves actually imply — is where the Next Economy framework operates.

The premise is specific: climate stress and resource degradation are not just systemic risks to manage around. They are actively creating some of the largest and most durable sources of unmet demand in the physical economy.

The grid needs to be rebuilt because the energy system that created those stresses cannot power what comes next. Industrial processes that depend on carbon-intensive inputs face rising cost pressure regardless of policy. The companies displacing them are doing so as their economics become increasingly competitive — not because they require a mandate.

Resource constraints do not ease when a regulation expires. The companies solving these problems are not simply beneficiaries of a political moment. They are building the systems the economy structurally requires.

Green Alpha looks for publicly traded companies already profiting from that shift — businesses whose solutions are economically competitive on their own terms. These firms are not positioning for a transition. They are already operating in the economy that is emerging.

The screen that matters most is learning-curve economics. Does solving this problem at greater scale make the solution cheaper and better, or does it simply make the company bigger?

A grid technology company with a large installed base makes the whole system smarter with every new deployment — each customer improves the product for the next one. A clean industrial process that wins on cost doesn't need a carbon price to keep winning; it becomes harder to displace as the cost gap widens. That dynamic separates durable competitive positions from temporary ones. Revenue is required to demonstrate that it's real. So is evidence that the unit economics actually improve as the business scales — not a model projecting that they will, but data showing that they already are.

In practice, that means the portfolio is anchored in companies solving the most structurally unavoidable physical constraints.

These include grid operators and transmission businesses modernizing infrastructure the economy cannot function without. They include industrial platforms displacing more carbon-intensive or resource-intensive processes on pure cost grounds. And they include companies in energy transition and resource efficiency whose competitive position strengthens as the underlying constraints worsen. In these businesses, the market opportunity expands as the physical problem becomes harder to ignore — the opposite of cyclical exposure. Higher-growth companies earlier in their improvement curves provide the return asymmetry.

The portfolio does not begin with a market index. It begins with where the physical constraints are largest, the learning curves steepest, and the competitive advantage most durable. Public markets often underprice that kind of structural demand. The gap between what markets currently reflect and what long-term demand curves imply is precisely where patient, framework-driven investors have historically found durable returns. We believe infrastructure is becoming one of the largest capital deployment stories of the coming decade.

SECTION 5

One Thesis, Two Instruments

For two decades, the smartest capital chased asset-light businesses. Software scales without factories. Platforms grow without permits. But the next phase of the economy may look different.

The physical economy has a capital lifecycle that most portfolio construction frameworks weren't designed to capture. Private markets fund the build-out: the early-stage platforms and the infrastructure that require patient capital and operational expertise to underwrite.

Public equities hold the scaled, proven versions of those same businesses — the grid operators, the industrial platforms, the clean-process companies that have already cleared the hardest obstacles and are now compounding their advantage.

These aren't parallel exposures. They're sequential ones. An allocator with access to both participates in the full arc rather than just one stage of it.

This environment rewards patience. Infrastructure takes time to build, and the companies that already know how to do it start with a head start. The risks on the two sides are real — and different. Public markets move every day, which tests conviction when you're holding a thesis that may take years to play out. Private markets involve construction risk, concentration, and illiquidity that can run longer than the paperwork typically suggests.

Neither is a reason to avoid the category. Both are reasons to be deliberate about how you enter it and what you expect from each sleeve. The opportunity is not just to finance infrastructure. It is to help build it.

The opportunity is defined by the need to build and finance infrastructure that can keep pace with rising load.

We believe the physical economy will be rebuilt. The capital that participates in that process — patiently, and with the right expertise at each stage — will look very different from the portfolios built for the decade just behind us.

The next generation of capital deployment may focus less on writing better software and more on rebuilding the physical systems that software ultimately runs on.

How to position across public and private sleeves to capture that fully is a conversation both firms are glad to have.

The question isn't whether the physical economy will be rebuilt. It's how and where capital will participate.



About Altes Capital

Altes Capital is an alternative investment manager focused on institutional allocators, including Endowments, Foundations, Family Offices, and pension-oriented capital, alongside select RIAs.

Our work centers on areas of the market that are often overlooked or under-allocated by institutional capital, where structural change, fragmentation, or complexity create investable opportunity. We translate these dynamics into investable strategies through disciplined underwriting, thoughtful structuring, and institutional execution.

The firm builds on an investment heritage dating back to 1981 and represents the continuation of a multi-decade alternative investment platform.

Altes designs and manages strategies across select areas of the alternative landscape, including real assets, private equity, multi-strategy alternatives, insurance-dedicated structures, and liquid alternatives. Across each, the focus remains consistent: aligning long-term capital with opportunities where structure and access drive outcomes.

The team has collectively managed or advised on over \$30 billion across global alternative platforms.

About Green Alpha Advisors

Next Economy Investment Management

Green Alpha Advisors is a Boulder, Colorado–based investment firm managing public equity portfolios built exclusively around the Next Economy thesis. Since 2007, we have constructed concentrated, benchmark-agnostic portfolios of companies whose economics improve as the structural problems they solve become harder to ignore.

Our 18-Year Framework

Green Alpha was founded in 2007 on a specific conviction: that systemic risks — climate disruption, resource degradation, disease burden, and inequality — are not peripheral concerns to be managed through screening or scoring, but the central economic forces shaping which companies will compound and which will not. We have applied that framework continuously for eighteen years, predating the mainstream adoption of the term "Next Economy" by institutions including Brookings and others. The thesis has not changed because the underlying logic has not changed. What has changed is the world's willingness to notice.

Investment Approach

We manage high-active-share public equity portfolios across: the AXS Green Alpha ETF (NXTE), separately Managed Accounts for RIAs, family offices, and institutional allocators, and custom portfolio solutions aligned with the Next Economy framework.

Intellectual Rigor

Our research process begins with structural economic analysis, not market benchmarks. Every holding must demonstrate revenue-verified demand, improving unit economics at scale, and a competitive position that strengthens as the physical constraints it addresses intensify. The leadership team — Co-Founder and CIO Garvin Jabusch, Co-Founder and CFO/CCO Jeremy Deems, and President Erika Karp — brings decades of combined experience across portfolio management, institutional capital markets, and sustainable finance thought leadership.

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