GLOBAL CLEANTECH 100

Explore leading private cleantech companies with solutions poised to help us build a more digitized, decarbonized, and resource-efficient industrial future.

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2026 Cleantech Group

Contents

01 Foreword

Welcome to the 2026 Global Cleantech 100, the 17th edition of our annual barometer on trends and sentiments related to global cleantech innovation.

Climatetech as a whole is in a painful, but necessary, adjustment phase. Market sentiment has shifted from the heady, albeit somewhat naïve mood of 2021, where anything climate was attracting capital.

A more sober and "risk-off" market has taken hold. There are some areas with strong tailwinds, many others are suffering or progressing more slowly.

In general terms, market sentiment has turned against companies with green premiums where demand is proving weak, companies without proven traction or momentum toward cost competitiveness, and/or companies where there are now strong policy headwinds.

Such shifts are more evident in the composition of this year's Global Cleantech 100 than they were last year.

A number of recent favorites of the market have not made the 100 this year– not because they have somehow overnight lost all support and become bad companies/technologies. But there are now doubters voicing their concerns, leading to certain segments/companies being downgraded for now. Cement, DAC, and hydrogen would be three examples of this.

This edition of the 100 carries a strong sense of "out with the old, and in with the new." Nearly half the list turned over (48 to be precise).

Looking at this year's list through the lens of those debutants, I start to see some patterns–here are five themes worth calling out.

01

The generational demand increase from AI has provided a major boost to sources of future potential baseload power (like geothermal, SMRs, and fusion)–but it doesn't stop there.

Consider these companies and their connection to the data center story:

- **Alloy Enterprises:** "Significant revenue momentum, by pivoting to a data center product that reduces cooling costs."
- **Amperon:** "Positive revenue traction, helping more power and data centers onto the grid."
- **HT Materials Science:** "Aluminium oxide nano particles that enhance the performance of water-cooling systems for data centers."

Or these companies, and their connection to the grid capacity and upgrade story:

- **AssetCool:** "Boosts grid capacity without new infrastructure investment."
- **Infravision:** "Helping both developed and emerging markets to expand their grid's capacity."
- **Ionate:** "A front-runner in the new generation of hybrid transformers."
- **Splight:** "Essentially doubling grid capacity through software alone, which is cheaper and faster than building out new lines."

02 The importance of AI in the cleantech theme goes well beyond the power demand, data center, and grid story, and into how it is being used to accelerate and design solutions.

These debutants illustrate the application story:

- **Augmenta:** "Adding AI innovation in critical sectors like construction...customer case studies highlight over 2x productivity benefit."
- **Cusp AI:** "AI solution to suggest optimized chemistry for the specific application."
- **Jua:** "Gaining traction with ML-based weather forecasting solutions that enhance grid and renewable asset management."
- **VerAI:** "One of the leaders in the emerging AI-driven mining exploration segment."

03 The critical materials and metals trend has strengthened in the 2026 edition of the Global Cleantech 100.

Joining returnees like Boston Metal, Cyclic Materials, Cylib, Mangrove Lithium, Nth Cycle, Solarcycle, and Sortera, are debutants such as:

- **ElectraLith:** "Could change how lithium is extracted from brines."
- **Hertha Metals:** "Unit economics look to be attractive."
- **Niron Magnetics:** "Important macro trend tailwinds."
- **Phoenix Tailings:** "Rare Earth Element supply chain could not be more important. Phoenix has a ton of momentum."
- **SiTration:** "Patented membrane offers chemical-free, energy-efficient metal extraction, cutting costs, and emissions compared to traditional processes."

04

Resilience and security will remain in the fore in 2026.

Such can be seen in the addition of these two companies, as well as the parametric insurance company, Arbol:

- **AiDash:** "Strong traction with utilities and infrastructure clients by providing satellite-powered remote monitoring, leading to measurable operational efficiencies and environmental impact."
- **Pano AI:** "Delivering significant value to utilities and emergency services through its AI-driven wildfire detection system, with strong evidence of adoption and real-world impact."

There seems to be an increasing appreciation of the value and national security significance of water. More water companies are on the 100 this year, especially where there is a connection to some of the key industries and trends of the day, like these two examples:

- **Aquafortus Technologies:** "Will transform management of water from O&G and mining; solution recovers clean water and makes recovery of metals and minerals from brines economical."
- **Membrion:** "Found its launch market in semiconductor wastewater, recovering critical metals; large pipeline."

05 The emergence of financial/trading services-type businesses.

These three European companies speak to the fact that many parts of the electrification and energy transition economy continue to grow, irrespective of the noise and different priorities from just a few years ago.

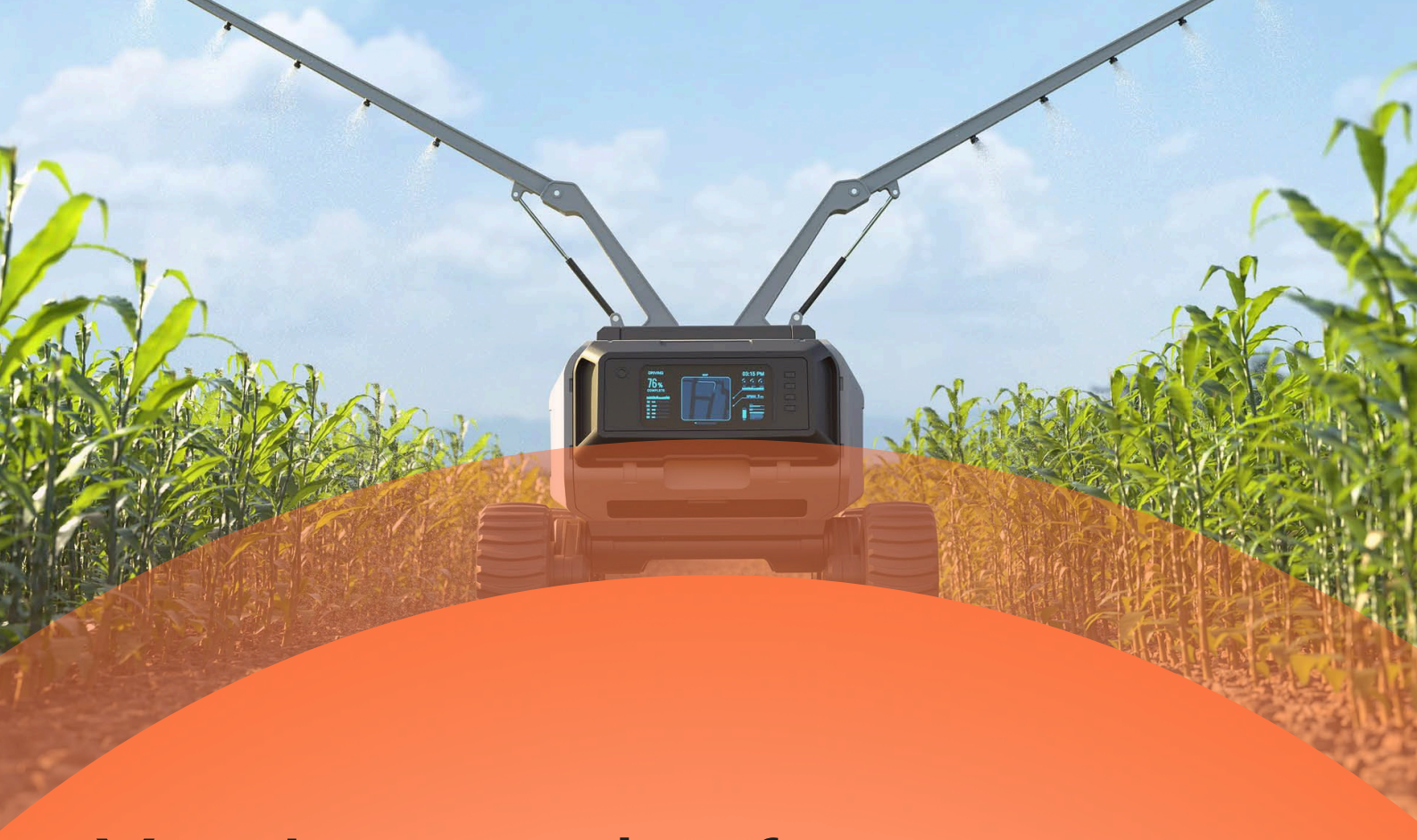
- **ESFORIN:** “Trading solutions like these become ever more important in a renewable/flexible world.”
- **Enspired Trading:** “AI-powered flexibility trading, enabling greater grid efficiency and revenue for asset owners in an increasingly volatile energy landscape.”
- **Flower:** “Great new model for financing storage.”

All quotes provided about companies are anonymized comments from members of the Global Cleantech 100 expert panel.

It will be interesting to review the landscape again at the end of 2026.

Here’s hoping for a positive year for clean technologies, in deployment (which remains strong where straight economics are at play) and in the advancement of innovative solutions.

Richard Youngman,
CEO, Cleantech Group



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As Climate Tech companies pioneer innovations for a sustainable future,they encounter distinct challenges stemming from the novel nature of their operations and the pressing need to scale quickly within a low-carbon economy. Significant investments from Venture Caps and Private Equity funds, coupled with Government incentives, has propelled the growth in Climate Tech.

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Climate progress needs protecting.

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02

Acknowledgements

Cleantech Group is pleased to present the 17th annual Global Cleantech 100. We recognize that this long-standing report would not be able to come together without the support and participation from the innovation ecosystem and would like to thank a few specific groups.

We first want to express our gratitude for the ongoing support of Chubb, the world's largest publicly traded property and casualty insurance company. Chubb has been the headline sponsor of the annual Global Cleantech 100 program for over ten years.

The list would not have been possible without the expert panelists who gave their time to provide their input and opinions. This is in addition to the many hundreds who made company nominations.

And finally, thank you readers and supporters—the true champions of the Global Cleantech 100. Your unwavering support provides the vital foundation these companies need to move from breakthrough ideas to global commercial scale. We are honored to build the future alongside a community that remains steadfastly committed to the mission, no matter the market cycle.

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How We Select the Global Cleantech 100

03 Methodology

The Question We Seek to Answer

According to the world's cleantech community, which 100 private companies today are most likely to make significant market impact over the next five to ten years? We answer this question in three phases.

Phase 1: Nominations

Nominations come from five sources:

1. The expert panel of 78 investor and multi-national corporation representatives.
2. Our Members Hub which tracks the investment and partnership history of thousands of relevant companies.
3. Over 80 third-party awards where expert assessment has been applied.
4. Our industry group analysts.
5. Public nominations from the global ecosystem.

Phase 2: Expert-Led Evaluation

Since our aim is to objectively synthesize and represent consensus, nominations are scored in a system rewarding companies that have multiple validations from our nomination sources. From this, a shortlist is created and sent to our panel of industry experts comprised of investor and multi-national corporation representatives. The panel votes positively or negatively based on their knowledge of the company's innovation, market, and ability to execute.

Phase 3: The Final 100

A combination of data from Phase I and Phase 2 are pooled and adjusted for geographic or other biases. Companies with the highest points overall make it to the final 100.

*Any independent, private, for-profit cleantech company can qualify for the Global Cleantech 100. These companies must have a knowledge-based offering that embodies doing more with less (provides superior performance at lower costs, greatly reduces or eliminates negative ecological impact, and improves the productive and responsible use of natural resources). We exclude those who we know to have reached Unicorn status and/or those who have been in the list seven times before. The list was struck on September 30, 2025.

Exploring the Depth and Breadth of the Cleantech Community

The number of nominations from the public, our expert panel, Members Hub, awards, and Cleantech Group totaled 24,093 nominations from over 57 countries. These companies were weighed and scored to create a short list of 264 companies that were reviewed by the 78 members of Cleantech Group's Expert Panel. The list offers a fair representation of global innovation and private company creation. It is not Cleantech Group's editorial voice, but the collective opinion of hundreds of individuals within the wider global cleantech innovation community.

04 The Global Cleantech 100

Congratulations!

To all of the **100 innovators** who made the list.

Agriculture & Food

4 Companies ↓ 2 Countries ↓

Company	Name & Description	Country	Region	Year Founded
Agtonomy	Agtonomy Platform that turns tractors and other farm equipment into autonomous machines.	United States	North America	2021
MASH MAKES	MASH Makes Containerized pyrolysis and gasification technology to produce biochar and biofuels from agrifood waste.	India	Asia Pacific	2015
NITRICITY	Nitricity Plant-based liquid organic fertilizers using biomass inputs like almond shells.	United States	North America	2018
TARANIS	Taranis Pest and disease prediction software platform with AI-informed analytics for real-time crop monitoring.	United States	North America	2015

Energy & Power

32 Companies ↓ 14 Countries ↑

Company	Name & Description	Country	Region	Year Founded
AERONES	Aerones Robotics for wind turbine inspection, repair, cleaning, commissioning.	Latvia	Europe & Israel	2015
AMPERON	Amperon AI-enabled energy forecasting and analytics platform used to support grid stability.	United States	North America	2017

	AtmosZero On-site modular heat production process to decarbonize industrial steam.	United States	North America	2021
	Circu Li-Ion Lithium-ion battery, upcycling services.	Luxembourg	Europe & Israel	2021
	CorPower Ocean Wave energy converter using point absorber technology.	Sweden	Europe & Israel	2009
	DG Matrix Modular solid-state transformer with power applications across industries.	United States	North America	2022
	Eavor Technologies Closed-loop, conduction-only geothermal energy solutions.	Canada	North America	2017
	Enspired Trading Trading and optimization platform for energy systems.	Austria	Europe & Israel	2020
	ESFORIN Automated system to monetize the flexibility of industrial and generation energy assets on the intraday markets through algorithmic trading.	Germany	Europe & Israel	2015

FLOWER	Flower AI optimization for battery storage and renewable energy infrastructure.	Sweden	Europe & Israel	2020
Gradyent Upgrading the grid	Gradyent Digital Twin and AI cloud platform to improve management of district heating networks.	Netherlands	Europe & Israel	2019
granular energy	Granular Energy Software provider that specializes in clean energy management.	France	Europe & Israel	2021
GridBeyond	GridBeyond Energy management solutions using AI to dispatch energy at optimal times.	Ireland	Europe & Israel	2007
H2SITE	H2SITE Membrane-based liquid reforming systems for ammonia and methanol cracking.	Spain	Europe & Israel	2019
Infinitum	Infinitum Lighter, durable electric motor technology.	United States	North America	2014
Infravision	Infravision Aerial robotics and software solutions to automate power line construction.	Australia	Asia Pacific	2017

Instagrid	**Instagrid** Portable power packs with various applications including construction, small businesses, and events.	Germany	Europe & Israel	2018
IONATE	**IONATE** Power transformers leveraging high-precision magnetic power flow controllers, enhanced by an AI control module.	United Kingdom	Europe & Israel	2019
KOLOMA	**Koloma** Natural hydrogen production solutions.	United States	North America	2021
KRAFT BLOCK	**Kraftblock** Modular, high-heat thermal energy storage solutions.	Germany	Europe & Israel	2014
MODOENERGY	**Modo Energy** Analytics platform for energy markets and management.	United Kingdom	Europe & Israel	2019
OMNIDIAN	**Omnidian** Performance assurance for distributed solar and storage energy systems.	United States	North America	2015
OXFORD PV	**Oxford PV** Plug and play perovskite-on-silicon tandem solar cells that enable solar energy cost reductions.	United Kingdom	Europe & Israel	2010

QPINCH	Qpinch Chemical heat pump that converts waste heat into carbon neutral industrial heat.	Belgium	Europe & Israel	2012
RADIANT	Radiant Helium-cooled, transportable, high-temperature gas cooled 1MW micro-reactor.	United States	North America	2021
RAPTOR MAPS	Raptor Maps Solar performance optimization software and aerial inspection solutions.	United States	North America	2014
RONDO	Rondo Energy Thermal battery technology that stores renewable power to support industrial decarbonization.	United States	North America	2020
SPLIGHT	Splight AI platform that provides grid management, energy efficiency, and performance solutions.	United States	North America	2021
Terabase	Terabase Energy Development and deployment platform that tracks and automates utility-scale solar development.	United States	North America	2015
TS CONDUCTOR	TS Conductor Carbon-core encapsulated aluminum conductors to increase the ampacity of transmission and distribution lines.	United States	North America	2019

VEIR	VEIR Evaporative cryogenic cooling system for high-temperature superconductors in electrical transmission and commercial cables.	United States	North America	2019
VERNE	Verne Green hydrogen solutions for decarbonization in the transport sector and commercial applications.	United States	North America	2020

Materials & Chemicals

32 Companies ↓ 15 Countries ↑

Company	Name & Description	Country	Region	Year Founded
44.01	44.01 Subsurface carbon mineralization solution via enhanced weathering to extract and store CO_2 from the atmosphere.	Oman	Middle East	2020
aeroseal	Aeroseal Aerosol-based process for sealing central heating/cooling and ventilation ductwork within homes and buildings.	United States	North America	1993
Alloy Enterprises	Alloy Enterprises Aluminum additive manufacturing system for high throughput of fully-dense parts, from prototyping to production.	United States	North America	2020
Altris	Altris Abundant, low cost cathode materials for rechargeable sodium-ion batteries.	Sweden	Europe & Israel	2017

Ardent	**Ardent** Advanced membrane-based CO_2 separation to decarbonize hard-to-abate sectors.	United States	North America	1993
ASSETCOOL THERMAL METAPHOTONICS	**AssetCool** Photonic coatings to reduce heat buildup on power lines, enabling higher transmission capacity and overall lower losses.	United Kingdom	Europe & Israel	2016
Augmenta	**Augmenta** AI-based construction software for building design to reduce waste and energy use.	Canada	North America	2018
BOSTON METAL	**Boston Metal** Molten oxide electrolysis platform for use in steel making and production of other metals and alloys.	United States	North America	2012
carbon upcycling	**Carbon Upcycling** Production of high performance materials for cement and other markets produced via CO_2 sequestration with industrial waste.	Canada	North America	2014
COOLBROOK	**Coolbrook** Electrified reactor providing high temperature industrial heat for use in cement, steam cracking, and other energy intensive processes.	Finland	Europe & Israel	2011
cusp.ai	**CuspAI** AI-powered materials discovery for clean energy and industrial decarbonization.	United Kingdom	Europe & Israel	2024

Dioxycle	Integrated modular electrolyzer systems to capture and convert industrial carbon dioxide emissions.	France	Europe & Israel	2020
econic	Catalysts that enable production of polycarbonates, polyols, and polymers from CO_2.	United Kingdom	Europe & Israel	2011
HERTHA METALS	Single step feedstock agnostic steel production using natural gas and/or hydrogen.	United States	North America	2022
HT Materials Science – Smarter Heat Transfer Fluids	Nanofluid heat transfer additives for use in thermal systems to boost efficiency and lower emissions.	Ireland	Europe & Israel	2018
INERATEC	Modular chemical plants for distributed Power-to-X and Gas-to-Liquid applications.	Germany	Europe & Israel	2016
LUXWALL See Beyond	Transparent insulation for improving energy efficiency of commercial buildings.	United States	North America	2020
Mangrove Lithium – Unlocking a battery-powered future	Modular platform for the cost-effective production of battery-grade lithium hydroxide.	Canada	North America	2017

MEMBRION	**Membrion** Flexible robust membranes for applications in water, clean energy, and health industries.	United States	North America	2017
Niron Magnetics	**Niron Magnetics** Producer of high-performance, earth abundant permanent magnets.	United States	North America	2014
OXCCU	**OXCCU** One-step catalytic process for producing sustainable fuels and chemicals from captured CO_2.	United Kingdom	Europe & Israel	2021
Safire	**Safire Technology Group** Lithium-ion battery additive that mitigates risks and optimizes battery performance.	United States	North America	2017
Tidal Vision	**Tidal Vision** Upcycled chitosan-based products for agriculture, water treatment, and materials industries.	United States	North America	2019
tretau	**Tretau** Solvent-free high performance coatings and wires, enabling more efficient electrical systems.	Italy	Europe & Israel	2019
ubq	**UBQ Materials** Circular process for transforming residual municipal solid waste into thermoplastic materials.	Israel	Europe & Israel	2012

Resources & Environmental Management

16 Companies ↑ 5 Countries ↑

Company	Name & Description	Country	Region	Year Founded
AiDASH	AiDash Grid inspection and monitoring platform using AI and satellite data to identify vegetation and weather-related threats to the grid.	United States	North America	2019
Arbol	Arbol AI- and blockchain-enabled climate risk analytics and parametric insurance platform.	United States	North America	2018
BURNBOT	Burnbot Integrated system designed for scaling fuel treatment for wildfire mitigation.	United States	North America	2022
CO280	CO280 Solutions Carbon dioxide removal project developer generating permanent CDR credits from industrial sources.	Canada	North America	2022
ElectraLith	ElectraLith Direct lithium extraction and refining technology that produces battery-grade lithium hydroxide without freshwater, chemicals, or fossil energy.	Australia	Asia Pacific	2021
Jua	Jua AI-based weather forecasting and analytics platform for energy trading.	Switzerland	Europe & Israel	2022
Living Carbon	Living Carbon Reforestation platform engineering trees with enhanced carbon uptake and long-term biomass storage.	United States	North America	2019

	Near Space Labs High-altitude autonomous balloon platform that captures high-resolution aerial imagery for earth.	United States	North America	2016
	Pano AI AI and ultra-high-resolution cameras to automatically detect, verify, and classify wildfire events in real time.	United States	North America	2020
	Phoenix Tailings Zero-waste metals production platform that recovers critical metals from mining and industrial waste streams.	United States	North America	2018
	Planetary Technologies Ocean carbon removal platform using alkalinity enhancement to accelerate CO_2 absorption in seawater.	Canada	North America	2019
	Vaulted Deep Slurry sequestration technology that injects organic waste underground for permanent carbon removal.	United States	North America	2023
	VerAI Discoveries AI-driven mineral exploration platform that identifies concealed ore deposits in underexplored regions.	United States	North America	2020
	Wint Water management platform that uses sensors and analytics to detect leaks and reduce building water consumption.	United States	North America	2011

XOCEAN Ocean data, delivered.	Xocean Ocean data collection and mapping platform.	Ireland	Europe & Israel	2017
ZWITTERCO	ZwitterCo Membrane-based pre-treatment solutions for desalination.	United States	North America	2020

Transportation & Logistics

5 Companies ↓ 5 Countries ↑

Company	Name & Description	Country	Region	Year Founded
Electric Era	Electric Era EV charging solution integrating battery storage and proprietary AI-enabled software to optimize energy use and reliability.	United States	North America	2019
ev.energy	ev.energy Charging management software to reduce grid strain and integrate EVs into energy networks.	United Kingdom	Europe & Israel	2018
NORSEPOWER	Norsepower Rotor sail systems and digital control software for large vessels.	Finland	Europe & Israel	2012
启源芯动力 QIYUAN GREEN POWER	Qiyuan Core Power Charging and battery swapping stations for heavy duty trucks.	China	Asia Pacific	2012

VAMMO	Vammo Electric motorcycles with proprietary battery swapping network and battery-as-a-service.	Brazil	Central/ South America	2022

Waste & Recycling

18 Company ↑ 8 Country ↑

Company	Name & Description	Country	Region	Year Founded
AMP	AMP Cost-competitive facilities to process single-stream recycling and municipal solid waste using artificial intelligence.	United States	North America	2015
Aqua Membranes	Aqua Membranes Reverse osmosis membrane filters for water purification.	United States	North America	2011
aquafortus	Aquafortus Technologies Nanofiltration and reverse osmosis water filtration stacks for water purification.	New Zealand	Asia Pacific	2015
Cyclic Materials	Cyclic Materials Rare earth recycler offering a supply chain service platform facilitating the recycling of critical metals.	Canada	North America	2021
CYLIB	cylib Renewable energy powered hydrometallurgy for lithium battery recycling.	Germany	Europe & Israel	2022

	ecoSPIRITS Glass cleaning, reuse, and refill system designed to collect end-of-life glass bottle for reuse.	Singapore	Asia Pacific	2019
	Greenore Platform for converting iron and steel slag into valuable chemical products such as calcium carbonates, iron oxide, and silica while consuming CO_2 as a reactant.	China	Asia Pacific	2016
	Greyparrot AI-powered vision solution to power robotics and smart systems for waste management in materials recovery facilities.	United Kingdom	Europe & Israel	2019
	Gross-Wen Technologies Algae-based water treatment to municipalities and industrial clients.	United States	North America	2014
	Indra Modular electrochemical waste-water treatment system to remove pollutants (suspended and dissolved) and pathogens from water.	India	Asia Pacific	2018
	Moleaer Nanoscale aeration technology for transferring gas into liquids.	United States	North America	2016

moment energy	Moment Energy Converts retired electric vehicle batteries into clean, affordable energy storage.	Canada	North America	2019
NTH CYCLE	Nth Cycle Modular system to refine critical metals from waste sources such as end of life batteries, scrap metal and mined ore.	United States	North America	2017
pani	Pani AI-powered automated water treatment operations and management software.	Canada	North America	2017
SiTration	SiTration Electrified membrane extraction technology for recovery of critical materials in the battery recycling process.	United States	North America	2022
SOLARCYCLE	SOLARCYCLE Solar panel recycling services and end-of-life solutions that can recover 95% of materials used.	United States	North America	2022
SORTERA	Sortera Technologies Scrap metal autonomous sorting technology using AI to optimize aluminum alloy sortation.	United States	North America	2020
Transcend	Transcend Automated design software for water treatment facilities.	United States	North America	2015

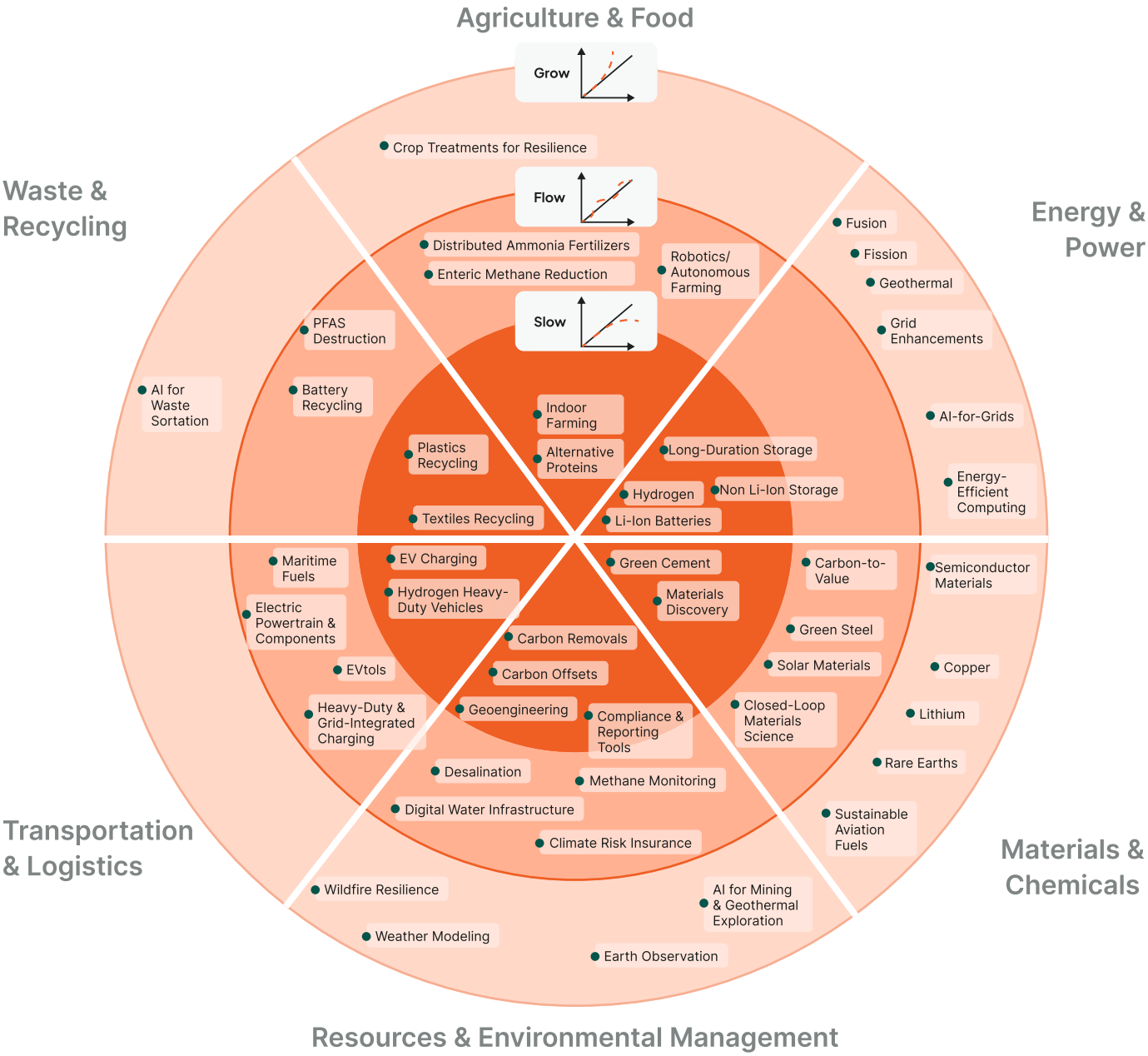
2026 Global Cleantech 100

05 Trend Watch

Anthony DeOrsey Jr.
Research Manager, Cleantech Group

A Rapidly-Evolving Landscape:

What Do We Predict to Grow, Flow, and Slow in 2026?



Grow	What will accelerate?
Flow	What will generally progress at pace, but with some nuance?
Slow	What will need to fight headwinds?

Coming off a 2025 replete with both "known unknowns" but even a few more "unknown unknowns" in the policy and global macroeconomic environment, we expect a 2026 that proceeds with slightly more certainty, but also more pressure on the global cleantech ecosystem.

Given that the majority of technologies in the "Grow" ring are associated with AI infrastructure or critical minerals, there is a clear narrowing of the growth areas into these two themes, while most else will stay in "Flow" or recede into "Slow". What we expect for 2026 is a "pressure cooking" effect, in which the spaces that are experiencing continued growth today will become extra competitive, while the "Flow" and "Slow" rings will become especially challenging to break out of.

2026 – Expect a "Pressure Cooking" Effect

- The "Grow" category is packed with innovators making the AI revolution more efficient–the pie is still expanding for now, but competitors are piling in at a rapid rate.

- The critical materials spectrum, firmly in "Grow" mode, will need to see innovators face long project development timelines and pre-emptively acquire customers.

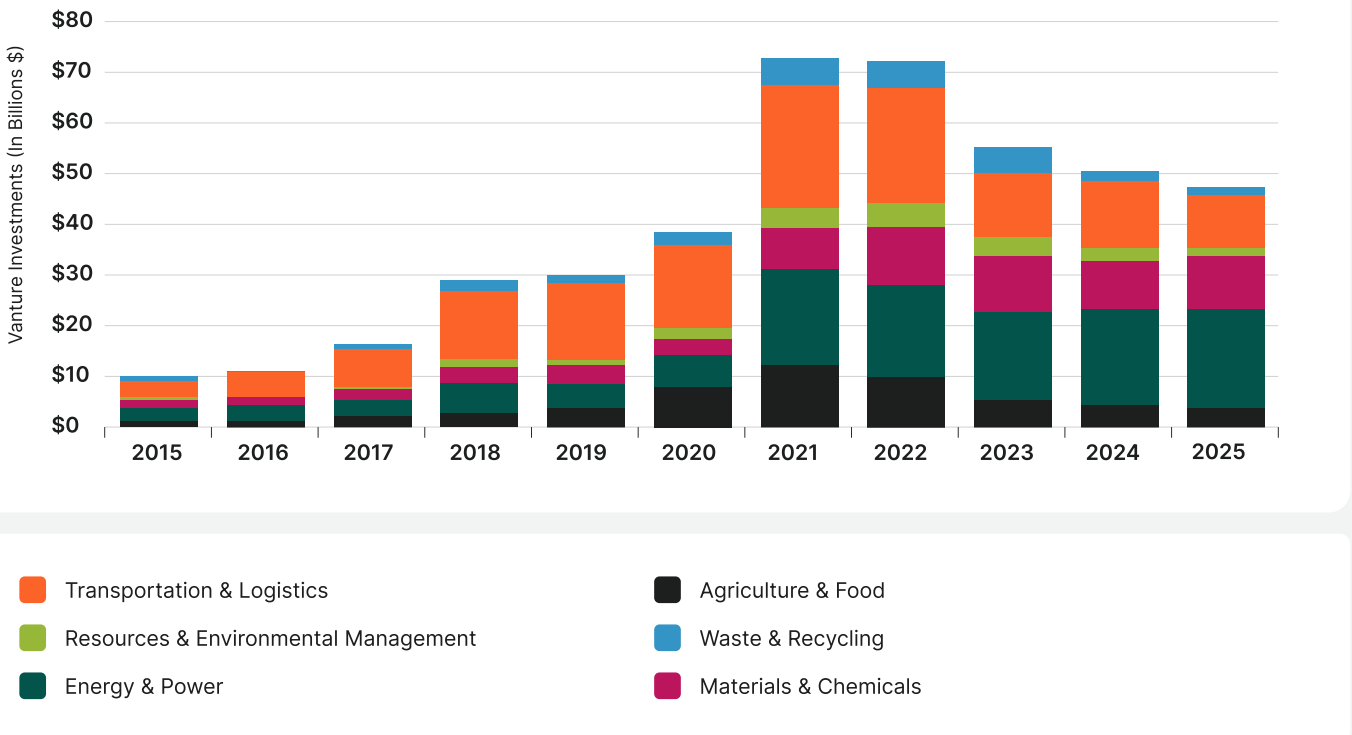
- The "Slow" areas (hydrogen, carbon removals, li-ion batteries) are likely to slow even further, leaving a smaller pool of survivors.

With today's headwinds in mind, it is still worth a step back to understand exactly where we are in cleantech history. When using venture investments as a proxy for confidence in growth, there is a tendency to index against the low-interest rate environment of 2021 and 2022, which points to an apparent drop-off in the years that follow. However, if zooming out over the past decade, it can be seen that the space is far more robust than 10 years ago, and investments today still outpace those of the years just before the pandemic.

Where Are We in Cleantech History?

Zooming out past the low-interest rate years of 2021 and 2022, we are witnessing a theme that's decidedly better off than a decade ago.

Venture & Growth Investments in Cleantech Innovators 2015-2025



*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025

The next era of cleantech innovation will be one that creates more "durability" in the global economy. We have seen for years that cleantech innovators have multiple arguments—decarbonization, supply chain stability, health, and safety improvement—for the adoption of their technologies. For this reason, we expect to see the arguments of adoption of cleantech innovation to shift toward those that demand economic durability.

We see this developing through two overlapping lenses: continuity and predictability.

- **Continuity:** See further down where a nexus between cleantech and defense has emerged; there are numerous technologies across the cleantech spectrum that offer operational and supply continuity to national defense actors but also in civilian applications.

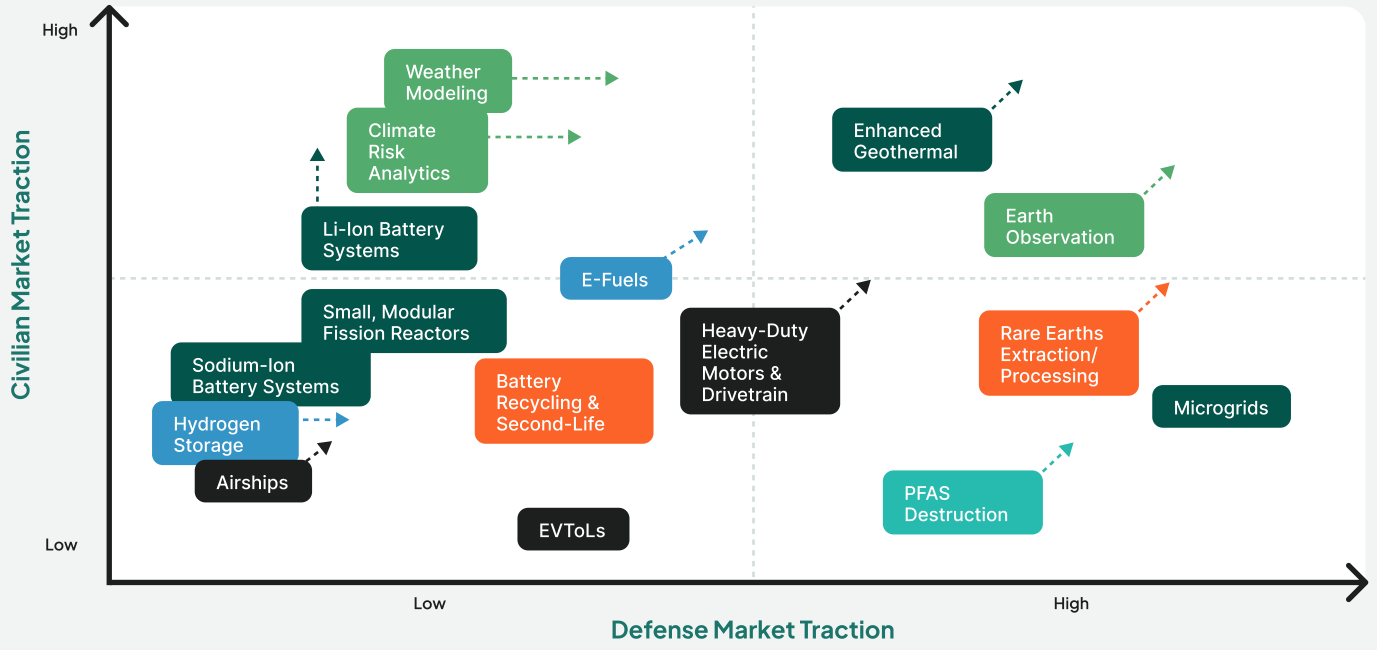
- **Predictability:** The race to secure power for the continual growth of AI will motivate the adoption of novel baseload power technologies but also grid efficiency and resilience technologies to mitigate uncertainty around power supply. The latter part of this Trend Watch outlines the slow growing but emerging urgency around predictability of water supply that is starting to show up in more parts of the economy.

The still under-engaged spectrum of adaptation and resilience technologies is expected to grow as predictability of public safety and economic activities face compound threats from climate change each year.

The Cleantech–National Security Nexus is Crystallizing

We have seen a clear change in the vernacular of cleantech companies over the past year, with the word “security” as the leading line in more companies’ headline selling points than ever. There are multiple flavors to the security argument in cleantech, namely, resource security (think critical minerals, energy, water), but also several areas where there is a direct overlap with national security and defense.

The Cleantech-Defense Nexus: Where to in 2026?



- Critical Minerals
- Power Supply
- Vehicles
- Alternative Fuels
- Remote Monitoring
- Resource Safety

With continued concerns over supply chain domination by China, technologies that offer superior material performance while eliminating supply chain risk will continue to be of paramount strategic value in 2026.

- **Niron Magnetics:** Manufactures the world's only high-performance, rare earth-free permanent magnets using proprietary iron nitride technology, which provides efficiency and thermal stability while bypassing critical supply chain constraints.

- **Phoenix Tailings:** Zero-waste, closed loop system for extraction and pure metal refining of rare earth elements (REEs) from mine tailings, offering potential to create an integrated, independent domestic supply chain.

- **Boston Metal:** Boston Metal's molten oxide electrolysis process is under demonstration in Brazil to recover rare metals such as niobium and tantalum from waste streams.

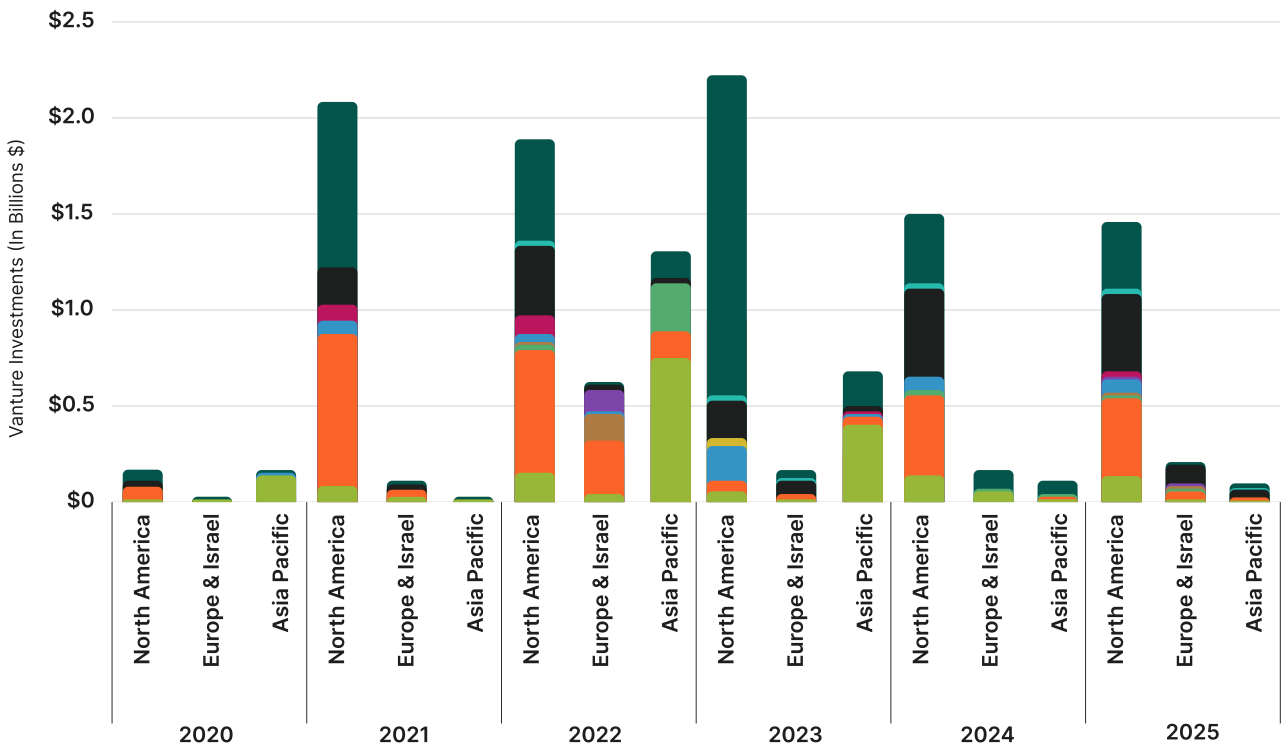
These three companies represent complementary strategic hedges: Niron removes the need for scarce materials in key technologies (motors, defense systems), while Phoenix Tailings and Boston Metal ensure that existing waste streams can be utilized to rebuild a vertically-integrated, domestically-controlled critical minerals supply chain.

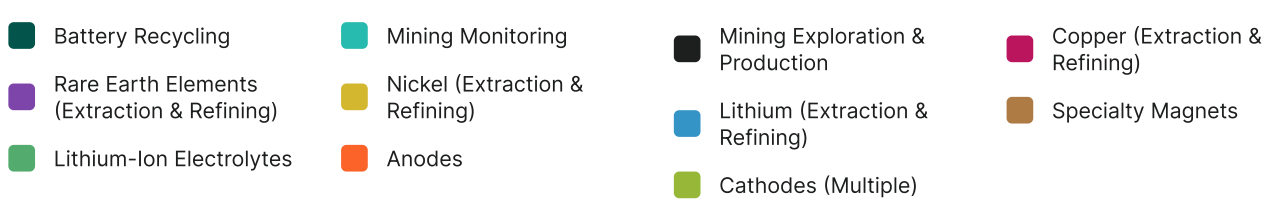
It's not just exemplified by this list, but also the major announcements happening elsewhere:

In July of 2025, the U.S. Department of War made a landmark agreement with MP Materials that included $400M of stock purchases and a 10-year agreement to purchase neodymium-praseodymium (NdPr).The Department of War subsequently provided a $620M loan to Vulcan Elements as a part of a larger partnership to produce magnets within the U.S.

The current geopolitical environment has made reliance on single sources of refined materials and concentrated supply chains for critical minerals untenable. We expect that technologies offering decentralized processing and recovery of materials in circulation will continue to see enthusiasm. With that said, price premiums are still the norm in on-shored and friend-shored minerals. Achieving enough iterations to drive down cost, in enough time to supply critical minerals at industrial scale is the challenge that many of this year's Global Cleantech 100 are taking aim at.

Venture & Growth Investments in Critical Materials Innovation





*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025

The high capital expenditures and long timelines of traditional centralized refineries are a liability in a market that's demanding better speed to deployment to break a supply bottleneck. The demands for lithium supply require refining solutions to be modular, electrified, and highly resource efficient.

- **ElectraLith:** ElectraLith's "Direct Lithium Extraction and Refining (DLE-R)" process refines lithium chloride (LiCL) to battery-ready lithium hydroxide (LiOH) in one processing stream.

- **Mangrove Lithium:** With a similar goal of bypassing the normal intermediary steps to LiOH, Mangrove Lithium's innovation is in oxygen cathodes that promise to produce LiOH without harsh chemicals and at a cost competitive with Chinese refiners.

The renewed urgency to claim critical minerals is providing a tailwind to recycling approaches, which represent the nearest-term path to onshored critical minerals. This year's Global Cleantech 100 demonstrates a developing.

- **Nth Cycle:** Nth Cycle's oyster system employs patented electro-extraction technology to refine and recover critical metals directly on-site from end-of-life batteries, scrap, or mined ore, using electricity instead of chemical waste or smelting. Nth Cycle effectively brings refining to multiple types of materials sources, facilitating the creation of distributed supply networks.

- **Cyclic Materials:** Cyclic Materials is building out a hub-and-spoke model to recover REEs from e-scrap at distributed recovery centers and then refine at hubs. The approach claims to only require 2% of the water use of mining virgin rare earths.

- **Cylib:** Cylib has a Europe-focused hydrometallurgical recovery of lithium, graphite, nickel, cobalt, and manganese from spent electric vehicle batteries.

- **SiTration:** SiTration has developed a high durability silicon membrane that separates materials with mostly electrical processes, versus those requiring high heat or harsh chemicals.

While not a materials recycling approach, Moment Energy has capitalized on the data center boom to accelerate deployment of repurposed electric vehicle batteries into stationary energy storage units. Further proof that there is demand for on-shore batteries and materials, and multiple ways for recyclers to turn recovered batteries into value.

AI in Cleantech: Less a Bubble, More a Crashing Wave

While much of the tech community writ large is wrestling with the prospect of an AI bubble, much of this is related to uncertainty around willingness to pay for general-purpose LLMs.

In industry-specific applications, adoption of AI is still mostly for basic purposes. Our position is that, while there are many AI companies in the cleantech theme, a high percentage offer simple process optimization using publicly available data sets or wrappers around LLMs.

Those models that rely on publicly-available data are unlikely to fare well this year, where industrial adopters will become more adept at leveraging AI to use their own proprietary data. What will continue to grow are the AI tools that bring unique data sets and data acquisition approaches into the mix.

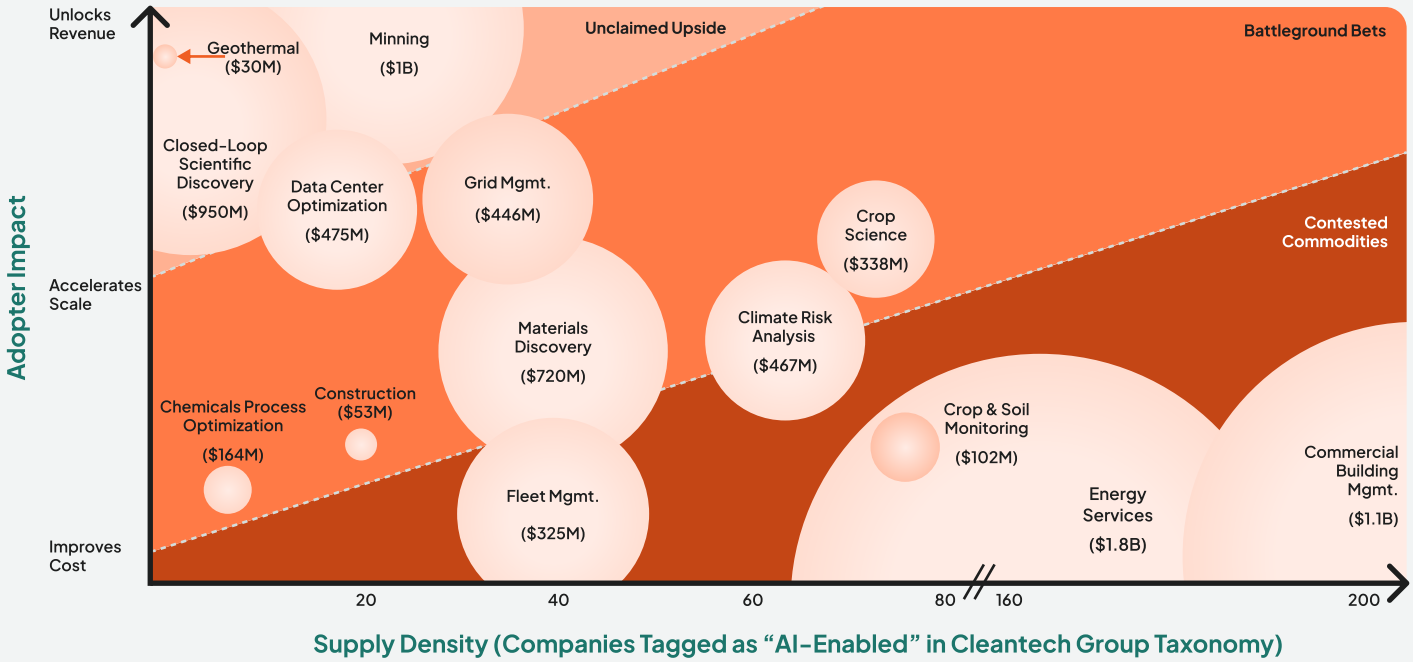
As a framework, we've segmented AI for cleantech into 3 categories:

- **Unclaimed Upside:** AI is helping adopters unlock revenue previously inaccessible due to some type of physical or economic constraint, and where there is low supply of innovation to the demand.

- **Battleground Bets:** Those approaches that go beyond process optimization to accelerate scale of adjacent solutions (hardware, chemicals, adaptation solutions) and are competitive, but not saturated.

- **Contested Commodities:** Those approaches that facilitate cost improvement, and are made available by a high number of companies.

AI-Enabled Cleantech Zones of Opportunity



Circle Size = Capital Raised Since 2023

*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025

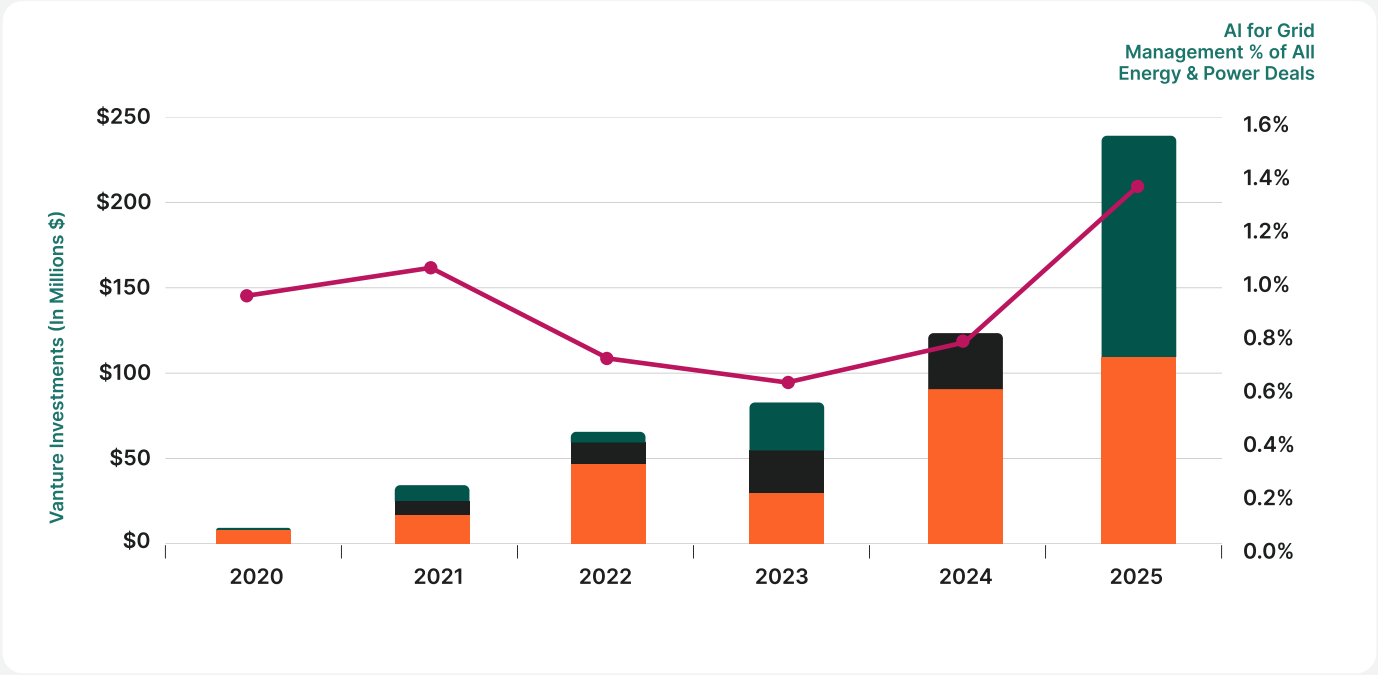
A clear case of unlocking revenue that previously would have gone unclaimed, VerAI uses custom data sets to identify otherwise concealed mineral deposits in under-explored terrain. While a significant amount of venture funding has gone to AI for mining in recent years, it is still a generally under-saturated space with only 20 or so companies making a defensible claim on the technology. If our hypothesis on the developing cleantech and national defense nexus bears out, we expect AI for mining to become even more competitive over this coming year.

And while AI is placing a significant strain on power systems around the world, AI applications are now taking aim at relieving some of that strain.

This has been a breakout year for grid management AI (in the next section, we recap a landmark year in grid resilience technologies at large), as the generational increase in power demand creates more urgency than ever for new solutions to identify latent capacity and inefficiencies in the grid.

Splight leverages continuous data on grid activities to predict events and prescribe actions in real-time, versus only indexing actions against worst case scenarios. Jua is a high-precision weather forecasting AI that facilitates ultra-accurate energy trading recommendations, reducing grid balancing costs and improving capacity.

Venture & Growth Investments in AI for Grid Management



*Seed, Series A, Series B, Growth Equity
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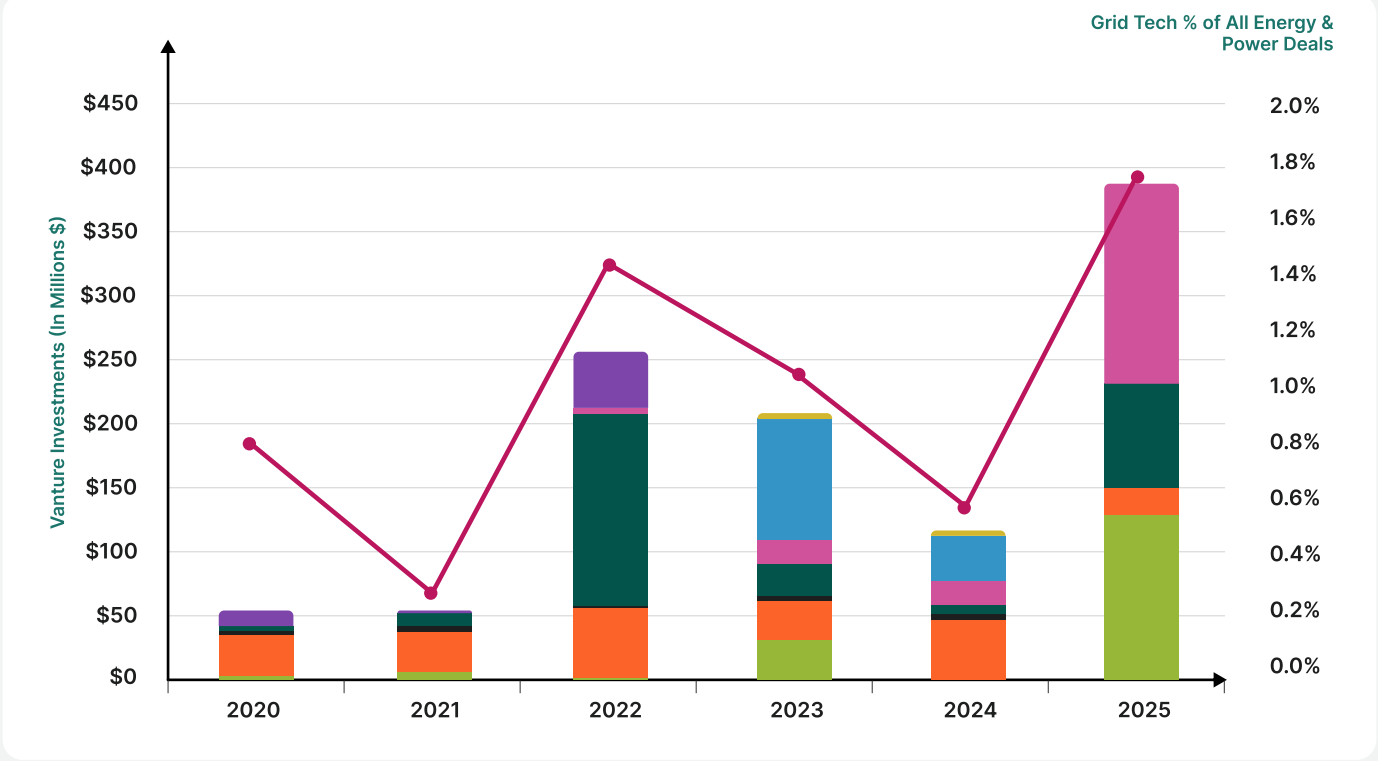
Grid Resilience Sees Demand Pull on Multiple Fronts

As utilities aim to manage this unique moment of growing electricity demand, there is a two-fold imperative taking hold: avoiding unnecessary CapEx buildout (i.e., maximizing capacity of existing and new assets) and ensuring continuity of services.

Ensuring continuity of services requires having a track on the moving target of climate threats to grids that compound year-by-year.

This has stimulated demand not only for grid technologies of today, but those that can promise better capacity and resilience tomorrow. For those supplying technology in the space, the moment is especially advantageous, given that data centers and other high demand centers (EV charging depots, electrified factories) are presenting new and growing commercial and industrial demand markets.

Venture & Growth Investments in Grid Technologies (2020 – 2025)



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Technologies for grid resilience experienced one of their most significant years in terms of adoption and investments in 2025. It is fair to say that some of these new, complex technologies have experienced an ahead-of-schedule adoption curve, and some technologies that we previously expected to mature by the 2030s are now benefitting from fast and frequent iteration. This year's Global Cleantech 100 demonstrates the urgency with which multiple technology classes are being pulled into the market.

High-Efficiency Transformers:

- **DG Matrix:** Multi-port solid-state transformers (SSTs) and power routers that consolidate multiple power systems to provide modular, programmable, and highly efficient electrification for applications like AI data centers and EV charging. SSTs have an additional promise in grid resilience, since they can isolate faults occurring in grids and shut down "parts" of the modular system where disruptions are occurring.

- **IONATE:** IONATE has reinvented the magnetic systems in transformers, enhanced with an AI control module for precision operations and decision making. The technology is delivered in a traditional transformer form factor to allow collaboration with existing supply chains and facilitate ease of integration into grids.

High-Capacity / High-Durability Transmission Lines:

- **VEIR:** VEIR has developed a novel cryogenic cooling system to leverage the efficiency of high-temperature superconductors, allowing its transmission lines to deliver 5-10 times the power capacity of conventional ones, rapidly unlocking bottlenecks for grid expansion and data centers.

- **TS Conductor:** TS Conductor's Aluminum Encapsulated Carbon Core (AECC) re-conductoring solution can double or triple grid capacity on an existing infrastructure while maintaining full compatibility with standard utility installation and maintenance practices.

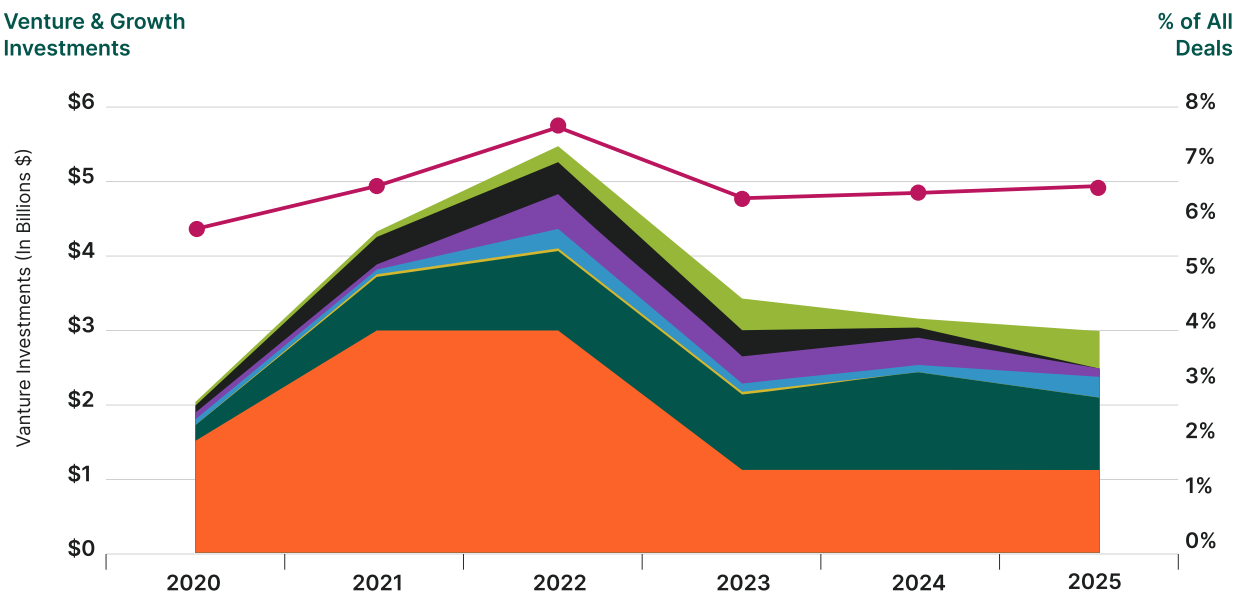
- **AssetCool:** AssetCool's application robotics (CAM-ACU) optimize power line surfaces with a temperature-reducing coating, in turn reducing maintenance and increasing capacity.

As highlighted further above, this has been a breakout year for AI in grid management. The physical upgrades across the grid value chain are complemented by the high-value intelligence provided by AiDash. AiDash processes satellite data (satellite aperture radar and multispectral imagery) and can predict and prioritize vegetation threats that cause outages. For utilities, this is a direct risk-mitigation tool that avoids catastrophic failure, reduces liability costs from disaster events (like wildfires), and dramatically cuts the cost of manual inspection and maintenance. With wildfires, especially, utilities are exposed to an ever-intensifying threat but now have more tools than ever at their disposal.

Adaptation & Resilience: Still Under-Recognized, but Wildfire Tech Presents a Case in Breakouts

Cleantech Group has posited for years that despite the ebbs and flows in enthusiasm for decarbonization technologies, a consistently under-recognized theme is that of climate adaptation and resilience. Indeed, the multiplying and ever-more-intensive weather events from climate change are still serially unaddressed, even with better technology coming into the market. However, in this year's Global Cleantech 100, we do see more recognition of these technologies' importance, in certain pockets: grid resilience (covered above) and closely related wildfire resilience.

Venture & Growth Investments in Adaptation & Resilience Tech



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Encouragingly, we see a technology landscape maturing, with solutions to support multiple phases of wildfires. Pano AI delivers early wildfire detection and real-time intelligence via an AI-powered network of cameras and situational awareness tools, enabling rapid response to mitigate catastrophic wildfire spread. AI is providing a new benefit in early identification systems, but the ideal hedge is the removal of risk altogether through physical prevention.

BurnBot's robotic systems carry out prescribed burns to control risks of wildfires before they break out. And while in a perfect world all weather events would be accounted for and avoided accordingly, that's not reality, and protecting from weather-related loss is as important now as ever. Arbol is a parametric insurance innovator, offering payouts to victims of extreme weather events as quickly as two weeks following an event's occurrence.

Water Scarcity: Is Urgency Finally Becoming a Mainstream Topic?

According to the World Resources Institute, 31% of global GDP ($70T) will be exposed to high water stress by 2050; those numbers were 24% and $15T in 2010. With new motivation to ramp up water-intensive industrial processes like semiconductor manufacturing and critical minerals extraction, we can expect that water stress will continue to be a global problem but also an especially urgent developing world problem.

This year's Global Cleantech 100 provides a case study in the various industrial wastewater treatment solutions being pulled into market on urgency of need across application areas:

- **Aquafortus:** Aquafortus leverages non-thermal desalination with a novel solvent exchange (ABX) process to purify high-salinity industrial brines with 90% less energy than conventional methods, achieving near Zero Liquid Discharge (ZLD). Aquafortus has applications in semiconductor manufacturing, flue gas treatments (fossil plants), and can recover minerals in mining operations.

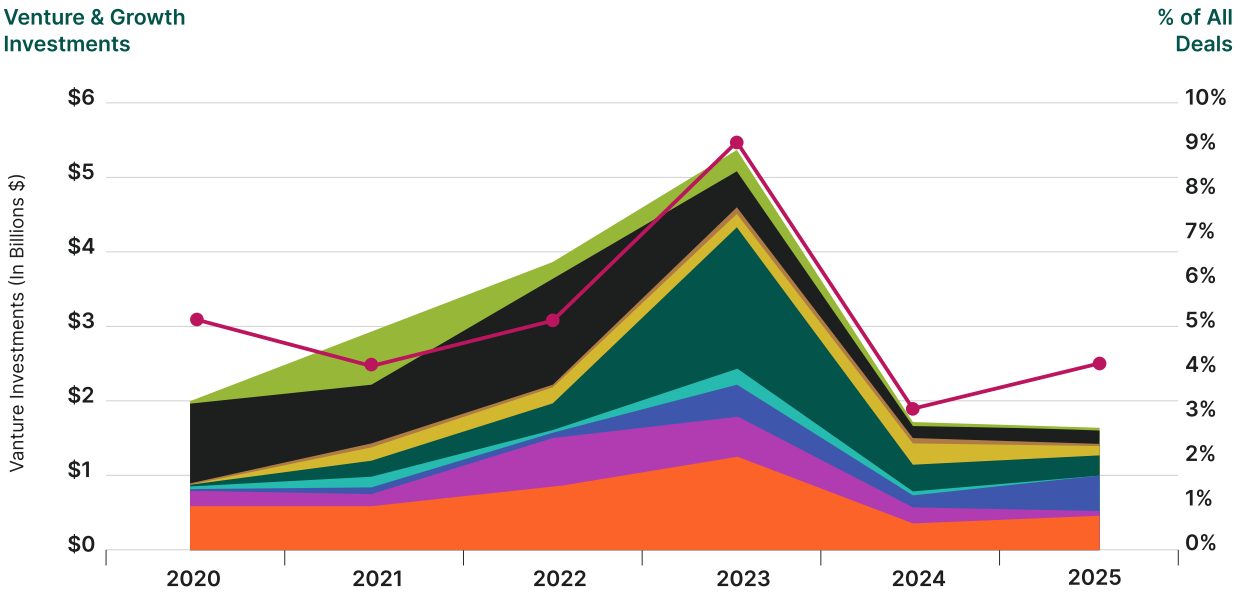
- **Moleaer:** Moleaer's patented generators create stable nanobubbles to efficiently oxygenate water, enhance performance, and reduce chemical/energy use across applications like agriculture, aquaculture, and wastewater treatment.

- **ZwitterCo:** ZwitterCo has developed membranes based on proprietary zwitterionic chemistry to actively attract water while repelling organic compounds, preventing permanent fouling and enabling reliable wastewater reuse in food and beverage, landfill management applications.

Indra is a repeat Global Cleantech 100 awardee, offering valuable solutions in India, one of the world's most water stressed countries, and where the market is already highly decentralized. Indra's physio-electrical process removes pollutants and pathogens from water and can act as the "first wastewater system ever implemented" in areas with deficient infrastructure.

We posited in 2025 that, in a tightening macroeconomic environment, resource efficiency would likely be back in vogue. While we see a tightening demand environment for solutions to embodied carbon in parts of the world such as the U.S. where policy support has melted, solutions for drawing down energy use and reducing water waste are remaining popular.

Venture & Growth Investments in Built Environment Cleantech



- Circular Construction
- Wood & Cross-laminated Timber
- Green Steel
- HVAC Assets
- Building Management Systems (Commercial, Industrial, Residential)
- Construction Methods (Automation & Assembly)
- Green Cement & Concrete
- Adv. Materials: Insulation & Windows
- Energy Management Devices (Smart Meters, Thermostats, Sensors, etc.)
- Built Environment % of Cleantech Deals

*Seed, Series A, Series B, Growth Equity
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We indeed see water waste in commercial and industrial buildings increasing in importance, with companies like Wint (water flow monitoring and anomaly detection) on this year's Global Cleantech 100, and Laiier (printed sensors to detect water leaks in tight spaces) on the 2025 Cleantech 50 to Watch. We see building energy efficiency back in vogue this year, too, with Aeroseal (non-toxic aerosol sealants for commercial and residential buildings) and Luxwall (vacuum-insulated glass) continuing their streaks on the Global Cleantech 100.

As much of the geopolitical order shifts to prioritize self-sufficiency independence over integration, we expect the concepts of "durability" to endure—around the world, nations are scrambling to fortify their current economic systems and hedge against disruptions. With that, we expect that there are more opportunities for the cleantech innovators to facilitate continuity and predictability of economic systems, even if the "clean" benefits of their approaches get less mainstream airtime over these next few years. We also expect that these innovators in the 2026 Global Cleantech 100, who have found ways to bend and break boundaries to create technological progress, will be the same boundary-pushers that bring cleaner approaches into the mainstream by winning the durability battle.

Our congratulations again to all of this year's winners.

Anthony DeOrsey Jr.,
Research Manager, Cleantech Group

The Global Cleantech 100

06 Industry Groups

01 **Agriculture & Food**
Buff López, Associate, Cleantech Group

02 **Energy & Power**
Zainab Gilani, Associate, Cleantech Group

03 **Materials & Chemicals**
Diana Rasner, Group Lead, Cleantech Group

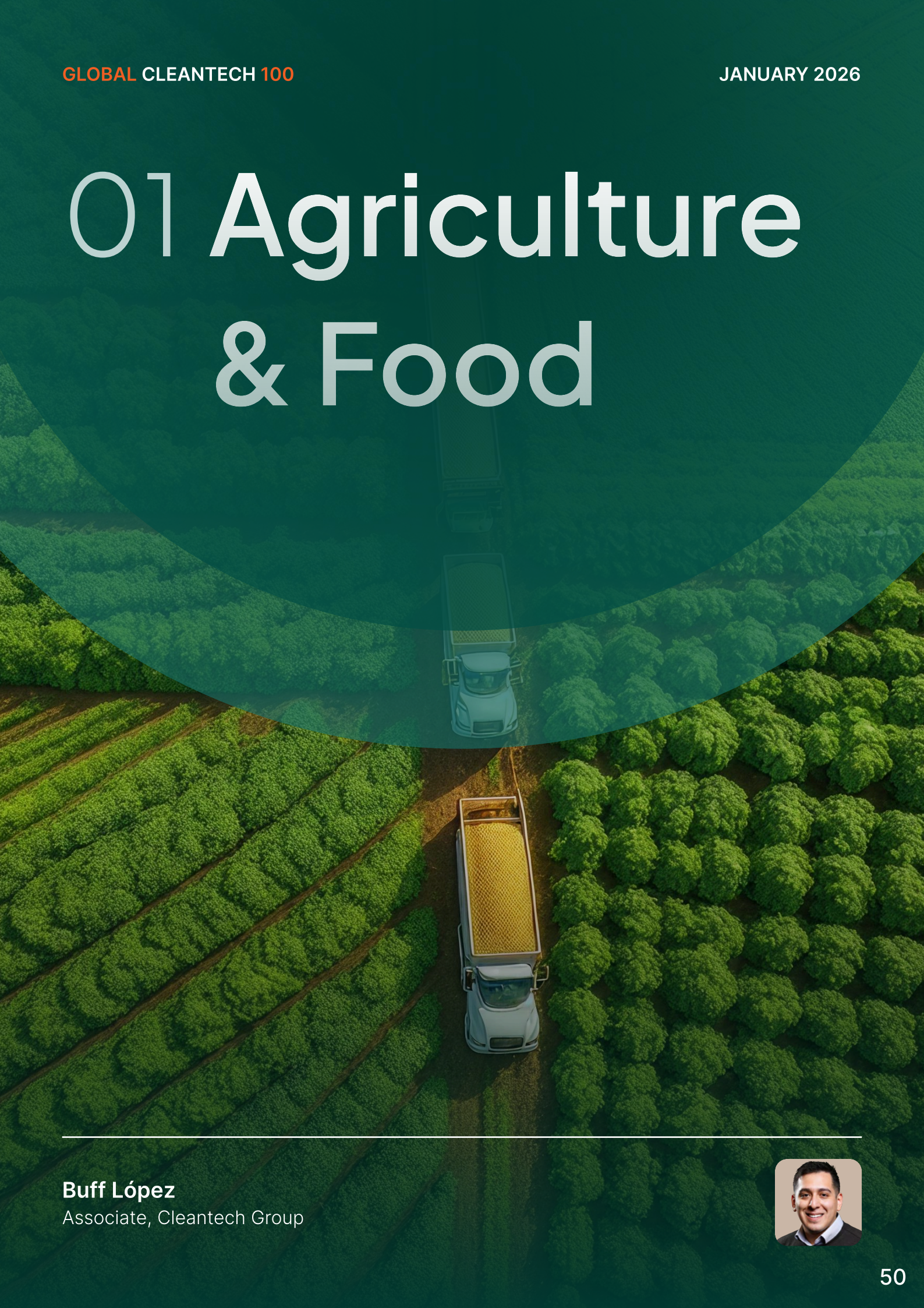
04 **Resources & Environmental Management**
Sunena Gupta, Associate, Cleantech Group

05 **Transportation & Logistics**
Nicole Cerulli, Associate, Cleantech Group

06 **Waste & Recycling**
Parker Bovée, Associate, Cleantech Group

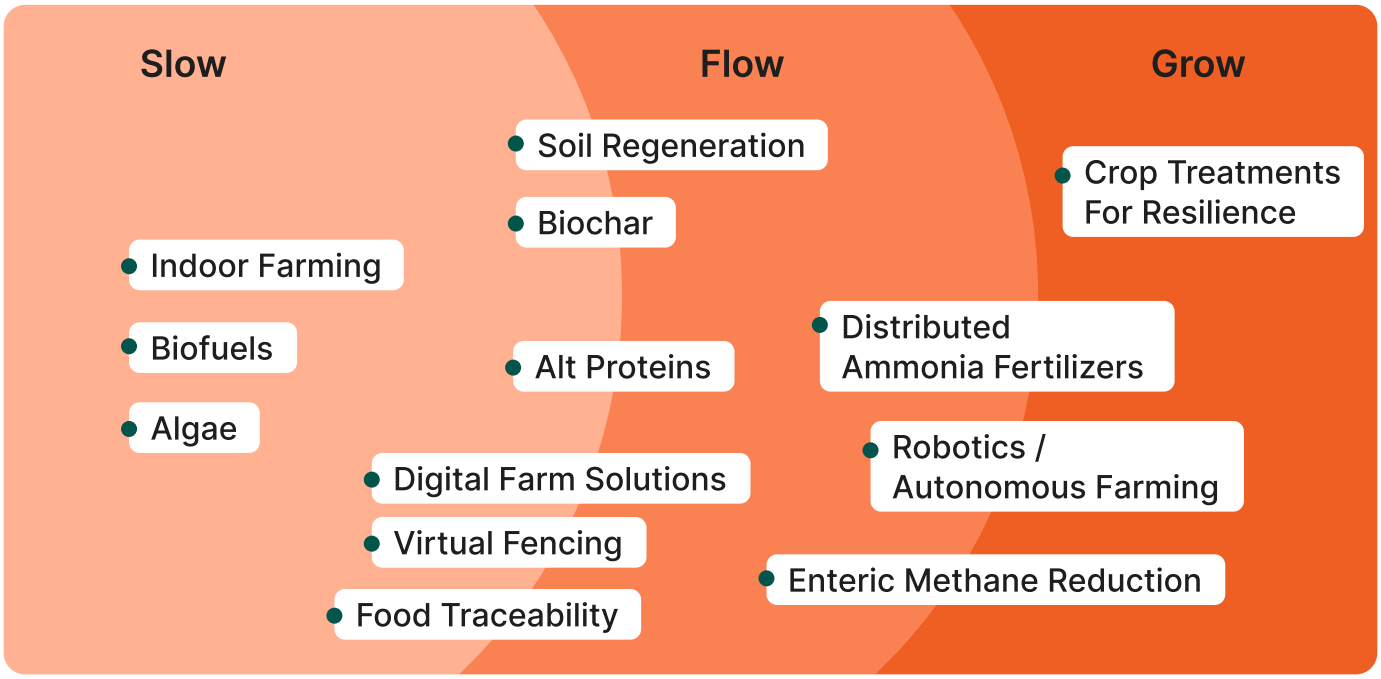
Industry Group Analysis

01 Agriculture & Food



Buff López
Associate, Cleantech Group

How far past the tipping point is the point of no return?



Current State

The once science fiction tales of future societies facing widespread famine and droughts are a reality many already know, and not just in developing regions.

According to Feeding America, in the U.S. alone, 1 in 7 face food insecurity, and The World Resources Institute estimates a global food gap of 56% by 2050. Traditional farming systems will not keep pace with the rapidly increasing food demand, necessitating farming innovation across the entire value chain.

Agricultural emissions account for 11.7% of global emissions, but the U.S. EPA estimates that figure to be as high as 22%.

The largest contributor is by far Brazil, where deforestation for pasture and crops is increasingly devastating. Global wildfires have also contributed significantly to deforestation that leaves land unusable. In 2024, the equivalent land size of Mexico burned globally.

Asia is a major emitter, particularly China and India. While most estimates suggest agriculture contributes a quarter of emissions in this region, Chinese researchers reported the contribution could be as high as 44% of total emissions.

What's more, among the highest methane emissions are not only from livestock, but also from rice production.

Zooming out, the food value chain, particularly in food processing and logistics, is increasingly complex.

Consumer awareness is driving the entire value chain—from farmers to retailers—to adopt more sustainable practices, including food traceability. What's more, mounting societal pressures even resulted in Indigenous groups storming the 2025 Brazilian COP30 climate summit in protest to demand forest protection.

Evolving Policies Reshaping Global Agriculture Business

Among the most significant frameworks that began to take effect in 2025 include the updated EU's Deforestation Regulation that forces large companies to prove they do not sell or export products that come from land that was deforested.

The U.S. market dynamics are facing headwinds, with declining crop prices, labor shortages, reduced fertilizer use due to decreased crop acreage, and postponed innovation uptake. Farmers in this region have been hit hard, so adoption of new farm equipment like electric tractors or typical upgrades is not a top priority.

U.S.-imposed tariffs on steel and aluminum even led food giant Del Monte to file for bankruptcy in July 2025. The implications of this market volatility will continue to be felt well into 2026 even for countries that have not been directly targeted by tariffs.

China's COFCO International, a major food conglomerate, has been strategically investing billions in the Latin American region, particularly to build out Brazilian infrastructure for soybean export. This comes on the heels of ongoing tensions with the U.S., signaling a long-term shift that has already devastated U.S. farmers.

2025 Investment Review

There's been a shift in focus with investment in agriculture & food innovation cooling down from 2021 peak highs. Investors are more deliberately funneling capital to later-stage, less risky and demonstrated solutions.

For example, the alternative proteins market has pivoted from consumer labelled plant-based products into a massive B2B industry where farmers, shipping companies, concentrate manufacturers, and plant-based feel/taste/smell innovators are all feeding a wide array of plant-based end products that all perform relatively the same (low differentiation). Alt proteins made a comeback in Q4, particularly for precision fermentation and plant-based proteins. This trend was clearly seen in Liberation Bioindustries' $60M Growth Equity disclosed via SEC regulatory filings in addition to its $50.5M Debt

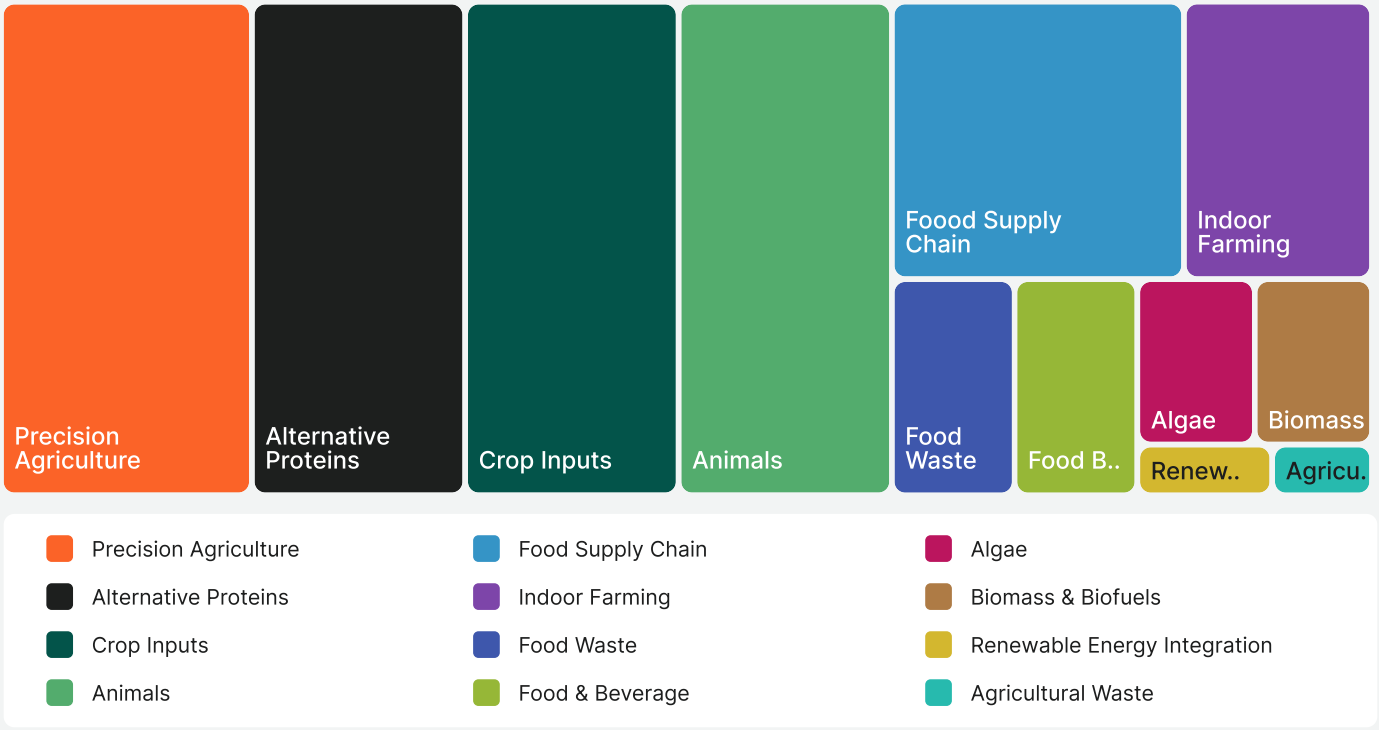
raised to build a biomanufacturing facility in Indiana, U.S. Similarly, The Every Company raised $55M Growth Equity from McWin Capital Partners, Main Sequence, and others, for its fermented proteins that replace eggs.

Despite indoor farming solutions taking a hit in 2023-2024, it reached a new high in 2025 with 4ag Robotics' $400M Series B for its robotics differentiated for mushroom harvesting from Cibus Capital, Voyager Capital and others. 80 Acres Farms raised $115M from General Atlantic, Siemens Financial Services, Barclays and others to expand its indoor farming platform, while simultaneously acquiring Israel-based Plantae Biosciences.

Capital is funneled most heavily for:

- Robotics and autonomous farm machines (e.g., precision weeding, crop monitoring).
- Alternative proteins, particularly fermented and plant-based proteins.
- Crop inputs that reinforce beneficial genetic traits (e.g., disease resistance).
- Digitalization of animal farming operations (e.g., inventory, real-time monitoring, etc).

$2.74B Across 260 Deals, Alt Proteins Comeback in Q4, 2025



*Seed, Series A, Series B, Growth Equity
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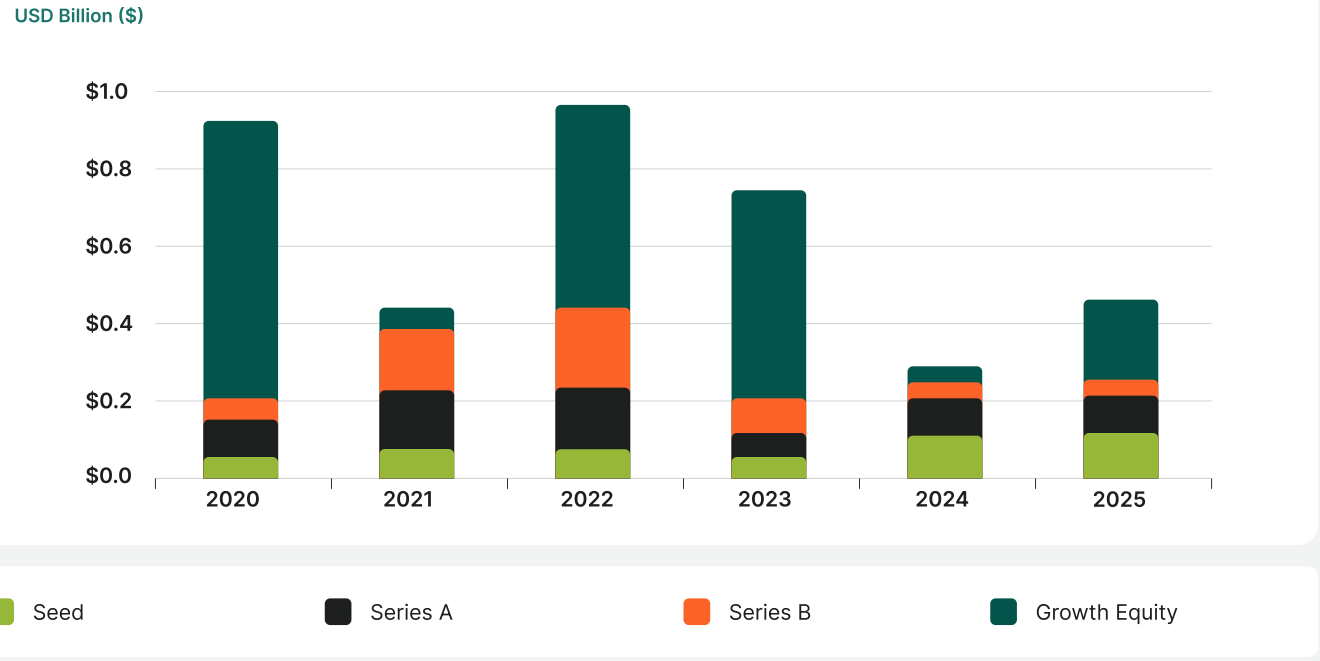
Digital Transformations Driving Animal Farming Efficiency

The hard truth: Animal farming is depleting precious resources. It is inherently resource intensive, consuming vast amounts of land and water. Our relationship with food has exhausted the world's richest regions (e.g., the Amazon rainforest, with many ecosystems inching toward potentially irreversible disruption).

Venture & Growth in Livestock Operations and Factory Farming, 2020-2025



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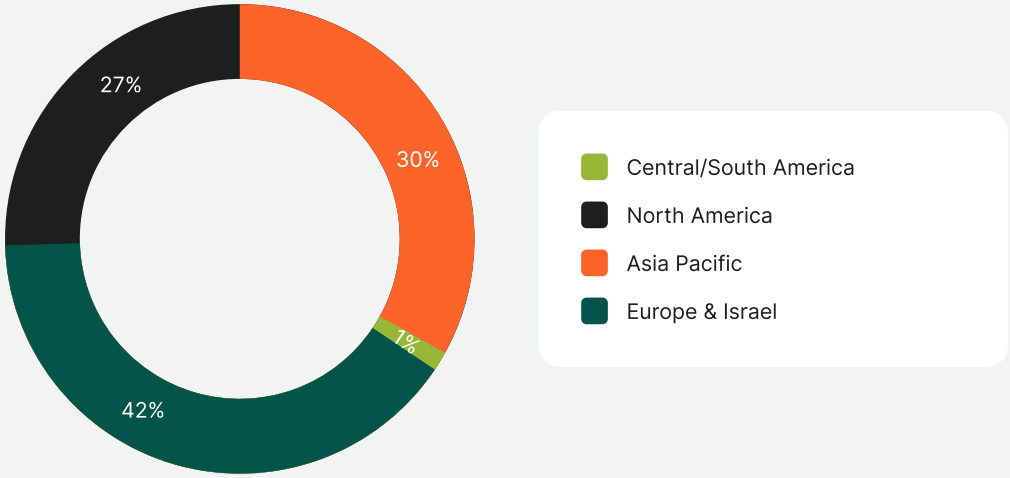
Regional Synergy to Transform Livestock Operations and Factory Farming, 2020-2025



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The UN Food & Agriculture Organization (FAO) estimates industrial animal farming, including livestock feed, to be the source of approximately 12% of total greenhouse gas (GHG) emissions. In 2025, researchers at the University of Michigan reported the U.S.'s annual meat consumption totals more carbon emissions than the entire country of Italy.

- Digitalization is modernizing farming operations while increasing efficiency in animal health and welfare. While these solutions aren't the flashiest and not fully scalable everywhere, they deliver incremental improvements to decarbonizing livestock production.
  - Nofence raised $35M Series B for its virtual fencing systems that enable conservation practices such as rotational grazing.
  - Halter raised $100M in Growth Equity, and Collie raised a $3.6M Seed, each for smart collars for virtual tracking.
  - Binsentry raised $50M by eliminating inventory guesswork of its feed mills—the biggest overhead cost in animal farming.

- Insect proteins are rising as protein-rich animal feed sources that require less land and water than traditionally used fishmeal and soymeal.
  - Beta Bugs raised $2.7M Seed funding for its black soldier fly-based feed products.
  - FEESH Bio and Protix also raised funding for a range of insect-derived feed solutions.
  - Future Fields raised an $8M Series A from Amplify Capital, Toyota Ventures, and others to scale its genetically engineered fruit fly products.
  - Although not an insect, Japan-based Superworms' worm-derived feed products attracted financial backing from Mitsubishi UFJ Capital.

- Animal health and welfare are improved via biological means to prevent disease and improve immune function.
  - Hoofprint Biome's probiotics and enzymes chemically alter cattle digestive systems to reduce methane emissions. The company raised a $15M Series A to begin trials in from SOSV, Amazon's Climate Pledge Fund, and Breakthrough Energy Ventures, among others.
  - Similarly, Biom produces probiotic products for aquaculture and raised Seed funding from BeAble Capital.
  - Bontia Bio uses synthetic biology to produce natural parasiticides to kill parasites and improve animal health as an alternative to chemical treatment.

Automation is enhancing decision-making and resource allocation, including KOA Biotech's AI-assisted biosensors for early detection of disease in aquaculture operations. Barnwell Bio, Catchwise, and Eggoz, among others, each inform operators of resource usage to optimize operations.

Crop Resilience: AI and Biotech Bridging the Gap to Prevent Widespread Famine

As extreme weather patterns hit every corner of the globe, farmers seek solutions to protect their crops. But farmers have a limited window for experimentation, a few dozen growing seasons at most, and little-to-no spare funds to embrace innovation. The industry is tightly locked, with few dominant players capturing much of the market at the top. New crop inputs or farming techniques must demonstrate value quickly, predictably, and at low cost. Doing so captures farm operators' trust while giving investors greater confidence to invest.

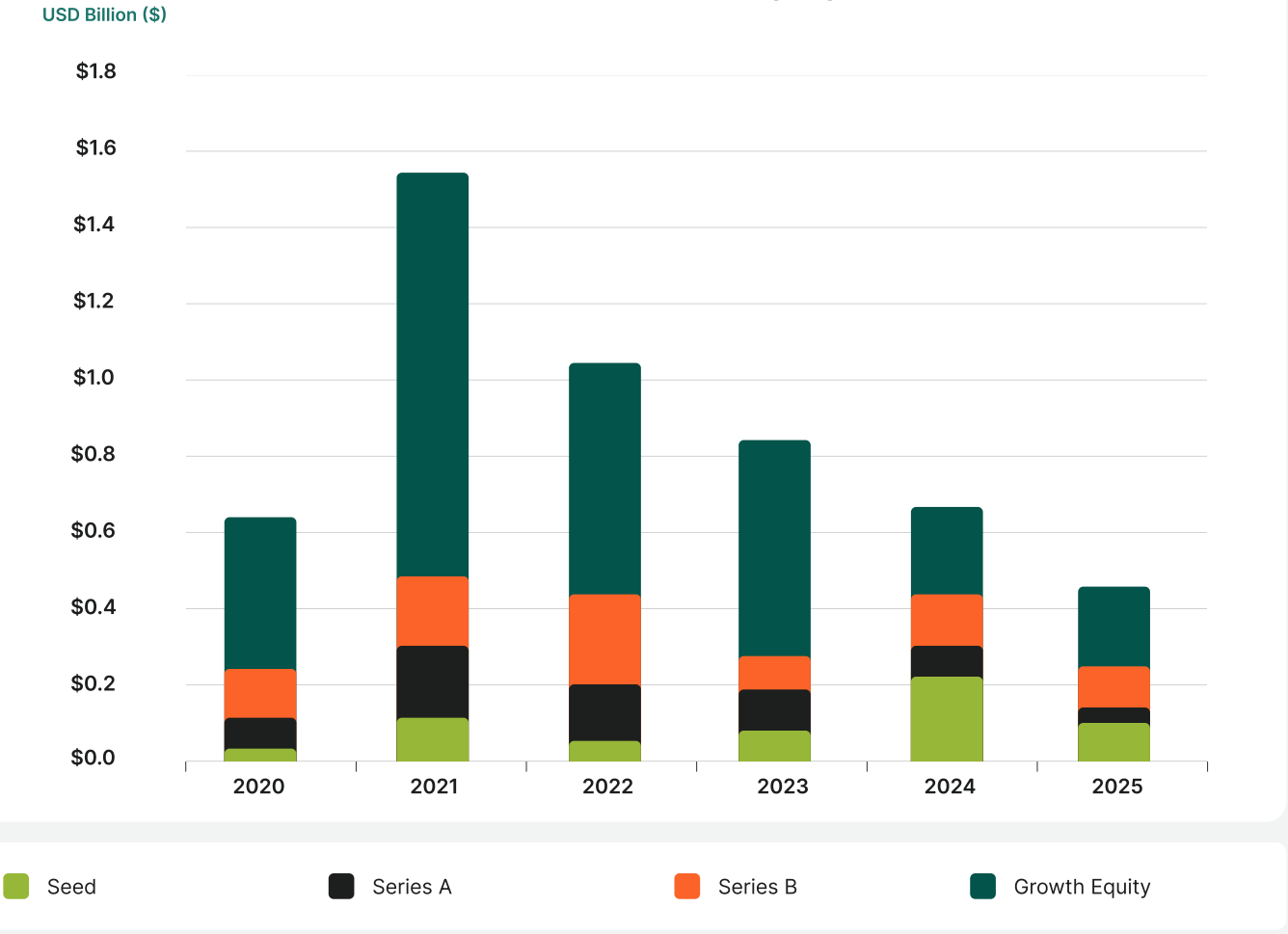
Genetic Traits

Genetic engineering has emerged as a leading crop input solution, moving beyond traditional breeding with precise crop modifications at the DNA/RNA level. There are mature solutions that have been technically derisked, establishing positive precedent (e.g., using CRISPR, a genome editing tool, to genetically alter the nutrition profile of rice). AI is used to accelerate and refine crop breeding experiments for greater crop yields and faster seed breeding cycles. The outcomes are genetically modified crops with built-in disease and pest resistance, weather tolerance, and improved nutrition uptake. For example, Taranis, a 2026 Global Cleantech 100 winner, has developed a pest and disease prediction software platform with AI-informed analytics for real-time crop monitoring.

Activity

- Aferna Bio uses RNA-based tools to reinforce beneficial crop traits, and recently began conducting field trials.
- Greenlight Biosciences combines RNA tools with cell-free systems (systems that do not sustain life). Greenlight received a $25M capital injection from Just Capital to expand in South American markets.
- On the heels of achieving unicorn status in 2024, Inari captured an additional $144M Growth Equity from Abu Dhabi Investment Authority and others for its gene-editing platform. The AI-informed platform uses diverse datasets to modify crop DNA with precision, resulting in a 10-20% crop yield improvement and greater resource efficiency.

Venture & Growth Investments in Crop Inputs, 2020-2025



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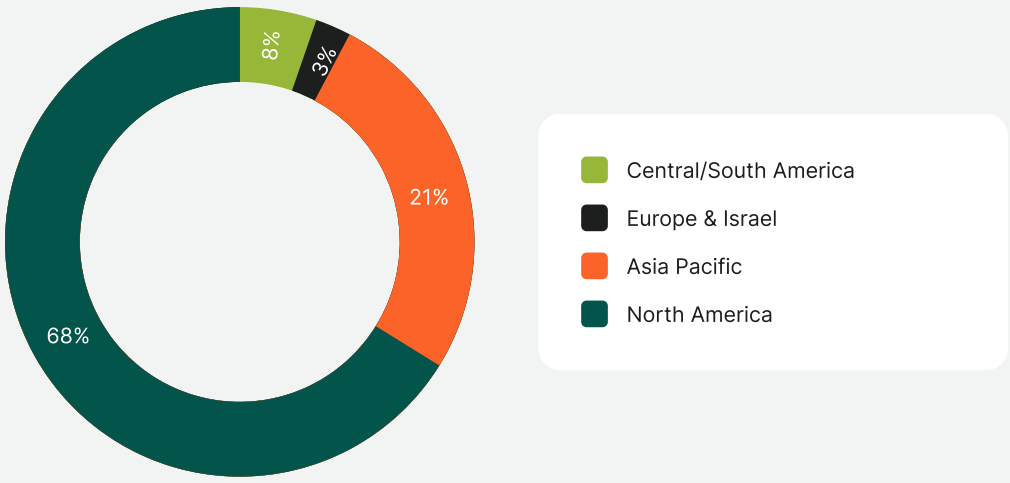
Clear Market Concentration in North America, 2020-2025



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Autonomous Machines Improve Operational Efficiency, Reduce Operator Liability

Beyond crop inputs are tools that optimize agricultural production at the operator level. Precision agriculture is a wide-ranging category that includes software and hardware to improve farm efficiency.

As predicted in our 2024 analysis, automation and robotics continued to experience growth in 2025, particularly by the U.S. in farm robotics, precision weeding, and crop monitoring. The European market is growing steady, while a significant increase in activity in the APAC region is rapidly expanding.

Farming is often labor-intensive, requiring hands to physically pick, plant, or stow away agricultural products. Over the course of a farmhand's lifespan, serious health problems may manifest due to excessive exposure to the sun or toxic chemicals and repetitive tasks. Robotics lower operational risks and reduce operator liability, e.g., removing farmhands from potential toxic chemical exposure like pesticides. These solutions are particularly advantageous to economies with labor shortages where robotics provide consistent labor.

Autonomous machines are among the most popular investment theses. Global Cleantech 100 awardee, Agtonomy, has attracted more than $50M for its autonomous farm machines including tractors. Its backers include big names including Bobcat, Kubota, and Toyota Ventures, among others.

- Neofarm raised a $35.3M Series B to launch a 25-hectare flagship robotics farm in France with an annual 1.3K ton output capacity—the equivalent of feeding 17,000 children.

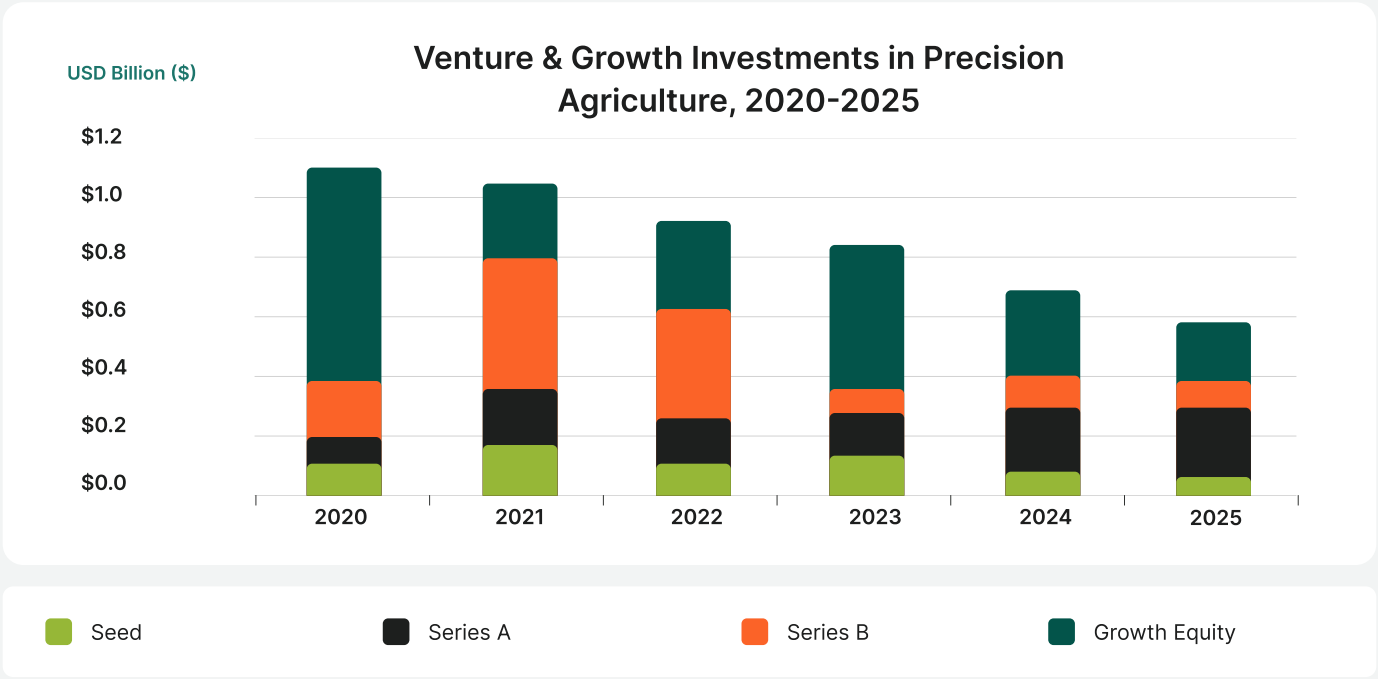
- Saga Robotics's autonomous vehicles raised an $11.2M Series B extension, a $22.7M Series B total.

- Swarmfarm Robotics raised a $20.7M Series B to expand into North American markets.

It All Comes Down to Cost

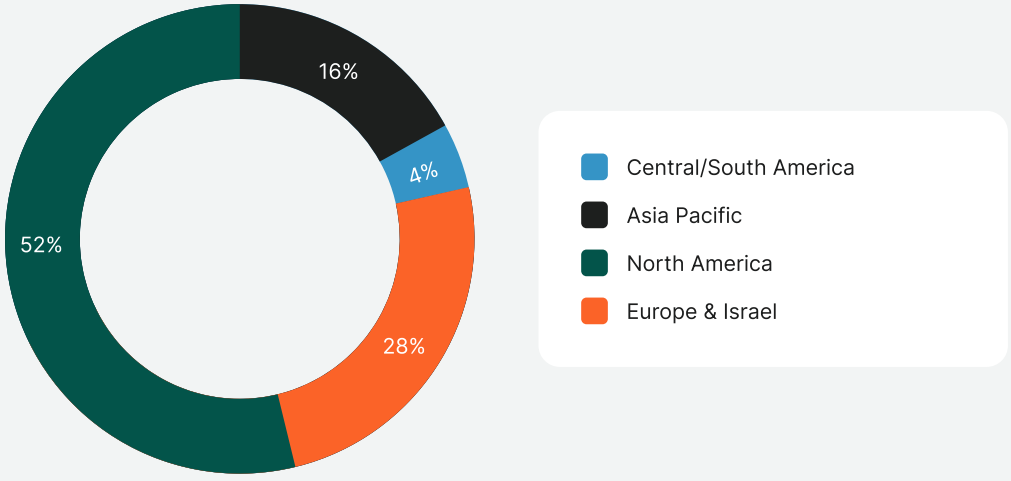
Farmers are operating within small profit margins, meaning these solutions will hit the larger producers first. These large-scale operations typically need the most help anyway, with smaller farming operations generally unable to afford the high upfront purchasing costs of new equipment.

But while robotics are gaining popularity, there is still a gap for more complex operations like fruits which require a "soft touch" to preserve freshness and avoid bruising. What's more, humans are still needed to oversee unpredictable conditions like identifying disease or pest outbreaks.



*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025

North America, Europe Dominate, as Expected, APAC Market Growing Fast, 2020-2025



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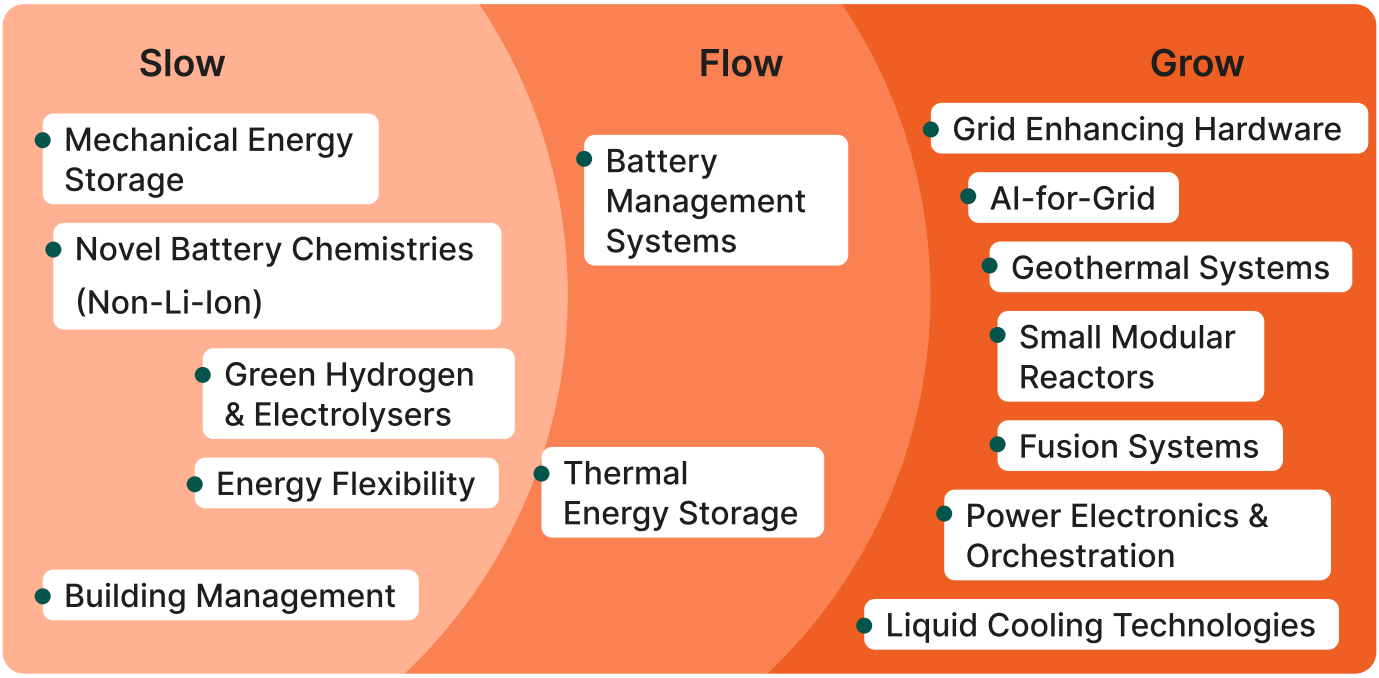
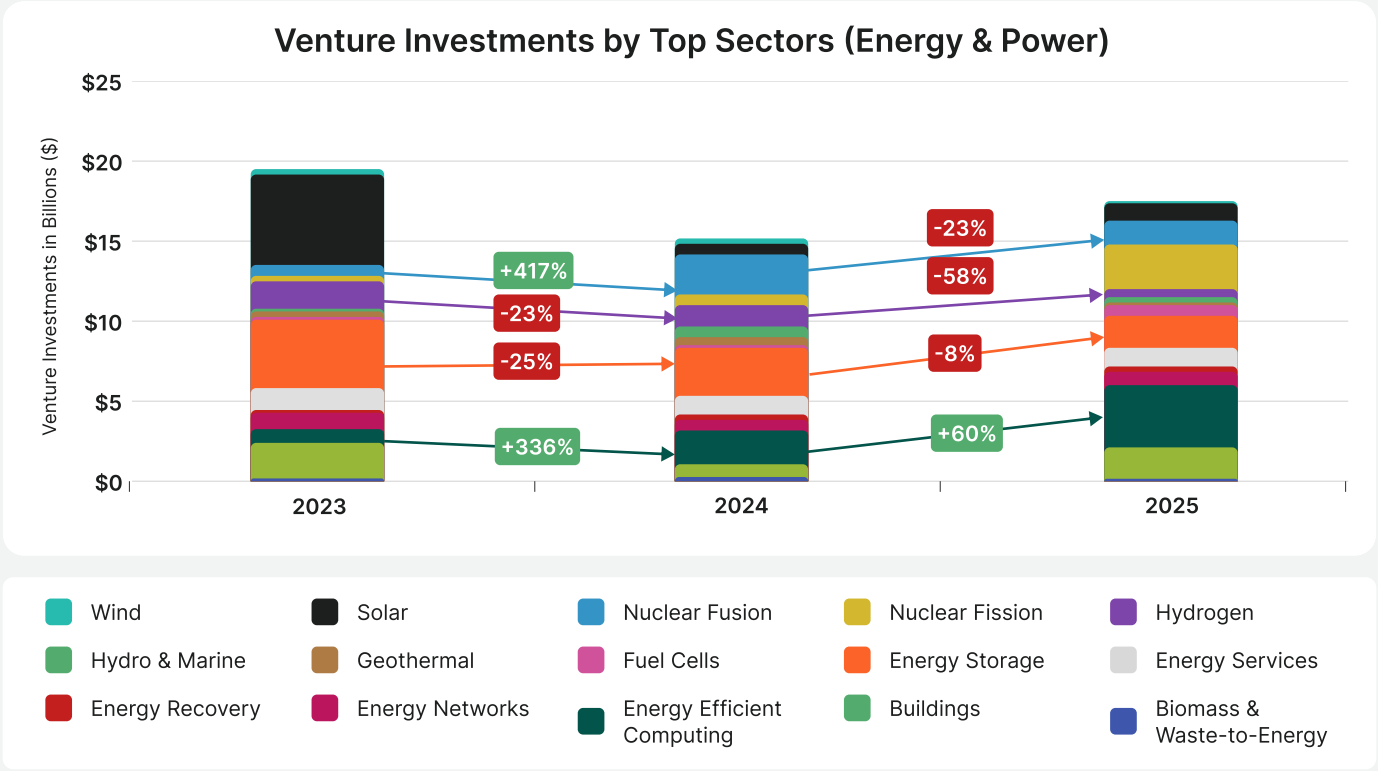
***Data through December 15, 2025

02 Energy & Power

Zainab Gilani
Associate, Cleantech Group

Energy & Power in 2026, Where Will Growth Occur?





*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025
****For trend illustration select outliers were excluded, not exhaustive data set

2025 saw continued growth in the Energy & Power sector with over 450 equity deals made in this space with over $18B raised. Certain segments that may have previously excited investors such as hydrogen, building management and innovations in solar and wind, did not see the frequency or the volume that previous years may have carried. Declining costs for lithium-ion batteries have made innovation in new battery chemistries and other forms of LDES difficult to scale on an economic basis. However, growing demands for AI and the energy to power the sector have driven growth in numerous other sectors including energy efficient compute, nuclear "both fission and fusion", grid tech and power delivery technologies.

Despite these trends across the globe accelerating a clean energy economy, renewed natural gas and fossil fuel demands remained a strong theme throughout the past year with turbines seeing an increase in demand and potentially more supply. Corporates, like BP, Equinor, Shell, and ENI also announced cuts to funding into renewables and low carbon investments.

Companies like Mainspring Energy ($258M Series F), Bloom Energy, and Sapphire Technologies ($18M Series C), which can support efficient ways to leverage natural gas infrastructure and fuels saw investments this year.

While certain downturns can be a consequence of unfavorable policies, such as a lack of incentives for hydrogen and building electrification in the U.S., other sectors like energy storage, wind, and solar are seeing less venture deals due to a diversifying capital stack and more mature methods of financing for larger projects.

The U.S. also faced particular challenges this year with changes in policy as the Inflation Reduction Act saw substantial cuts while simultaneously a growing interconnection queue increased.

However, notably outside the U.S., numerous other countries announced key strategies to improve energy and power resources. The UK announced the Clean Industrial Deal dedicating $105B to support industrial process modernization and energy infrastructure projects. Germany announced $109B to support climate transformation.

China dramatically expanded renewables capacity creating a global impact by installing 250GW of solar and 100GW of wind power.

China is leading the way in numerous areas of energy production. This includes operating the first advanced nuclear reactor, reducing construction timelines for nuclear plants (~7 years compared to 10-15 years in other countries) and outspending many other nations in the fusion sector. For example, the U.S. spends close to $800M annually on fusion projects compared to China's $1.5B-$3B from the government to support the industry. Despite this strong growth in renewable power being driven by China, there is still quite a bit of room for improvement across the rest of the world.

CHINA'S RAPIDLY SCALING RENEWABLES PORTFOLIO

Sector	China's Rapidly Scaling Renewables Portfolio
Fusion	• Investing $1.5-$3B annually and developing localized supply chain. • Growing specialized workforce with focus in fusion. • Leading in fusion patents and research.
Nuclear Fission	• Government support with plan to construct 150 new nuclear reactors between 2025 and 2035. • ~7 year average construction time (compared to 10+ year global average). • Connected first fourth generation, small modular reactor in 2023.
Solar	• In the first half of 2025, China installed 256GW of the global 380GW of solar deployed globally. • 80% of world's solar manufacturing capacity is in China. • World's Largest Deployment: Gonghe Talatan Solar Park, 15.6GW Capacity.
Wind	• Estimates suggest that over 70% of new wind capacity in 2025 will be deployed in China (~100GW deployed in China compared to 140GW globally). • World's Largest Deployment: Gansu Wind Farm / Jiuquan Wind Power Base (Onshore), 10GW Capacity.
Geothermal	• Wide deployments for district heating, more limited for electricity generation applications.
Hydrogen	• Estimates suggest that 70% of new global electrolyzer installations will be in China. • Strong manufacturing dominance in Alkaline Water Electrolyzers. • World's Largest Deployment: Qingqing No.1 Songyuan Project will produce 45,000 tons of green hydrogen annually.

Even as renewables are implemented globally and natural gas and fossil fuel infrastructure scales in parallel, corporations and industrial users of energy will still require access to energy as soon as possible, opening up wider opportunities for innovation in multiple segments.

Data center operators, liquid cooling, power orchestration, and grid technologies have seen substantial growth this year and will continue to do so. According to the IEA, multiple scenarios of AI uptake suggest that data centers may consume anywhere from 800TWh by 2030, to 1,260TWh by 2030 if broadly implemented.

The growing need for energy comes from the rapidly changing architecture and power demands of the GPUs that are used to support AI systems and training. NVIDIA chips are becoming more and more powerful. Traditional data centers have an average of ~10-15kW per rack globally but the Rubin Ultra, set to be released in 2027, will require 900kW to 1MW per rack.

Existing infrastructure will not be able to keep up, so innovators developing enhanced cooling systems, power delivery, and specialized offerings for AI infrastructure will excel.

- Crusoe raised $1.3B and will focus on creating resources for high performance compute and construction of GW scale AI factories.

- Firmus raised $220M in 2025 to go beyond providing cooling solutions, to provide a full stack service of solutions and develop AI factories in Australia.

In the liquid cooling space, we've previously seen money go into specific cooling technologies. In 2025, we saw companies add additional strategies and products to support data centers and provide a suite of solutions by integrating power technologies.

- Accelsius and Zutacore, which are developing two-phase direct-to-chip cooling solutions, also saw investments of undisclosed amounts in 2025.

In the upcoming years, we'll likely continue to see strong growth in two-phase direct-to-chip technologies, innovations related to the cooling liquids, and more cooling technologies providing full stack services as they grow and potentially get acquired by other larger corporates.

- Notable exits from this year include Vertiv acquiring PurgeRite, Eaton acquiring Boyd Thermal, and Daikin Applied Americas acquiring Chilldyne.

Unlocking More Energy from Existing Resources

Critical outage events occurred this year, such as the outages in the Iberian Peninsula, which reports claim resulted from spikes in voltages. Although specifics of the outages may be difficult to pin down, challenges like these can potentially be addressed by integrating smart and solid-state transformers into grid applications.

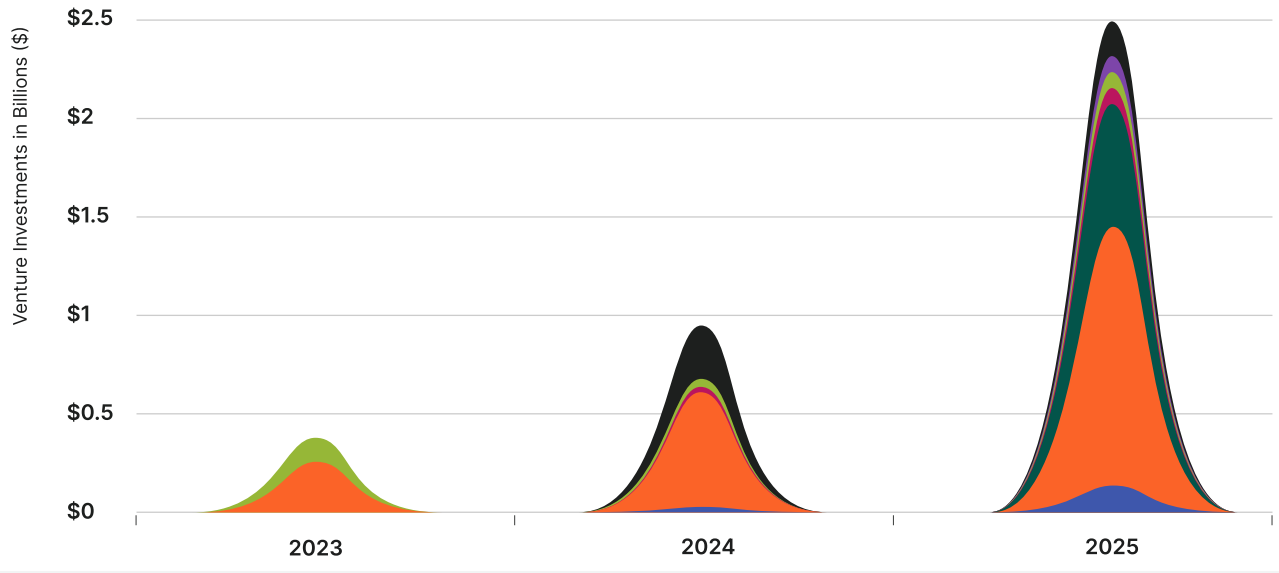
Companies like DG Matrix ($20M Seed), Heron Power ($38M Series A), Amperesand ($80M Series A), and Ionate ($17M Series A) all raised funds this year. These companies can provide multiple power functions in a modular unit, real-time monitoring, automated voltage regulation and fault isolation which can prevent blackouts and decrease the time back to power.

In addition to supporting a reliable grid, technologies have been funded and developed to address the growing load growth and energy requirements. Companies like CTC Global and VEIR are actively collaborating with technology companies like Google and Microsoft to improve energy access to data centers and improve power management at the facilities themselves. VEIR is going beyond providing transmission cables by also innovating on cabling that can be integrated inside the data center itself to improve power delivery to racks.

Outside of transmission and distribution, new capacity and new forms of energy generation must be unlocked. While China may lead the way in commercial solar and wind deployments, there are a range of supporting technologies and systems that need to be scaled creating opportunities for both types of innovators. Additionally, segments such as wave energy, geothermal power, advanced fission, and fusion which are still at an earlier stage are anticipated to grow rapidly globally.

CorPower, the only Global Cleantech 100 company accelerating wave energy this year, is developing a unique wave energy converter to capture energy from waves using a point absorber design. In the geothermal space, several companies have seen success in 2025. Fervo Energy raised over $500M in funding across multiple rounds and announced full funding for their Cape Station Utah project, which is estimated to produce 100MW of power. Eavor Technologies also raised capital to support their commercial deployment of their closed-loop system, and Quaise Energy announced a successful test of a deep 100 meter borehole drilled in Texas using their millimeter wave technology to vaporize rock.

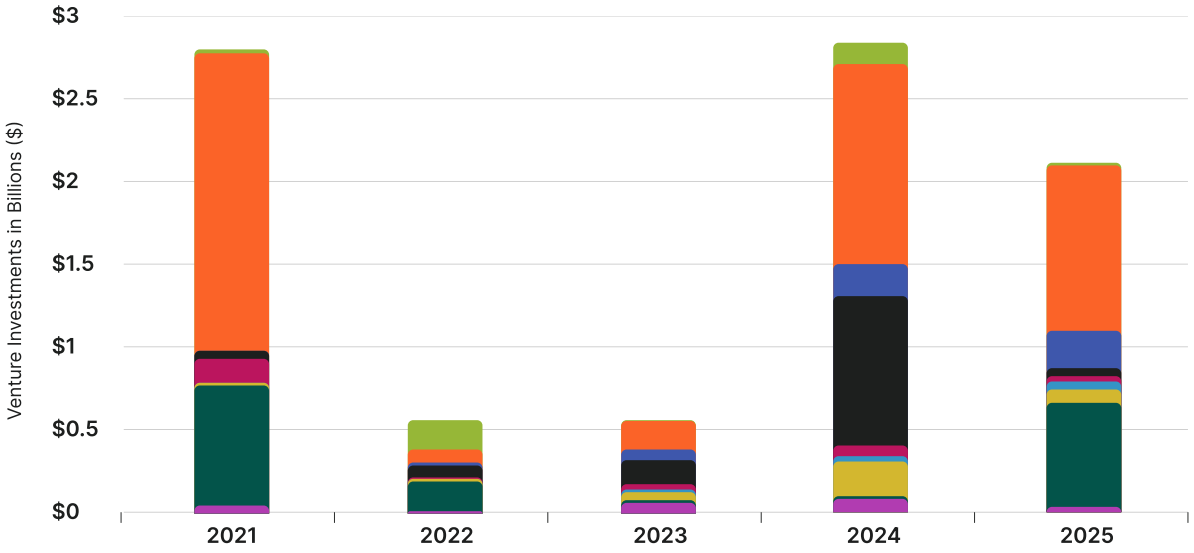
Venture Investments in Advanced Nuclear



- Components & Enabling Technologies
- High Temperature Gas Cooled Reactor
- Liquid Metal Cooled Reactor
- Micro Reactor
- Small Modular Light Water Reactor
- Molten Salt Reactor
- Nuclear Waste Management

*Seed, Series A, Series B
Growth Equity, **Includes outlier deals above $350M
***Data through December 15, 2025

Venture Investments[Δ] in Fusion Technologies



- Components & Enabling Technologies
- Field Reversed Configuration
- Inertial Confinement
- Magnetic Mirror
- Magnetized Target Reactor
- Novel Fusion Reactor
- Stellarator
- Tokamak
- Z-Pinch

*Seed, Series A, Series B, Growth Equity,
**Includes outlier deals above $350M,
***Data through December 15, 2025,
Δ Select investments in Chinese Fusion companies may not be disclosed depending on funding mechanism

Nuclear also saw strong growth in 2025, continued from 2024 across fission and fusion technologies. The U.S. administration announced a goal to quadruple nuclear capacity by 2050. In December the U.S. Department of Energy announced $800M in funding for small modular reactor development. The demand from large energy users for nuclear technologies, especially those in the technology and data spaces, is unprecedented. Google, Amazon, Meta, and Dow have joined 14 major banks, 140 nuclear companies, and 31 countries to publicly support the goal of tripling global nuclear capacity by 2050.

Support for the U.S. nuclear industry is in part due to the growing demands for energy from data centers, but also in support of technologies to improve energy security that may also have applications in defense and reliability. Radiant, a developer of a 1MW microreactor, announced the closing of their Series C extension round in May, closing with $165M from a range of investors and $300M in December. Radiant also confirmed a partnership with the U.S. Department of Defense to apply their microreactor for military sites. Other key companies that received funding this year include TerraPower, X-Energy, and Oklo.

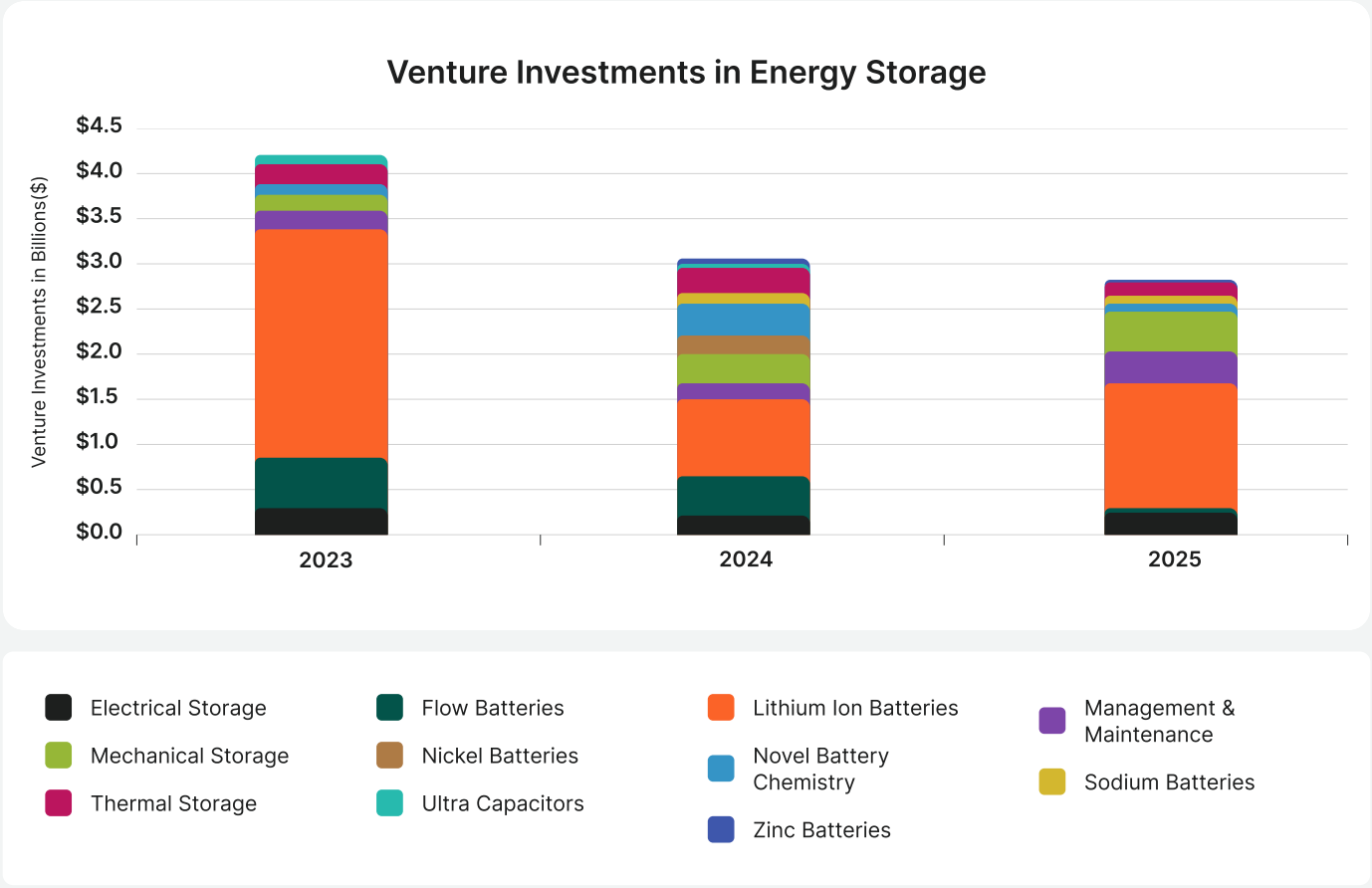
While some small modular reactor developers are scaling rapidly, those basing their reactors on specialized components and HALEU fuels may face supply chain challenges when compared to small modular reactors using existing and accessible fuel supplies. Last Energy, is developing a reactor that can scale rapidly using existing supply chains and also raised $100M.

For fusion, 2025 was also a significant year with major companies like Helion and Commonwealth Fusion Systems (CFS) raising over $400M. These megadeals bring investment numbers back into the range of 2021, which was a significant inflection point in the industry as it relates to funding from private capital and setting larger players apart from their competitors. CFS raised over $800M and has secured a $1B power purchase agreement with Eni. In a move no analyst could have predicted, TAE Technologies announced a merger with Trump Media to create the world's first publicly traded fusion company. However, despite this vote of confidence in the industry, the private sector still needs to prove it can develop reactors that can achieve net energy gains and the process to develop a replicable power plant around it. The first company to achieve net-energy gain will likely see substantial funding rally around it.

In China, the government funded primarily tokamak models while in the U.S., more diverse and early-stage concepts are being explored in addition to tokamaks.

While some companies may have been successful at raising capital in earlier stages, not all the approaches that have received seed and early-stage investments will succeed. Companies developing tokamak, stellarator, and inertial confinement systems will likely see more growth given the history of research around these ideas.

There will be some consolidation in the fusion industry in the years moving forward, not all the companies in the sector will successfully be able to raise the long-term capital needed. Some may look to generate revenue by selling components, IP, or targeting other industries such as those in healthcare, transportation, and electrical infrastructure. Most notably, the advancements in fusion will also support high-temperature superconducting cables and tape which can have a transformative impact on a range of other industries as well.



*Seed, Series A, Series B, Growth Equity
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***Data through December 15, 2025

Sector	China's Diverse Energy Storage Portfolio
Sodium Battery	• World's largest sodium battery deployment by HiNa battery 50MW/100MWh. • Will capture large portion of global manufacturing capacity by 2030.
Vanadium Redox Flow Battery	• Largest installation in Dalian province at 100MW with Dalian Rongke. • Construction for 200MW/1GWh VRFB system completed. • China benefits from domestic vanadium supplies and lower vanadium costs.
Lithium-Ion Battery	• China will likely own 70% of global battery capacity by 2030 potentially delivering up to 6,200GWh of storage. • Vertical integration is bringing costs down (~$50-70/kWh for LFP batteries). • Multiple large corporates, CATL, BYD, Gotion advancing Li-Ion.
Compressed Air Energy Storage	• World's largest operating project Hubei Yingcheng CAES station (300MW/ 1500MWh).

While there have been bright spots and opportunities in a range of different sectors in Energy & Power, there have also been critical areas that have seen stagnation and a decline in venture investments. Energy storage has been an area where there have been some notable challenges. The declining costs of lithium-ion batteries have made the economics difficult for more novel and innovative battery types looking to scale. This was seen as two notable sodium-ion battery developers went out of business this year, Natron and Bedrock Materials. While China has an edge on commercializing sodium batteries and benefits from a domestic vanadium supply chain for flow batteries, not all other regions in the world will have the same advantages. However, there were still of companies in energy storage that raised rounds in 2025.

- Base Power raised $1B to support residential lithium-ion battery systems.

- Redwood Materials is creating a business line to support data centers by providing second life lithium-ion batteries through Redwood Energy.

- Some alternatives to lithium-ion batteries also raised funds including Lyten, VFlowTech, and XL Batteries.

On the thermal energy storage side, many companies continued to secure capital and engage in partnerships to scale their technology. Rondo Energy announced the commercial operation of the world's largest industrial heat battery at 100MWh in California, a partnership with Heineken and EDP to support a brewery in Portugal, and it is launching a battery with SCG at a cement plant in Thailand.

For hydrogen, there were dual trends of some specific technology types raising funds and maturing but against a background of companies and projects failing, for example, Amogy ($80M Growth Equity), Vema Hydrogen ($13M Seed), H2SITE ($39M Series B), Stargate Hydrogen ($11M Series A), and Supercritical Solutions ($18M Series A) raised funds this year to scale green hydrogen, ammonia cracking, and electrolysis solutions.

- Amogy raised $80M in 2025 to support expansion of projects in Asia and is pivoting towards focusing on the power generation market using ammonia.

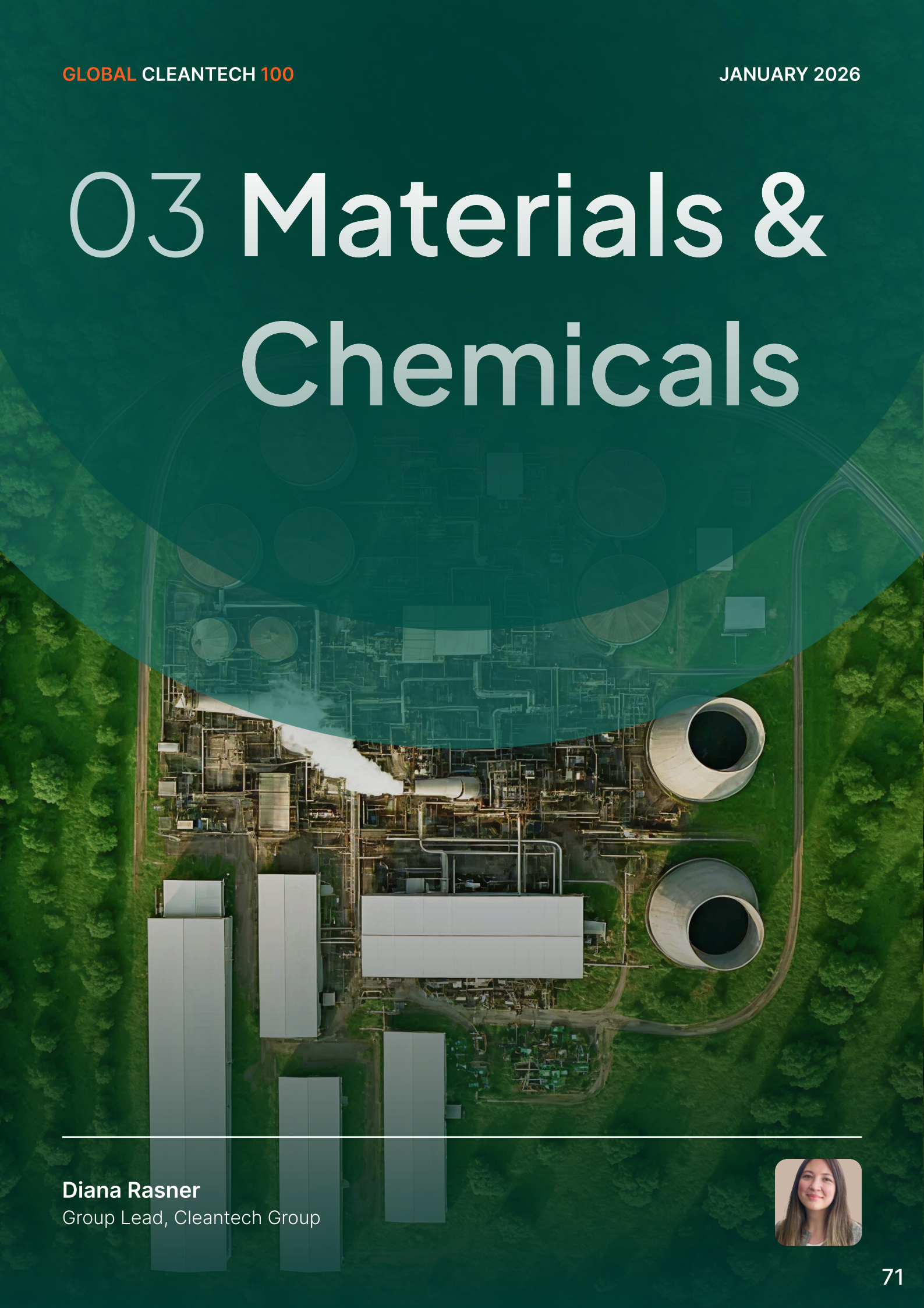
- H2SITE raised $39M in 2025 to support membrane-based liquid systems for ammonia and methanol cracking.

However, elsewhere, other large projects, saw substantial cuts, and project cancellations. For example, BP's project in the UK, was cancelled due to rising costs and a renewed focus on natural gas and fossil fuels and Fortescue cancelled both large Arizona and Gladstone green hydrogen projects.

In a similar vein, building management also saw a downturn in investment from 2023 but up from 2024. Software platforms like 75F ($45M Series B), Runwise ($30M Series B), and Aedifion ($19M Series B), raised millions in funding to scale their AI and IoT solutions for optimizing energy efficiency in commercial and residential buildings.

On the hardware side, Aira raised $175M to support its Heat Pump as a Service (HaaS) model which is steadily growing across Europe and has policies enabling the growth of electrified solutions and more favorable electricity costs and Quilt raised $20M to expand their heat pump and smart energy solution.

03 Materials & Chemicals

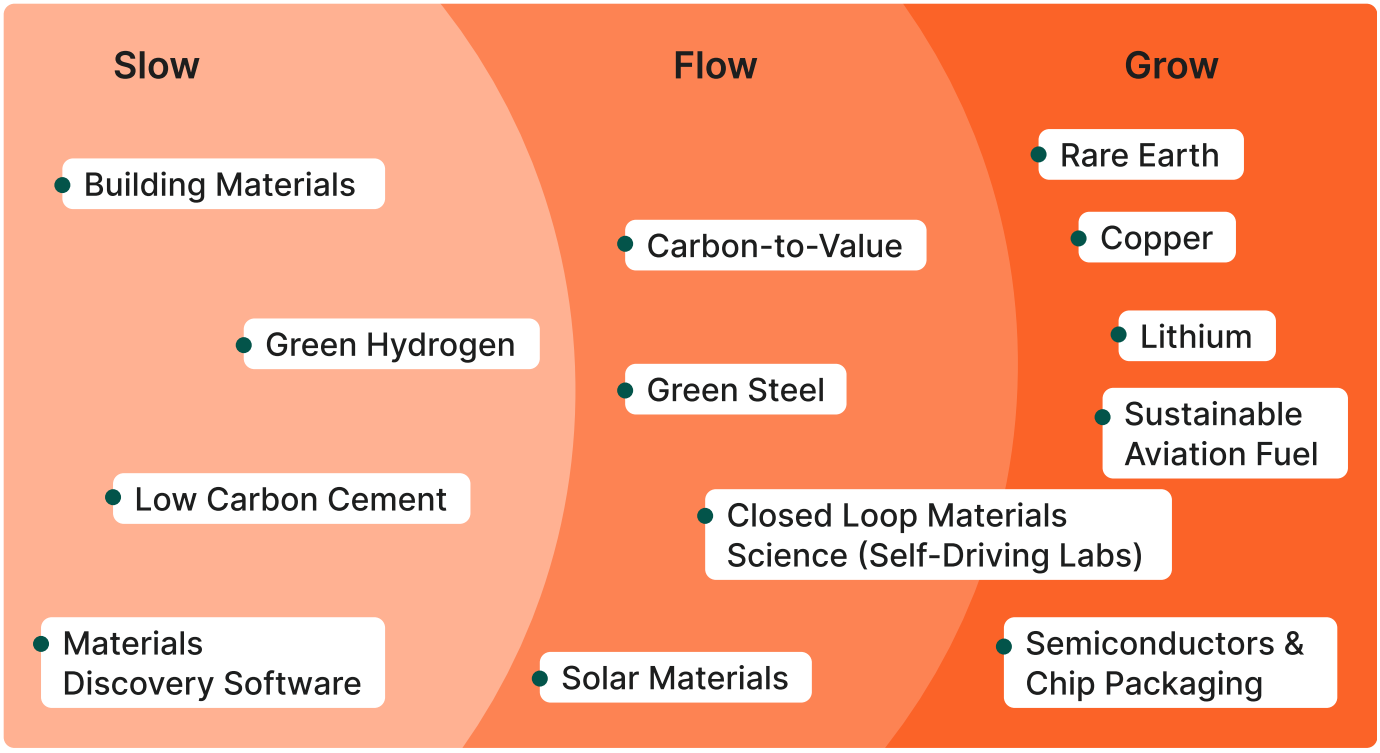


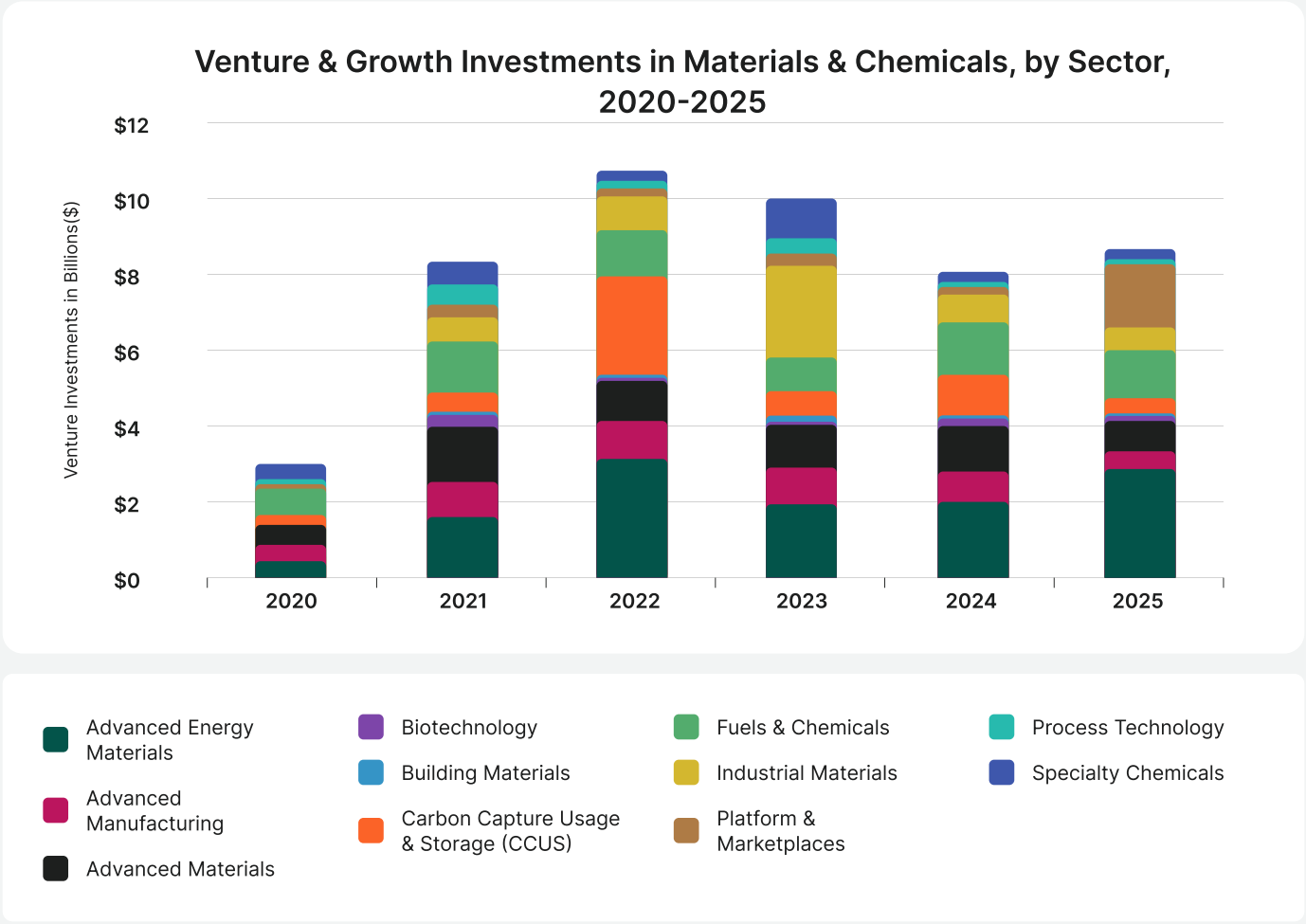
Diana Rasner
Group Lead, Cleantech Group

From Revolutions to Evolutions: Navigating Critical Minerals, AI, and Hard to Abate Solutions

The AI boom continues to be a recurring theme weaving through all industry groups, including its monumental impact in the Materials & Chemicals world. Its influence shows up both in the rapid expansion of new AI-driven discovery platforms and, further upstream, in the continued growth of advanced energy materials spanning next-generation substances and semiconductor-grade chip designs. With this heightened demand for manufactured components comes a brutal reality and equally complex challenge of figuring out how to secure the raw minerals and inputs needed for this surge amidst geopolitical instability.

And while much of the hard-to-abate Materials & Chemicals world hit some harsh setbacks with rising costs of energy and goods, innovation and capital kept flowing, offering a slight glimmer of optimism so it's no longer a question of how, but when, these solutions start making an impact.





*Seed, Series A, Series B, Growth Equity
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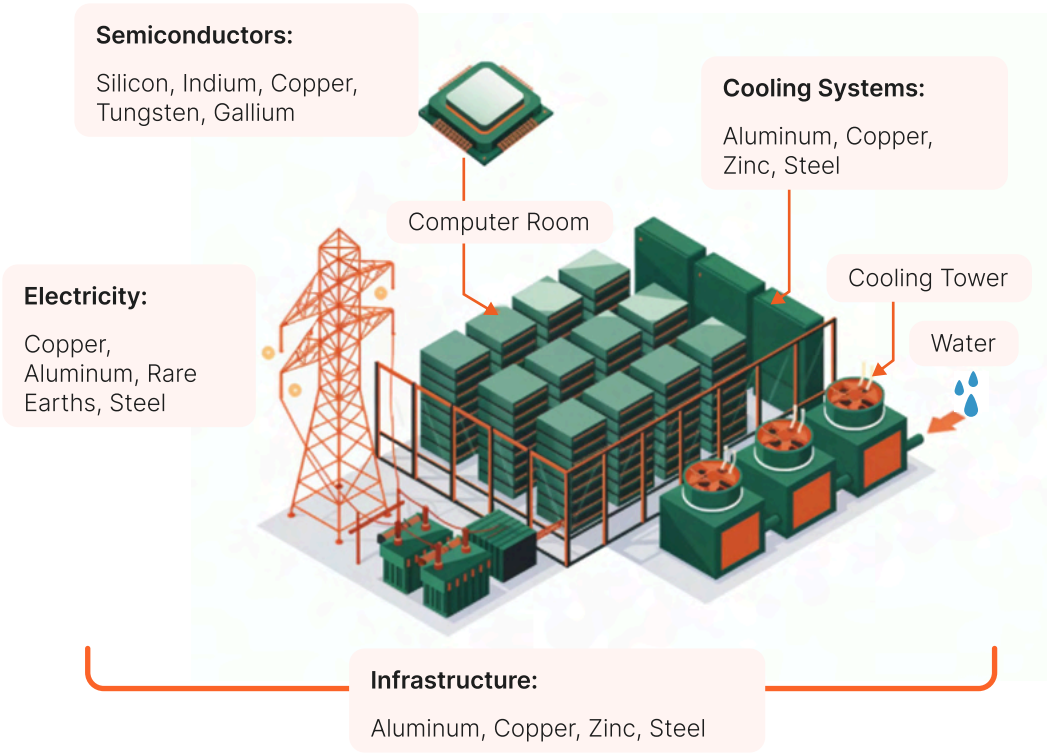
***Data through December 15, 2025

The Race for Critical Minerals

Global dependence on critical minerals has become one of the most visible pressure points in the energy and industrial transition. These materials form the foundation of modern manufacturing, underpinning semiconductors, defense systems, clean-energy infrastructure, and advanced electronics. Yet production remains heavily concentrated in a small number of countries, with China processing and refining the majority of global supply. With this bottleneck in mind, those currently following or invested in the rise of AI and data centers will face intensifying competition to source and secure the critical minerals and metals required to build the components, equipment and infrastructure that power these facilities. Overall costs and timelines in an already ultra-competitive space will inevitably compound, particularly given the mining industry's historically slow pace of change within a commodity-driven market.

Critical Minerals Demand for Data Centers



Mining and refining processes for critical minerals are among the world's most energy—and emissions-intensive industrial activities, frequently linked to water stress, toxic chemical byproducts, and large-scale land disturbance. This dual vulnerability—geopolitical and environmental—is driving a surge of innovation focused on reshaping the supply chain. Several Global Cleantech 100 innovators put emphasis on how mining operations are evolving. From use of AI for exploration (See Resource & Environmental Management: AI & Digital Innovation Transform Mineral Exploration) to re-engineering how minerals are processed, refined, and recovered, a new generation of low-impact, circular, and regionally resilient supply systems are coming online.

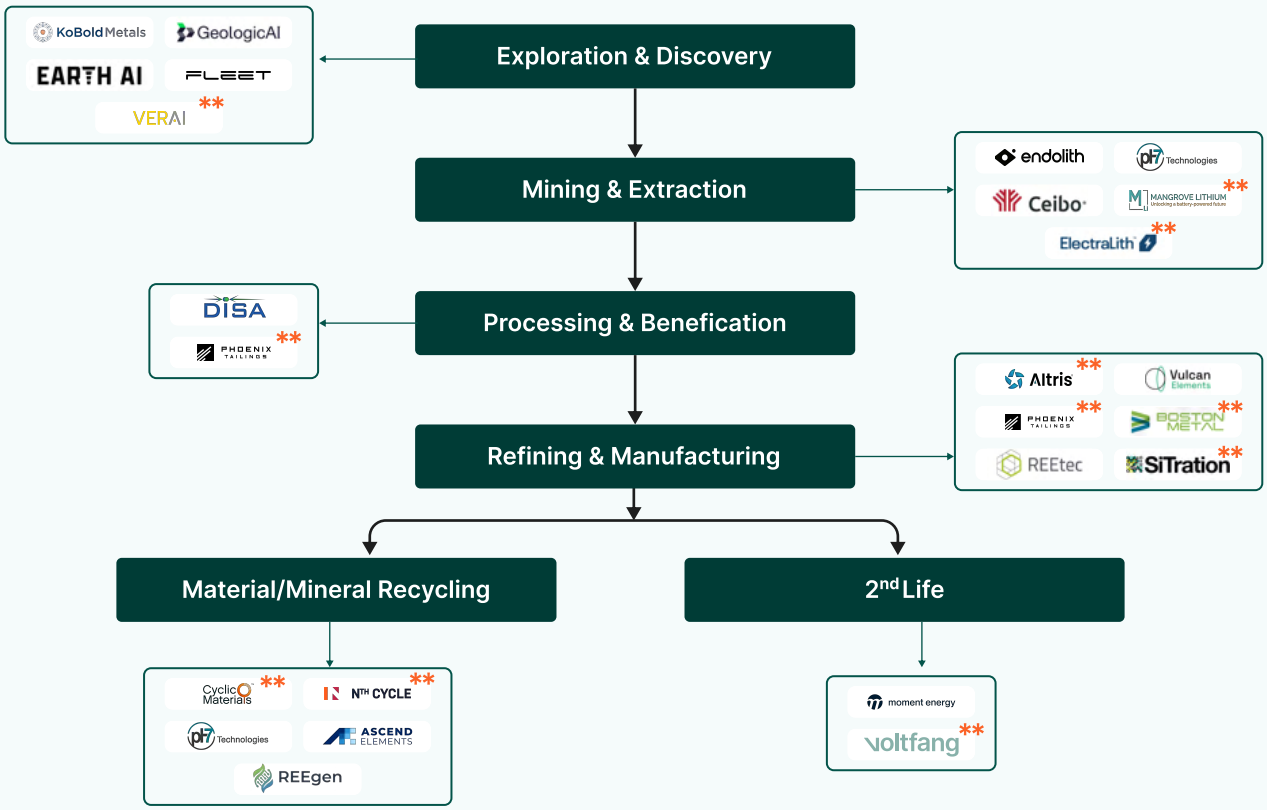
- **Mangrove Lithium:** Mangrove Lithium uses an electrochemical refining platform to produce battery-grade lithium hydroxide or carbonate from brines, hard rock, or recycled feedstocks. Its process eliminates acid-based chemical conversion, significantly reducing waste, energy use, and water intensity.

- **ElectraLith:** ElectraLith applies an electrochemical process to first extract lithium from brine and then directly convert it to battery-grade lithium hydroxide, enabling low-carbon operations that can be co-located with battery manufacturing.

- **Phoenix Tailings:** Recently opened the first rare earths refinery outside of China with its U.S.-based facility, marking a significant step toward diversified global supply. Their process uses renewable energy and produces zero chemical waste, demonstrating that critical-metal refining can be both commercially viable and environmentally responsible.

- **Nth Cycle:** Nth Cycle uses an electro-extraction process for recovering critical minerals like nickel and cobalt, and leverages machine-learning models to optimize reaction conditions, increasing yield and purity even from low-grade or variable feedstocks.

- **Boston Metal:** Boston Metal (2026 Hall of Fame) recently opened its own mineral processing plant in Brazil using its electrified platform. Tapping into the abundant hydropower found in the region, they are already recovering metals such as niobium and tantalum for traders and end users alike by processing waste materials.

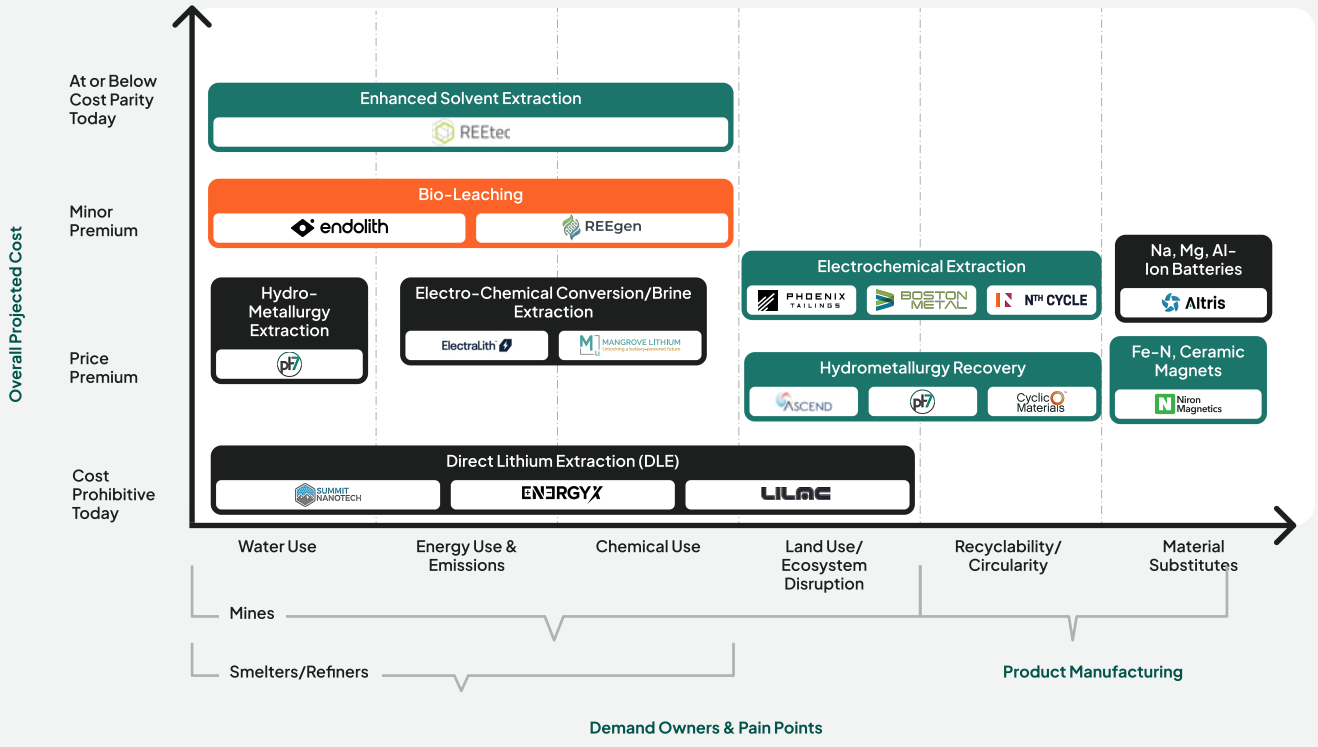


** 2026 GCT 100 Award Winners

And while much of the focus in the critical minerals sector is relying on onshoring supply and its affiliated processes and equipment, one of the fastest ways to relieve pressure is not through new extraction, but through material substitution and design. The strategy is gaining momentum as manufacturers seek to balance security of supply with cost and environmental performance, with companies like. Niron Magnetics (see Trend Watch: Cleantech National Security Nexus) and Altris as examples who are offering solutions with earth abundant materials.

- **Altris:** Altris is commercializing sodium-ion battery technology that replaces lithium, cobalt, and nickel with more abundant elements such as sodium and iron. The chemistry supports cost-effective, large-scale energy storage without reliance on critical minerals, and uses a water-based manufacturing process that further minimizes environmental impact.

Mapping Critical Mineral Innovations



AI or Bust: The New Norm in Materials & Chemicals Discovery

AI is rapidly reshaping the Materials & Chemicals industry group, transforming a historically slow, experimental field into one defined by speed, precision, and scalable innovation. At the CIEX conference in September, chemicals major Syensqo noted that identifying a polymer with the desired properties they need for a product would traditionally have taken five to six years; with AI, they achieved it in 18 months. Numerous Global Cleantech 100 winners have already tapped into the power of AI and machine learning to help optimize and refine their processes and platforms.

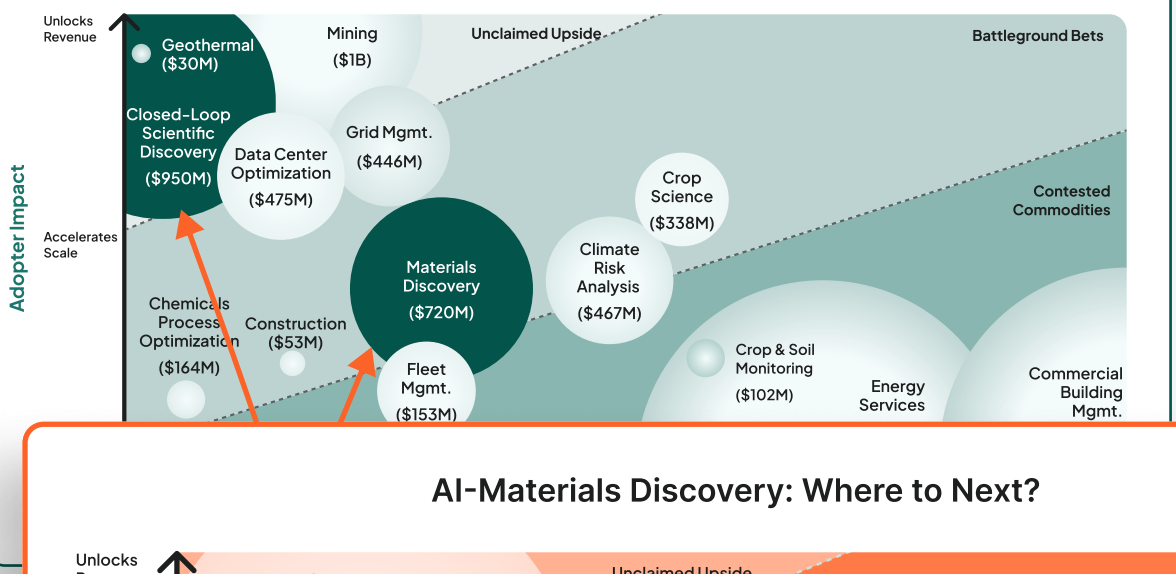
- **Dioxycle:** Dioxycle applies ML-guided catalyst optimization to accelerate its CO_2-to-ethylene electrochemistry, improving catalyst selectivity and durability more quickly than traditional experimentation.

- **Econic Technologies:** Econic Technologies uses AI-assisted molecular modeling to design and refine catalysts for CO_2-to-polyol production, enabling faster iteration and improved integration of captured CO_2 into polymer supply chains.

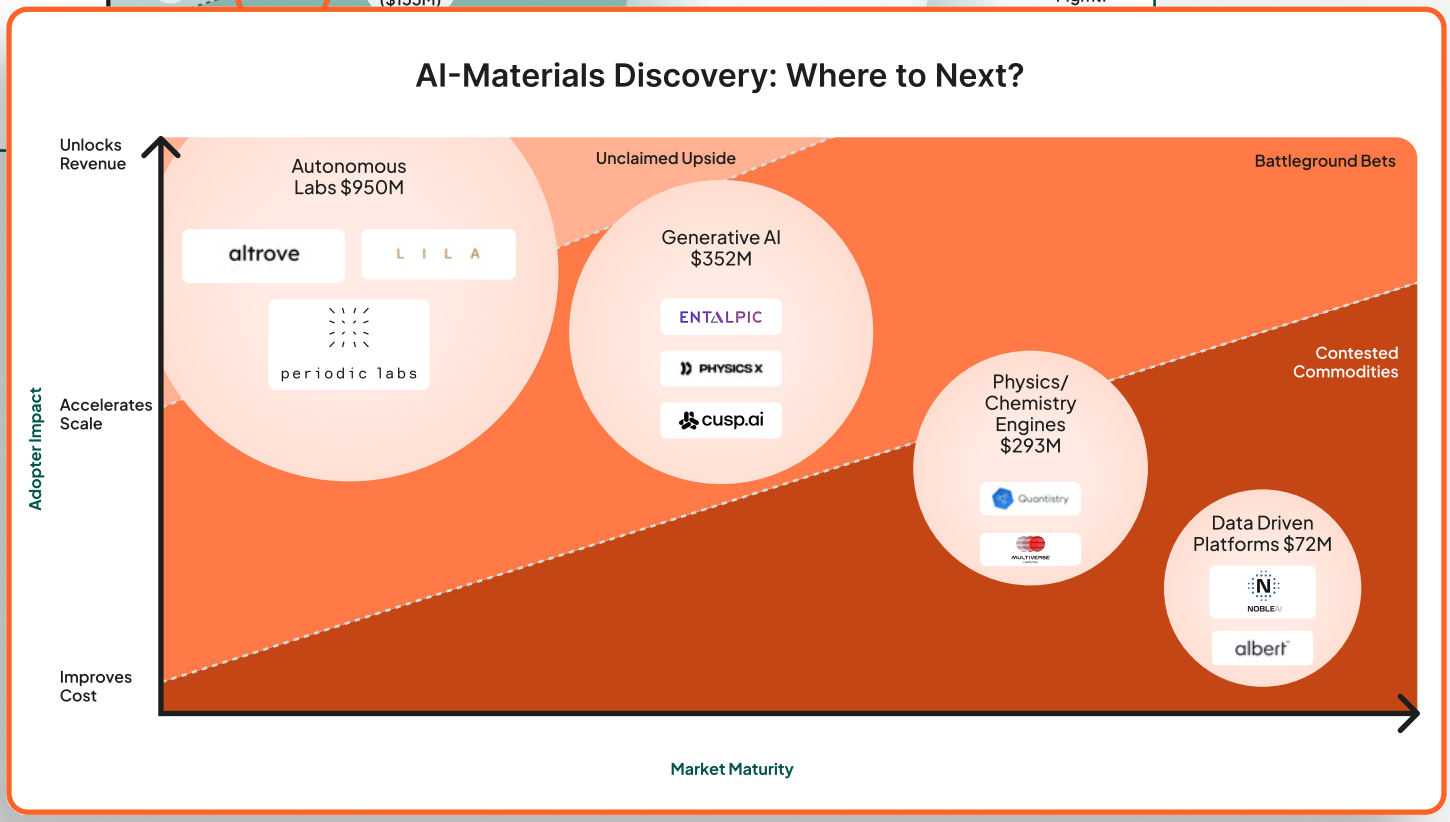
To date, much of the AI-driven materials discovery landscape has centered on generative AI —models and simulation engines capable of identifying novel materials or optimizing combinations of existing ones to meet targeted performance requirements. Start-ups such as Entalpic and PhysicsX have spent the past several years enabling engineers to run extensive iterations and simulations, accelerating the development of next-generation solutions across defense, semiconductors, and energy sectors.

- **CuspAI:** CuspAI uses generative AI and high-fidelity simulation to design new sorbents, catalysts, and membrane materials for carbon capture and other climate applications. Its platform evaluates millions of candidate structures and ranks them by performance potential before any physical testing, dramatically compressing early-stage development timelines.

AI-Enabled Cleantech Zones of Opportunity



AI-Materials Discovery: Where to Next?



Circle Size = Capital Raised Since 2023

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*Seed, Series A, Series B, Growth Equity
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***Data through December 15, 2025

By late 2025, the field had progressed from digital exploration to machine-guided optimization and, increasingly, toward fully autonomous creation. Closed-loop materials autonomy advanced at unprecedented speed, where AI does more than propose new materials—it physically creates, tests, and improves them through automated feedback cycles.

Companies like Periodic Labs, Lila Sciences, and Altrove collectively raised nearly $1B, building systems that combine predictive models with robotics and high-throughput automated experimentation. These systems autonomously synthesize, evaluate, and iterate on new materials, linking discovery directly to production and pushing the field toward continuous, self-improving innovation.

This convergence of digital intelligence with physical creation is also filtering into corporate R&D. Major materials and chemicals companies, including Dow, 3M, and BASF, are expanding their AI capabilities. It is a clear indication that AI is evolving from a purely analytical aid into an active participant in production, tightening the link between discovery and deployment.

Together, these developments signal the emergence of a new operating model for the Materials & Chemicals group—one in which AI, automation, and materials science function as an integrated system, accelerating innovation cycles and redefining what is technologically achievable.

Wait or Abate: That Is The Question

Hard-to-abate sectors such as cement, steel, fuels, and heavy industry faced some of the steepest decarbonization challenges in 2025.

Emissions in these sectors stem from high-temperature heat, intrinsic process chemistry, and energy-intensive feedstocks making transitions costly and highly sensitive to power prices, CAPEX inflation, and policy uncertainty.

These pressures were reinforced by a sharp pullback in public support. The U.S. DOE's withdrawal of $3.7B in CCUS and industrial-decarbonization awards halted multiple carbon-capture projects across power and industrial sites, setting the tone for a difficult year.

CCUS in particular faced immense scrutiny, particularly around the transparent but nonetheless major shortcomings brought to light by those working in the Direct Air Capture (DAC) space in 2025. However, not all solutions in this space faced the same setbacks, with many accelerating pace with verified pilots, continued investment, and major offtake agreements.

- **44.01:** 44.01 demonstrated field-scale mineralization through Project Chalk in Oman, confirming permanent CO_2 storage in peridotite rock. Its approach avoids the need for long-term monitoring, since mineralization locks CO_2 into solid rock within months rather than centuries.

- **Ardent:** Ardent closed the first part of its Series B fundraise in early December 2025 with more than 18,000 operating hours on its Optiperm™ platform, a carbon capture system which selectively separates CO_2 using proprietary polymer membranes rather than energy-intensive solvent regeneration.

- **Vaulted Deep:** Vaulted Deep signed a 12-year offtake agreement with Microsoft for up to 4.9M tons of durable carbon removal—one of the sector's largest commitments. Its process relies on injecting organic-waste slurries into deep geologic formations, offering a scalable, infrastructure-light removal pathway with immediate permanence.

In cement, Heidelberg Materials Sweden paused its CCS project at the Slite plant after failing to secure state co-funding—an abrupt setback for efforts to tackle process emissions from clinker production and a reminder of how reliant the sector remains on public support. Against this backdrop, Carbon Upcycling continued to scale its platform.

- **Carbon Upcycling:** Carbon Upcycling closed an $18M round to deploy its CO_2-enhanced cement-replacement technology across multiple plants. The company's system upgrades waste materials, such as fly ash or slag, into high-performance SCMs, strengthening concrete while reducing clinker requirements.

Steel faced similar turbulence: ArcelorMittal cancelled two green-hydrogen projects in Germany despite $1.5B in subsidies, and Salzgitter pushed later phases of its SALCOS program back by roughly three years, with both citing unfavorable financing and project risks. Solutions such as the ones from Boston Metal (Hall of Fame 2026) and Hertha Metals are looking to push the industry to reimagine their traditional carbon intensive processes.

- **Hertha Metals:** Hertha Metals validated its single-step Flex-HERS™ process at a continuous 1-ton-per-day steel pilot plant, with plans underway for a 9,000-ton-per-year facility. The process keeps favorable steel economics as the north star of its operations, allowing for flexibility not only in their fuel source (natural gas and/or hydrogen) but also in feedstocks which traditional steelmaking cannot utilize efficiently.

Even sustainable fuels were not spared despite a growing number mandates coming online. Both Uniper's SkyFuelH_2 initiative and Shell's planned e-SAF facility in Forsmark were abandoned amid weak project economics. Despite the challenges, modular and chemistry driven approaches gained traction to fulfill a looming supply shortage of sustainable aviation fuel.

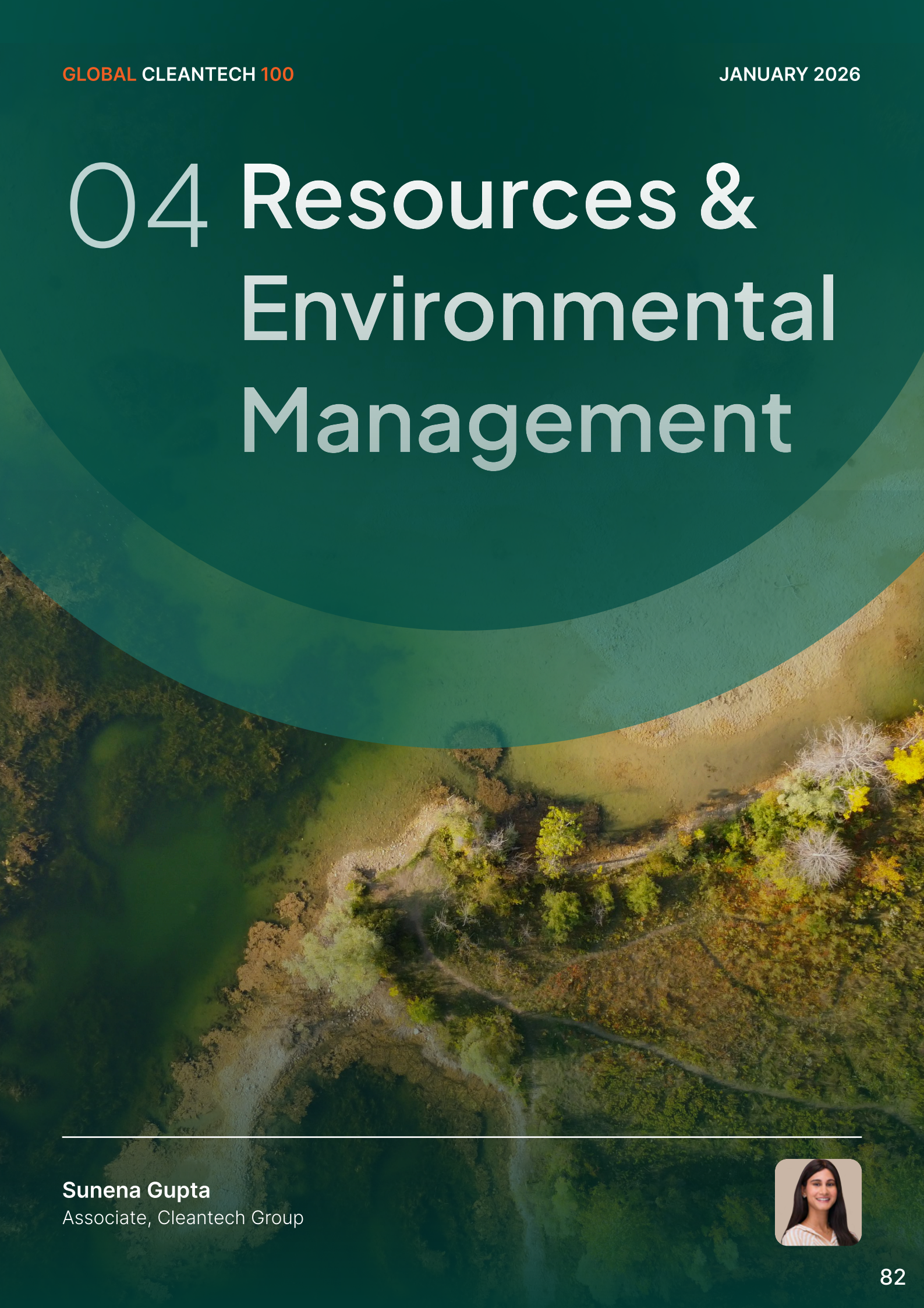
- **INERATEC:** INERATEC commissioned Europe's largest PtL e-fuel plant in Frankfurt-Höchst, producing commercial volumes of synthetic fuels. The company's modular reactor design allows rapid replication of plants globally, reducing both capital intensity and deployment timelines.

- **OXCCU:** OXCCU secured an oversubscribed $27.8M Series B to scale its one-step CO_2-to-SAF process. Its catalyst innovation eliminates several intermediate steps found in conventional Fischer–Tropsch pathways, significantly lowering cost and energy demand.

Looking ahead to 2026 hard-to-abate sectors will continue to struggle as demand for the same energy, resources and financing required to scale increasingly compete with the rapid expansion of data and AI infrastructure. Still, it would be short-sighted to view this as a zero-sum outcome. The same companies driving this boom will be under mounting and justified scrutiny to ensure their assets are efficient, resilient and genuinely sustainable.

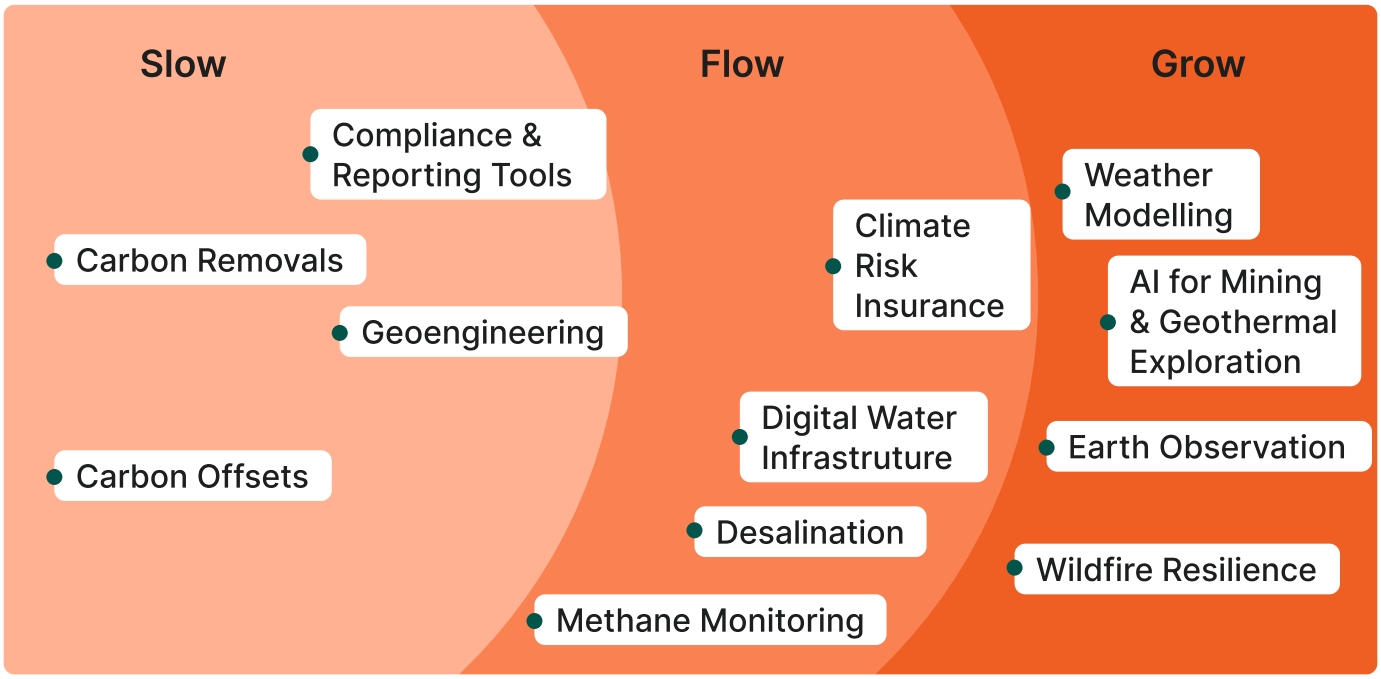
Progress will favor solutions that are modular in design, capital efficient in deployment and resilient to public policy and subsidy frameworks. The next phase of growth will be less "scale at any cost" and more intelligent collaboration. Innovators who align themselves with established players that have capital and urgency but limited time will move ahead; they're no longer waiting for conditions to improve. Instead, they're actively building the systems that will define the Materials and Chemicals industry for the next decade.

04 Resources & Environmental Management



Sunena Gupta
Associate, Cleantech Group

Resilience Revolution: AI, EO, and Weather Tech Reshape Resources



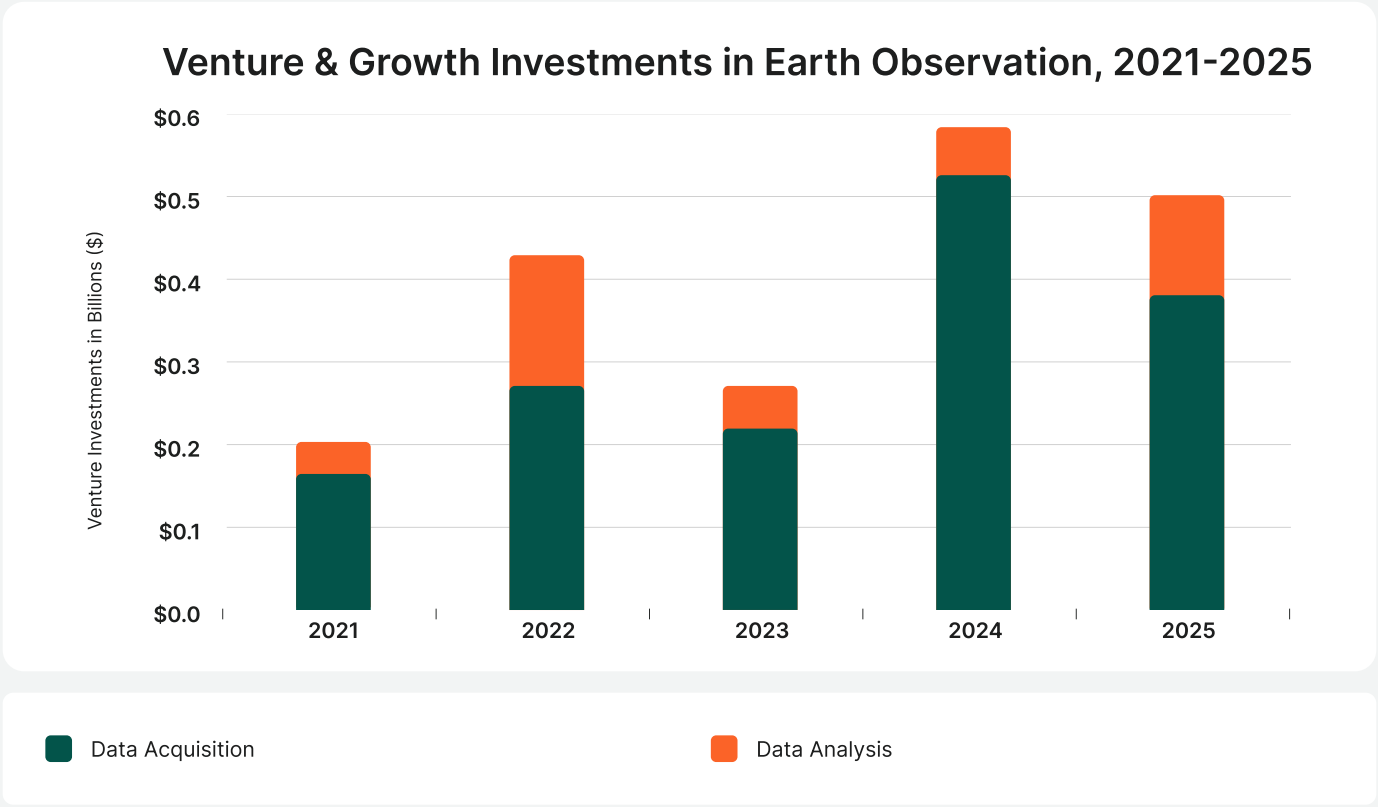
In last year's report, we anticipated that 2025 could be the breakout year for adaptation and resilience technologies. That forecast proved accurate within a few pockets of the Resources & Environmental Management (R&EM) industry group. Market activity reflects a clear shift from viewing emissions reduction as the sole climate solution to recognizing adaptation as essential. As extreme heat and weather intensify, resilience has become both urgent and investable. Companies are using AI, digital modeling, and sensing infrastructure to move from measuring risk to managing it.

Earth Observation (EO) Underpins R&EM Trends

Cheaper satellite launches, advances in AI analytics, and growing regulatory and defense demand have propelled EO from a niche utility to essential infrastructure for monitoring resources, ensuring compliance, and managing climate risk.

At the hardware level, innovation is expanding what can be observed and how quickly data is delivered. Superspectral and Synthetic Aperture Radar (SAR) sensors now enable imaging through clouds, smoke, and darkness, while innovators like Near Space Labs have carved out a unique position with stratospheric balloon platforms that operate between drone and satellite altitudes.

Meanwhile, edge computing is transforming how EO data is processed and distributed. Satellites equipped with onboard analytics can now transmit key insights in near real time, replacing the hours-long download cycles that once limited responsiveness during disasters or wildfire events.



*Seed, Series A, Series B, Growth Equity
**Includes outlier deals above $350M
***Data through December 15, 2025

The market is experiencing a period of consolidation and investor confidence. Funding for data acquisition surged in 2024, reflecting a strong appetite for capital-intensive satellite and sensing infrastructure, while data analytics rounds remain smaller, consistent with the software-based nature of those businesses. Funding rounds for companies like ICEYE, Pixxel, and Matter Intelligence, along with acquisitions such as Nuview's purchase of Astraea and EarthDaily Analytics buying Descartes Labs, signal confidence in vertical integration across the data-to-insight chain.

As infrastructure matures, the next competition will center on control of the geospatial platform layer. Foundational players like Google are expanding global data ecosystems that could commoditize baseline geospatial services. For EO companies, this creates a strategic crossroads: remain data suppliers or move deeper into select verticals where analytics, domain expertise, and user applications are tightly linked. Most are choosing the latter, embedding themselves in industries such as energy, agriculture, and disaster resilience where EO insights directly inform decisions and compliance.

Weather Shifts from Small Talk to Big Business

Weather forecasting is undergoing its most profound transformation in decades. Once dominated by national meteorological agencies and large physics-based models, the field is now being redefined by artificial intelligence, satellite mini-constellations, and sensor networks. The result is a more dynamic and commercialized ecosystem that is reshaping who makes weather predictions, how they are produced, and who benefits from them.

At the center of this shift are AI-native innovators pushing the boundaries of traditional weather science. Companies such as Atmo, Brightband, Beyond Weather, and Silurian are developing machine learning models trained on decades of atmospheric data to produce accurate forecasts in seconds and at a fraction of the computational cost of conventional systems.

Jua stands out for building a foundation model for weather and climate trained on petabytes of global atmospheric data, enabling insurers, commodity traders, and renewable operators to integrate hyperlocal forecasts directly into their operations. Similarly, AiDash applies AI and satellite analytics to help utilities predict storm impacts and manage vegetation risks to infrastructure.

Large incumbents are reinforcing this momentum. Google DeepMind's GraphCast and Microsoft's Aurora models already outperform operational benchmarks, while NVIDIA's Earth-2 initiative is creating an ecosystem for global-scale digital twins that simulate weather in near real time. Increasingly, innovation in this sector is partner-driven, with companies aligning around ecosystems such as Earth-2 to integrate data infrastructure, model development, and application layers. Government partnerships are also derisking adoption, as national meteorological services begin testing AI models alongside traditional systems.

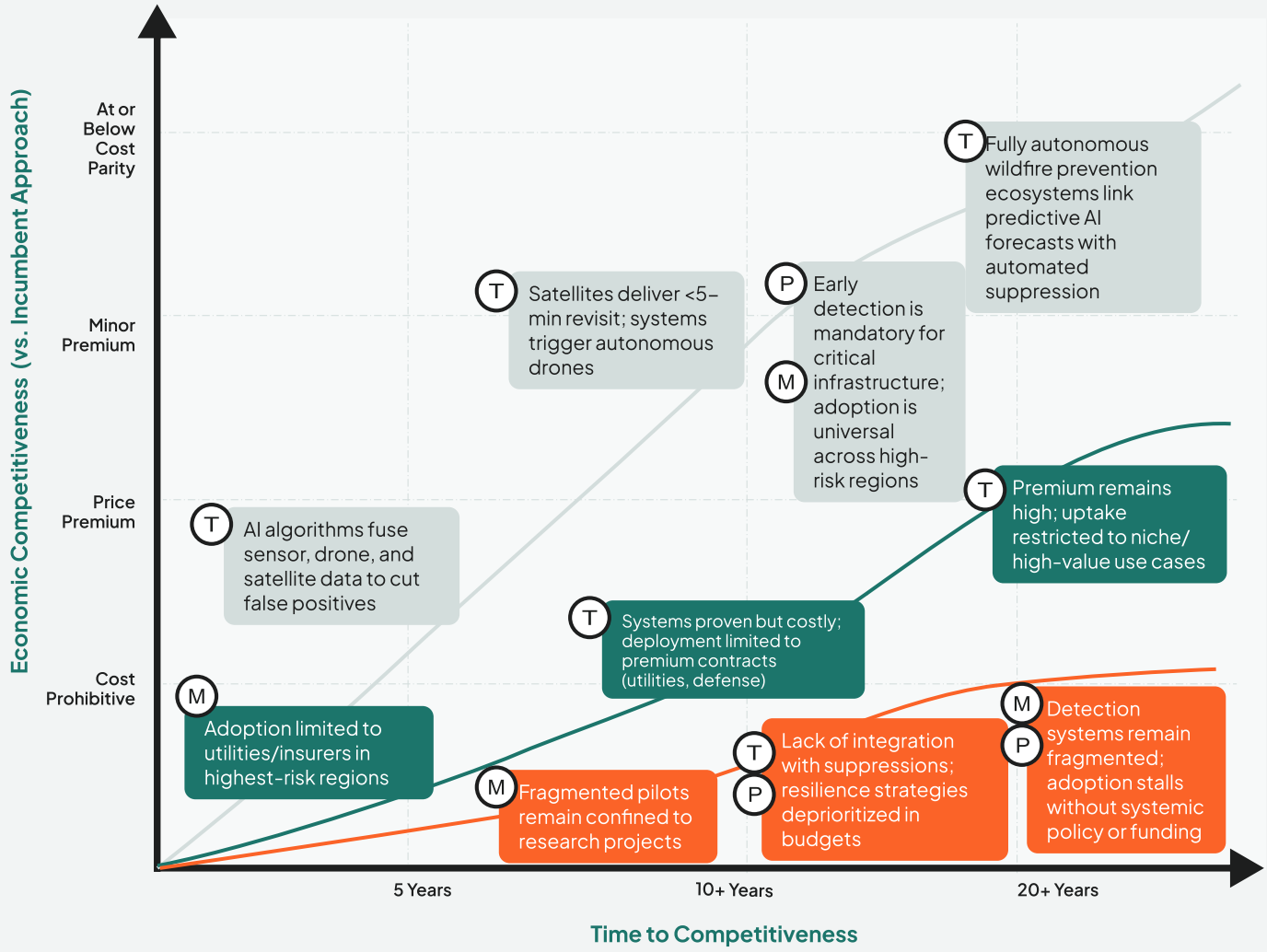
Over the next few years, expect the rise of integrated climate-risk platforms that pair predictive weather models with asset monitoring and insurance analytics. As climate volatility intensifies, the ability to predict and act on extreme weather will underpin nearly every sector of the resilience economy as we need to not only forecast the atmosphere, but the risks that it creates.

Wildfire Technology Progresses Towards Solution Stacking

Wildfire technology has moved from fragmented point tools to integrated resilience platforms that connect early detection, situational awareness, and suppression. Satellite operators like OroraTech and ICEYE have advanced orbital monitoring, while Dryad Networks and Pano AI have matured ground systems that alert within minutes of ignition.

These capabilities are now deployed in stacked configurations that combine sensors, cameras, AI models, and drones across detection, response, and recovery. The recent launch of Seneca from stealth exemplifies system stacking by linking detection, communications, and suppression in a single workflow. Suppression is where today's market gaps are most apparent.

Wildfire Early Detection Time to Competitiveness



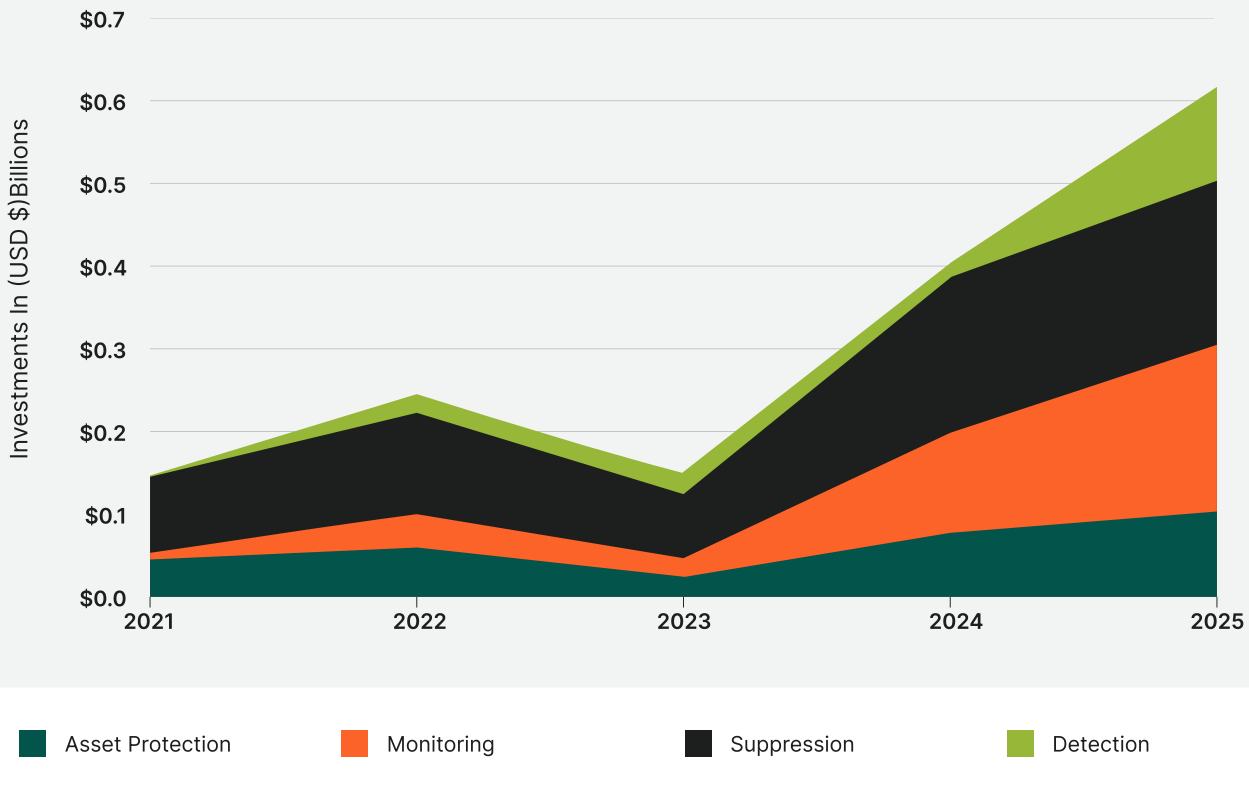
Aerial suppression is shifting from piloted aircraft to autonomous or semi-autonomous platforms that can fly in smoke, wind, and darkness. Ground robotics is moving into defined roles such as reconnaissance, hose handling, and perimeter work, placing machines in high-risk zones instead of placing people. Although the hardware is capital intensive, the avoided-loss logic is strong given multi-million-dollar incident costs and the broader economic toll of major fires.

If suppression is about speed, vegetation management is about scale. Two models dominate.

The first is data-led vegetation intelligence, which uses EO and AI to identify where to clear, trim, or plan prescribed burns. Companies such as Overstory and Gridware have built strong utility partnerships in this space.

The second model centers on mechanized treatment, led by innovators such as Burnbot, which brings precision and repeatability to fuels reduction and prescribed fire operations. These approaches are scaling quickly as insurers and utilities convert risk models into budget line items and as satellite and grid data improve the return on investment for vegetation analytics.

Venture & Growth Investments in Wildfire Tech, 2021-2025



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- The past year marked a clear acceleration across all wildfire technology types. Monitoring remains the largest and most consistent category, anchored by earth observation technologies that enable faster, more accurate insurance claims and post-event assessment, as illustrated by ICEYE's recent growth equity round.

- Detection and suppression are growing fast with momentum driven by advances in AI, automation, and sensing that make rapid detection and tasking feasible at scale. Utilities, insurers, and public agencies are increasingly prioritizing technologies that shorten the time between ignition and response, shifting capital toward solutions that can demonstrably reduce losses rather than simply monitor risk.

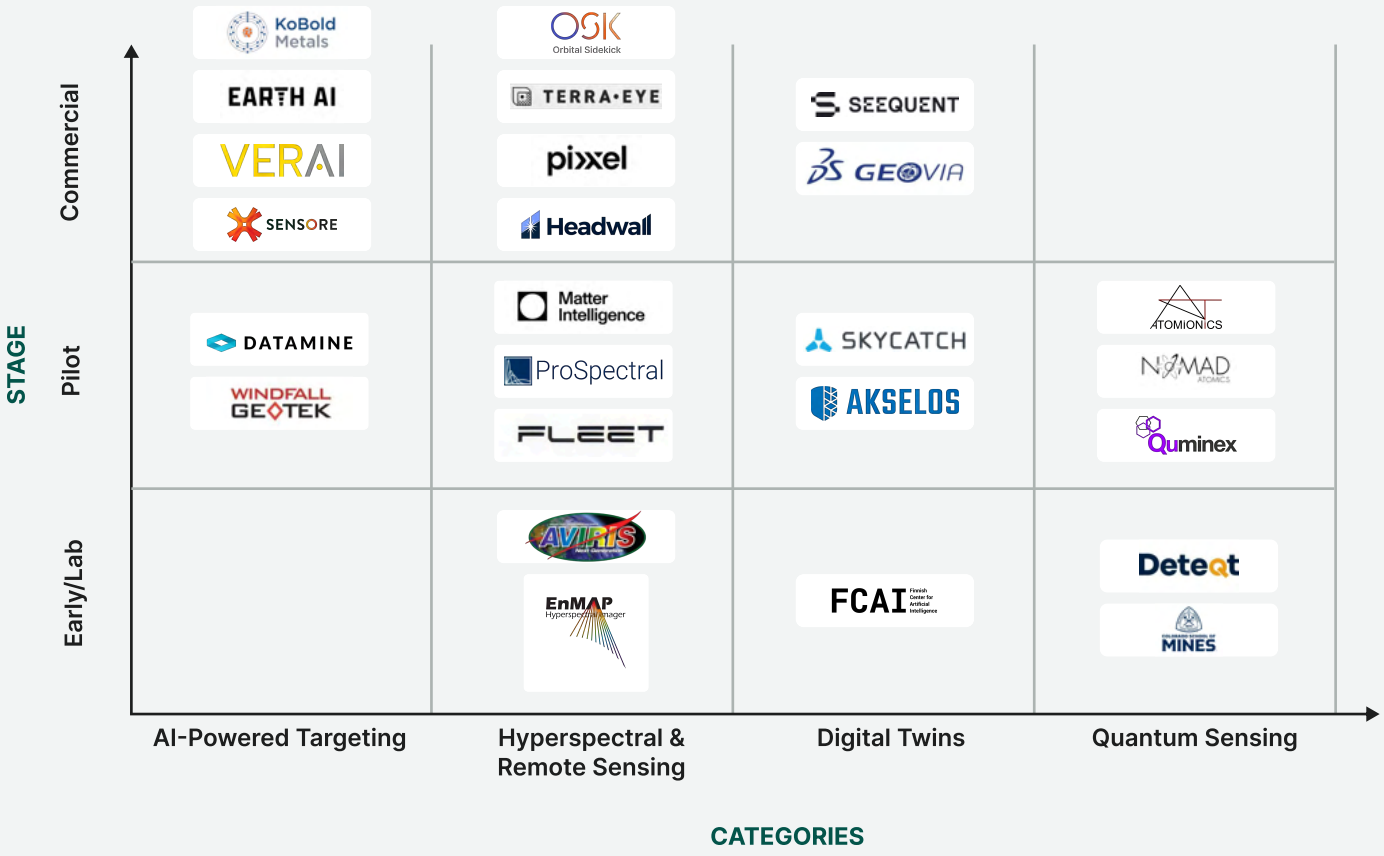
- Asset protection is scaling steadily as utilities and insurers work to harden infrastructure against escalating fire risk, with innovators such as Gridware, Overstory, and Rhizome emerging as market leaders. These companies stand out because they sit directly in utility and insurer workflows, translating risk signals into operational action. Their solutions combine persistent sensing, AI-driven prioritization, and clear ROI tied to avoided outages, regulatory compliance, and loss reduction. Going forward, asset protection solutions that integrate seamlessly with grid operations and risk models are likely to see the fastest adoption.

- Together, these trends point to a market maturing into an integrated ecosystem of prevention, response, and recovery solutions. The central question for buyers and investors is no longer whether the technology works, but how quickly it can be deployed across utilities, insurers, and public agencies.

AI & Digital Innovation Transforms Mineral Exploration

Beyond immediate risk response, digital innovation is also transforming how we manage Earth's resources themselves.

Exploration Technologies to Close the Demand- Supply Gap



Traditional exploration has long been a high-cost, low-probability pursuit, with greenfield projects historically facing odds of one in 5,000 for commercial success. Today, digital-first explorers are reversing those odds. AI-powered targeting and remote sensing are delivering drill success rates approaching 75%, compressing discovery cycles, and redefining the economics of mineral exploration.

This transformation is driven by the convergence of data fusion, automation, and advanced modeling. Tools like KoBold Metals' data-integration algorithms and Earth AI's predictive targeting platforms have set a new performance benchmark, emphasizing not only accuracy but also speed to discovery. Early results suggest potential cost reductions of up to 80% and exploration timelines shortened by a factor of four, with significantly less environmental disturbance.

While major players such as BHP, Rio Tinto, and Vale are pursuing internal digital innovation and supporting start-ups through accelerators, the most dynamic adoption is expected to happen among junior and mid-tier miners. These firms are more agile, constrained by labor shortages and permitting delays, and willing to trial new technology.

Investors are backing companies that combine technical performance with control of proprietary data and early access to high-potential resource assets.

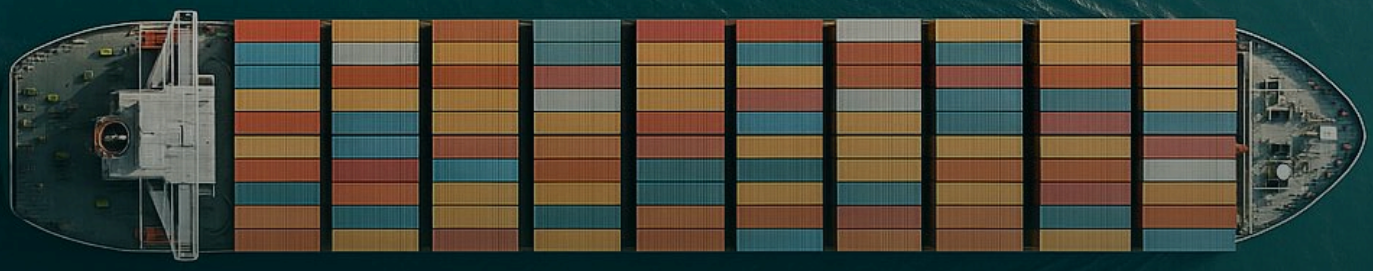
VerAI's Series B, for instance, exemplifies this strategy by turning AI insights into a diversified portfolio of mineral rights, blending technology and finance into a single discovery model.

Looking ahead, the next phase of disruption will center on quantum sensing (e.g., Atomionics from our Cleantech 50 to Watch list), digital twins, and predictive subsurface modeling that continuously refines geological understanding as new data is collected.

What to Watch in 2026

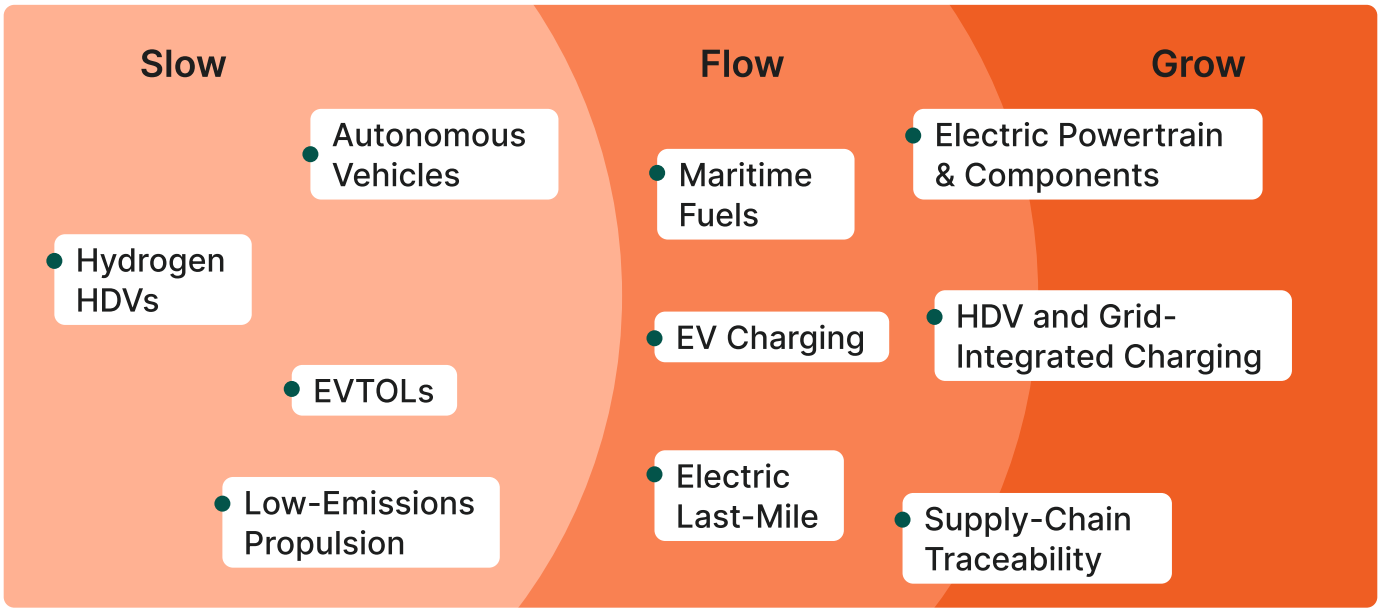
Watch for deeper integration across sensing, modeling, and response technologies as climate data becomes embedded in daily operations. The next wave of growth will favor platforms that merge observation with action, linking satellites, AI models, and automation into unified resilience systems. Future disruption will be driven by new data frontiers such as quantum sensing and digital twins, which promise to further close the gap between prediction and response.

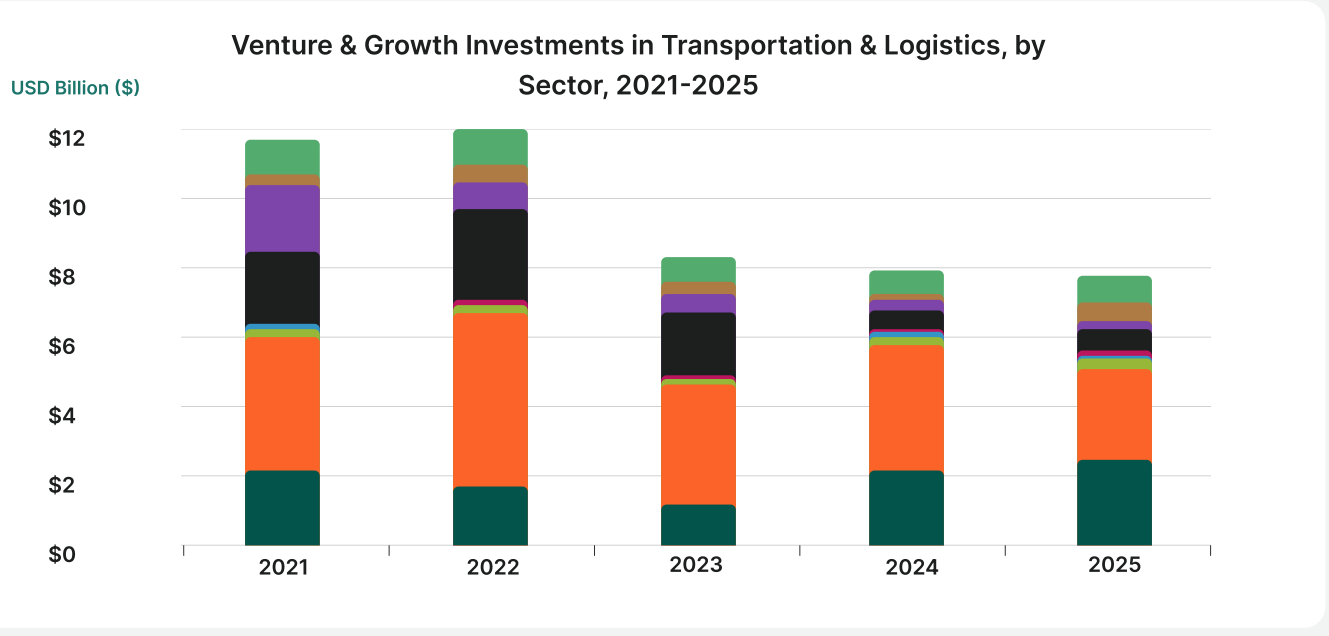
05 Transportation & Logistics



Nicole Cerulli
Associate, Cleantech Group

2025 Transportation and Logistics: Slow, Flow, and Grow





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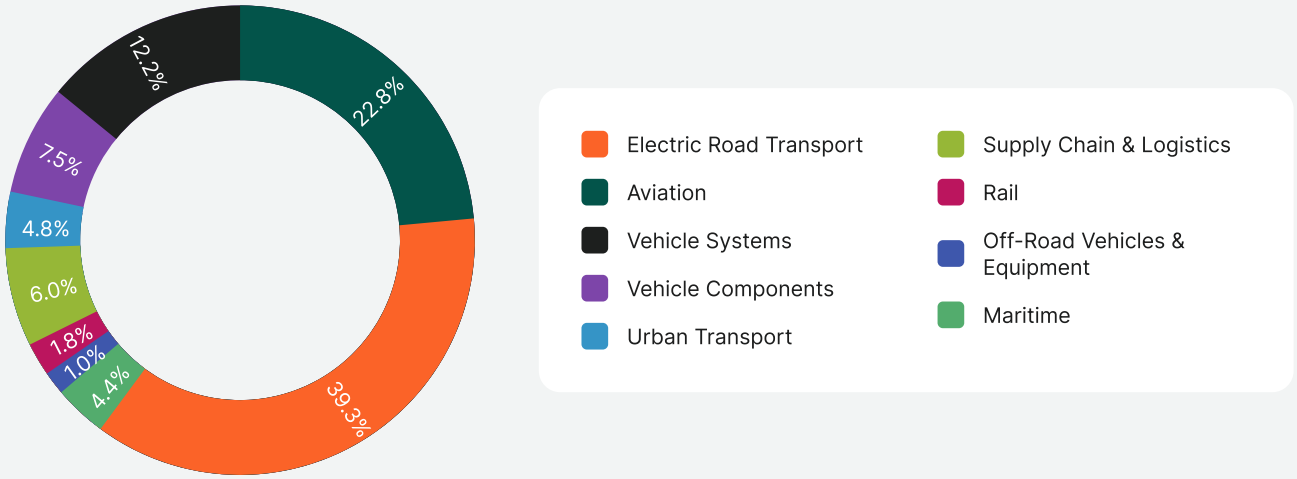
Venture & Growth Investments in Transportation & Logistics, 2025



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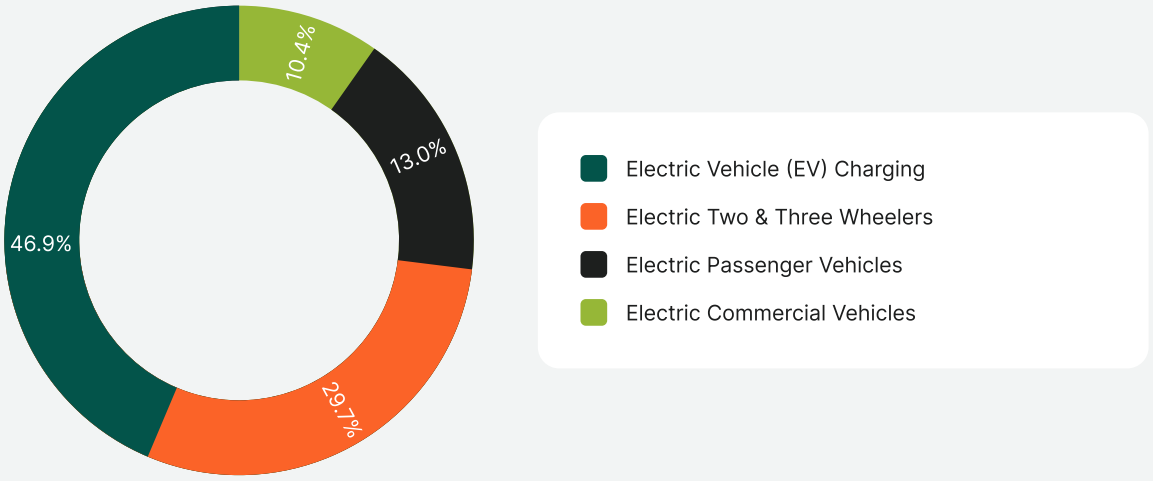
Total Investments in Electric Road Transport, 2025



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Overall Trends

Infrastructure and Deployment Key Challenges

VC and private investment have remained relatively steady from 2024-2025, $7.89B compared to $7.9B in 2024. However, there is a marked gap between VC-investable innovation and solutions with high climate impact. This divide has grown clearer since last year, when we noted the transition of the EV charging space from VC and private funding to institutional and infrastructure deployment.

2025 saw this trend expand beyond EV charging. Markets such as electrification of heavy-duty vehicles (HDVs) and low-emissions fuels continue to develop novel early-stage innovation supported by private investment, but commercially available solutions now require strong regulatory and institutional support to reach the market and impactfully scale.

The electric heavy-duty-vehicle market in China is a clear example of the role of institutional support for clean transportation. Strong regulatory and policy support, such as vehicle scrappage schemes, purchase incentives, and stringent emissions mandates for HDVs, low charging infrastructure costs, and complementary solutions such as battery swapping, underline high electrification rates of HDVs—notably over 98% electrification of city buses.

Slow

Hydrogen Vehicles: Increasingly Narrow Niche

Over the past two years we have seen the hydrogen-for-decarbonization bubble boom and then burst as upstream and value chain challenges impede cost efficiency. In 2025, the initial enthusiasm for hydrogen as panacea to all decarbonization challenges has transitioned to a search for key use-cases where hydrogen can fill gaps left by more cost-effective forms of power generation, energy storage, and electrification.

In the case of Transportation & Logistics, the use-case for hydrogen has become increasingly narrow. Battery electric vehicles (BEVs) have been clearly established as the winner for passenger cars, but in the past several years, HDVs remained a target market for fuel cell solutions. This was mainly due to how hydrogen vehicle solutions addressed key pain points to battery electric HDVs, mainly long charging times, cost and difficulty of charging infrastructure build-out, and limited range.

Despite the initial optimism, 2025 has seen BEVs secure the on-road HDV market as well. Both battery-electric trucks and buses have proven to be more cost-efficient for fleets in terms of up-front costs and charging/refuelling infrastructure deployment. Even in more developed hydrogen markets such as the transportation system in China, fuel-cell heavy-duty trucks make up less than 1% of new vehicles sold.

A forward-looking challenge for fuel-cell HDV uptake is battery swapping and the anticipated commercialization of megawatt charging. Megawatt charging would bring down HDV charging time to as little as 15-30 minutes, alleviating one of the key pain points and barriers to HDV fleet electrification, and eliminating a key advantage of fuel-cell HDVs. Similarly, battery swapping reduces recharging time to approximately five minutes and battery swapping networks are expanding particularly across the APAC region, including southeast Asia and Africa.

While hydrogen HDVs fall squarely in the "Slow" category and will not compete for cost or energy efficiency with BEVs for the general market, select, niche use-cases remain. Hydrogen is the most practical electrification solution for HDVs that must traverse difficult terrain where batteries perform poorly (mountainous regions, cold temperatures) and where charging infrastructure cannot be deployed.

Autonomous Vehicles: Tech Innovation, Regulation-Dependent, Limited Climate Impact

While robotaxis expand across the U.S. and continue to make headlines, autonomous vehicles as a decarbonization solution are stalling. Regulation is a major barrier to uptake for highly automated vehicles. A growing number of countries are developing frameworks for deployment and regulation, but few have been solidified and permissions vary within countries and across regions. Low support from the general public, high-profile accidents and lawsuits, questions about insurance and risk management, and strong opposition from unions and drivers also slow uptake.

Besides policy and market uptake, the sustainability case for autonomous vehicles is highly context- and use case-dependent. While autonomous capabilities increase vehicle and energy efficiency, autonomy in itself does not equate to decarbonization—a clear example is robotaxis themselves which may actually shift users from lower-emissions forms of transportation like public transport.

Meanwhile, use cases with a more likely climate impact (though it still remains uncertain), such as long-distance trucking and maritime, are stalled by lack of regulatory enablers. In the coming year, expect a proliferation of autonomy solutions, but a divide between autonomous solutions for decarbonization and autonomy for labor cost savings.

The cleantech applications for autonomy in transport and logistics will not stem from the deployment of fully autonomous vehicles but rather identifying systems, components, and use cases where autonomy can address inefficiencies or enable integration of parallel systems to reduce energy demand and emissions (e.g., cold chain and logistics optimization, EV charging and grid management, fleet management and renewable energy).

Flow & Grow

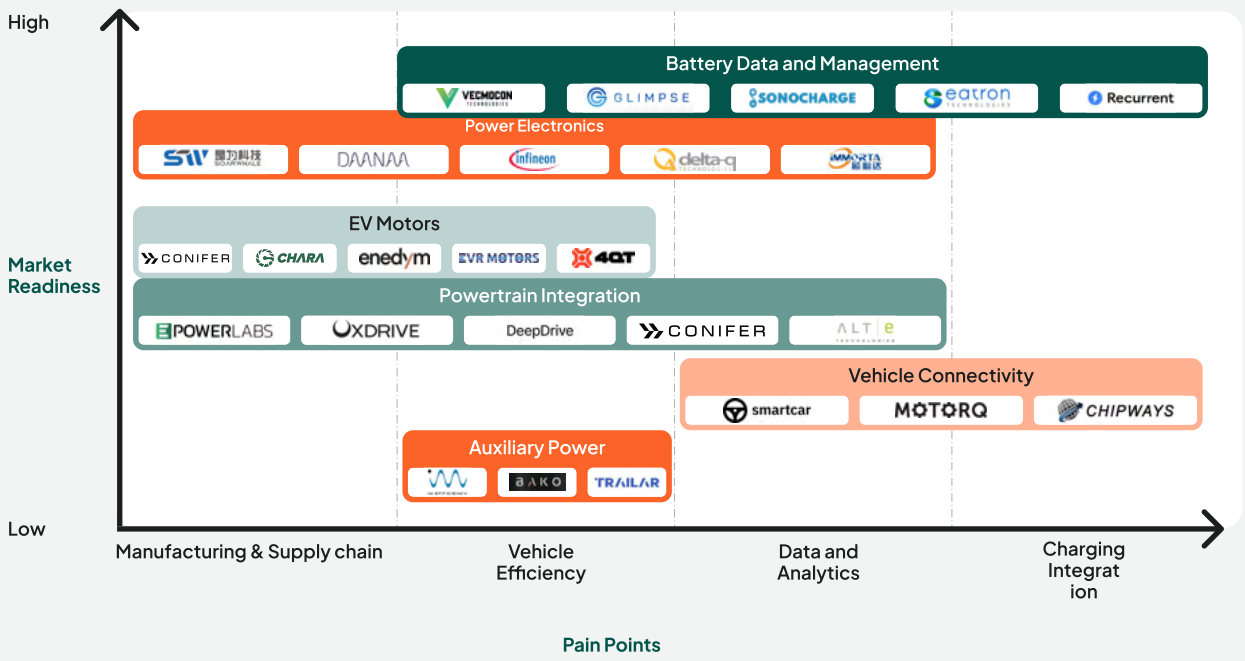
Vehicle Systems and Components

While adoption and climate impact of autonomous vehicles may be "slow," innovation and funding for software-enabled vehicle systems is certainly not. As the energy demand from electric vehicles increases exponentially and EV charging technology has reached maturity, the innovation and private investment focus has shifted from large-scale charging deployment to efficiently integrating the transport and energy sectors. Innovators are developing software-enabled vehicle systems and components to improve powertrain and battery efficiency and performance, enable smart- and grid-integrated charging, facilitate battery re-use and predictive management, and fleet electrification, charging, and routing.

EVs as Mobility & Energy Assets

Innovation in power electronics, battery analytics and management, and vehicle architecture aims to enable high efficiency design and manufacturing, increased vehicle energy efficiency and range, and lower end costs for consumers, a key barrier to uptake. Beyond efficiency, software-enabled vehicle systems and components aim to optimize the space where energy and vehicles overlap. Battery and vehicle data and analytics enable fleets and network operators to optimize vehicle use and maintenance, engage with secondary battery markets, inform charge station deployment, and facilitate smart charging and grid services.

Innovation in Vehicle Systems & Components



Practicalities for EV Adoption

Similar to EV charging, the EV market is mature, consolidated, and has little room for innovators. However, while EVs are commercially mature, the high cost for consumers, limited range, and reliance on often insufficient charging infrastructure remain barriers to EV adoption. There is an increasing demand for component innovation to fill these gaps and address the practicalities of EV deployment across a range of use-cases.

EV motor innovation is a key example of this trend: both innovators and auto OEMs are exploring motor design such as axial flux or reluctance motors, that eliminate or reduce rare-earth materials and offer performance improvements. These alternative designs reduce costs, improve energy efficiency, and establish secure supply chains, insulating developers from price volatility and potential supply chain disruptions.

2025 Roller Coaster of Cleantech Policy and Incentives

The past year saw strong regulatory and funding commitments at the national and international level, marking commitments to infrastructure build-out and market development of difficult-to-decarbonize sectors such as maritime, aviation, and heavy-duty vehicles. Notably, ReFuel EU Aviation and Maritime entered into effect at the beginning of the year, establishing SAF blending and maritime emissions intensity requirements. Across Europe, commitment to EV charging buildout and reduction of HDV emissions was solidified through the Alternative Fuels Infrastructure Regulation (AFIR) and HDV emissions performance standards. In the U.S., the 45Z Clean Fuel Production Credit came into effect, a key support mechanism for low-emissions fuel supply into maritime, aviation, and heavy-duty sectors.

These developments reflect the increasing institutional support for decarbonization, with national and international actors establishing mandates, incentives, and standards to buoy both demand and supply of low-emissions transport solutions.

Encouraging regulatory signals notwithstanding, the past 12 months ushered in a wave of funding cutbacks, delays, and policy reversals due to political pushback and economic slowdowns. The United States placed itself squarely in the vanguard of these climate-reversals; the gutting of the IRA and subsequent One Big Beautiful Bill Act froze a number of transportation programs and compressed incentive timelines such as EV charging and clean fuel credits. EV incentives and credits were rolled back in several more countries including Spain, Germany, Canada, and India, citing budget constraints and suggesting fiscal tightening and shifting political priorities. Meanwhile, the IMO Net-Zero Framework, though preliminarily approved in April, was delayed a year, postponing global carbon pricing and fuel standards. Looking forward, the impact of these delays and funding cuts will increase uncertainty and adoption risk of electric vehicles and low-emissions fuels, slowing momentum and the critical infrastructure build-out and institutional support necessary to drive sector-wide decarbonization.

Looking Forward

- As AI and autonomy become increasingly ubiquitous, innovators are finding use-cases where inefficiencies can be addressed for both economic and climate benefits. Spaces to watch include cold chain logistics, EV charging and grid integration, and battery management

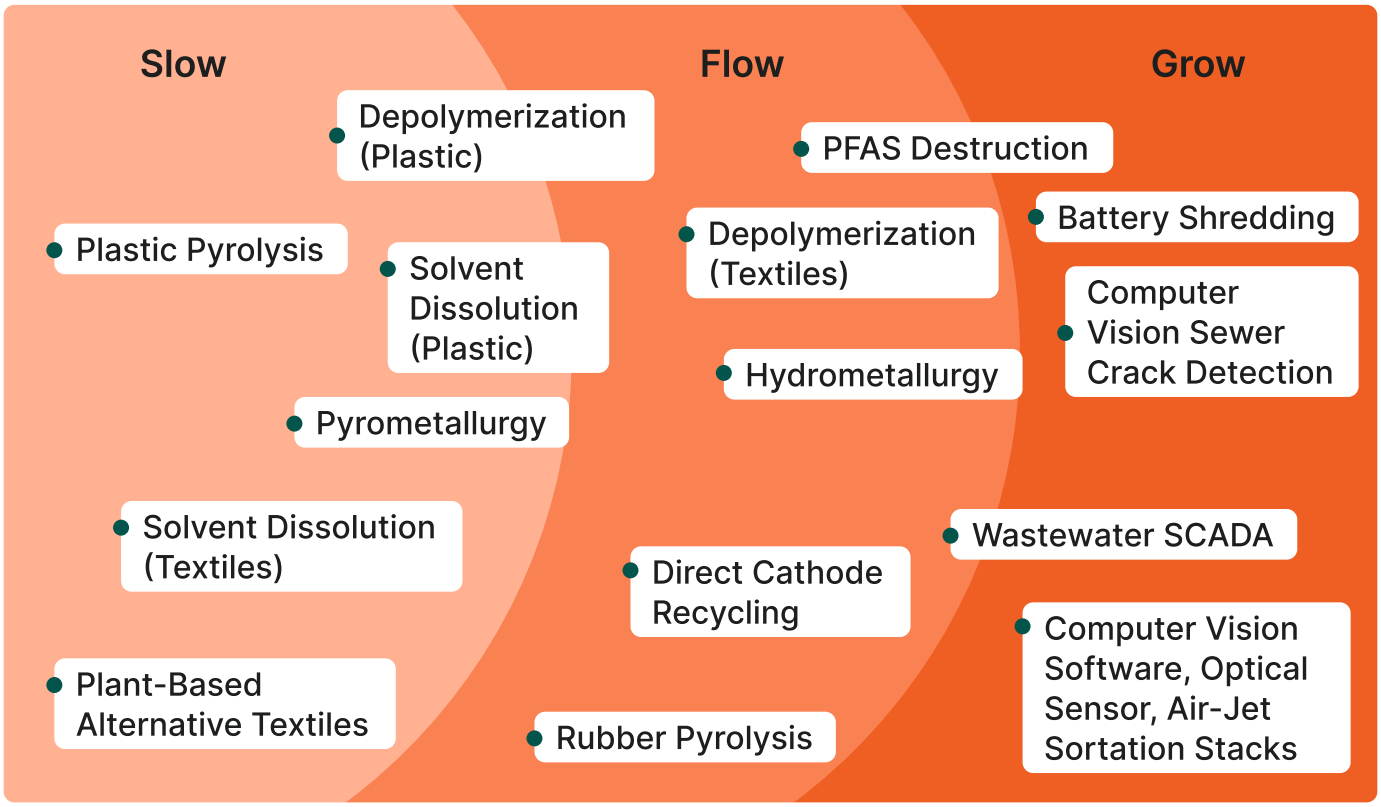
- Supply chain resilience and traceability:
  - Traceability regulations, mandates, and disclosures are looming across many industries, from batteries and chemicals to textiles and agriculture. Keep an eye on traceability innovators navigating both technology and market development.
  - COVID spurred a sector-wide transformation towards digital and resilient supply chains. As critical mineral challenges become more dire and geopolitical tensions rise, the coming years will see an increased emphasis on securing supply chains against potential disruptions.

- Aviation and maritime face an industry transition to low-emissions fuels. While regulation, infrastructure build-out, and institutional support are stalling, complementary fuel flexible solutions can be deployed immediately. We expect an increased role for these solutions (e.g., vessel and aircraft fuel efficiency solutions, low-emissions propulsion) to navigate decarbonization targets and emissions penalties.

06 Waste & Recycling

Parker Bovée
Associate, Cleantech Group

Commercial Wins Amid Market Challenges



Waste Innovation Finds Its Edge in a Lean Market

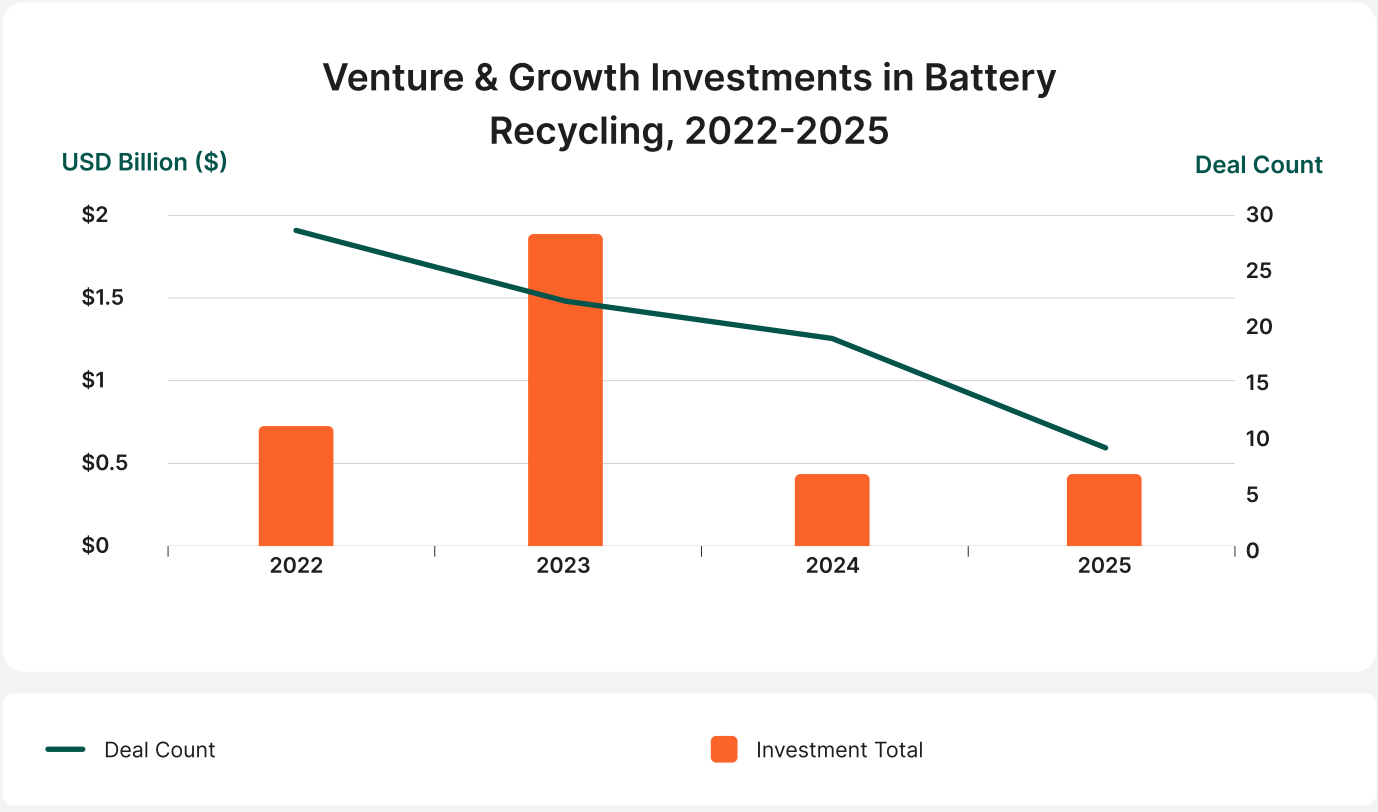
2025 was a year defined by profitability fears in waste management innovation. Seemingly transformative technologies in plastic, battery, and textile recycling appeared over-hyped and flawed. Yet, innovation in each waste stream is maturing commercially despite especially turbulent market conditions areas such as in battery waste. Software remains a crucial part of innovation in the waste sector. Wastewater analysis, sortation automation, and remote facility operation are all now commercially viable technologies that provide operators, cities, and governments direct savings on waste management and resource recycling.

The Silent Battleground: Battery & Metal Recycling

The long-anticipated mineral conflict between China and the U.S. has arrived. Export controls levied by China on the rest of the world are decreasing the supply of several rare earth minerals needed in magnet and battery manufacturing. These minerals are primarily used in defense, robotics, and energy applications. Retaliatory tariffs and GPU export restrictions from the U.S. government inflamed this already volatile market. Countries without domestic caches of rare earth are now scrambling to secure them through any means.

Hydrometallurgy, a technology borrowed from the mining industry, has become a key tool for the global recycling industry, capturing over 90% of market share for Electric Vehicle (EV) battery recycling and it is expanding rapidly into magnet recycling.

While a good technology fit in theory, hydrometallurgy has already failed in several commercial deployments such as Li-Cycle's recent bankruptcy and acquisition by Glencore. Venture investors, once excitedly pouring billions of dollars a year into recycling scale-ups, are tightening budgets and waiting to see which innovators can succeed in a volatile global and regulatory environment.



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From a policy perspective, the Biden administration pushed through a remarkable stimulus package for EVs and battery recycling. The current Trump administration is opting for a more direct approach of mining, with minimal support of EVs, even repealing subsidies and grants.

A recent Department of Energy grant will provide $134M to FOAK American battery recyclers, but this investment simply pales in comparison to similar efforts from the former administration.

European countries are exploring ways to incorporate battery recycling into existing automobile assembly facilities (Mercedes Benz) but regulators stifle innovators' market presence with excessive regulation. India and South Korea are also developing mature supply chain and technology stacks to supply their EV industries.

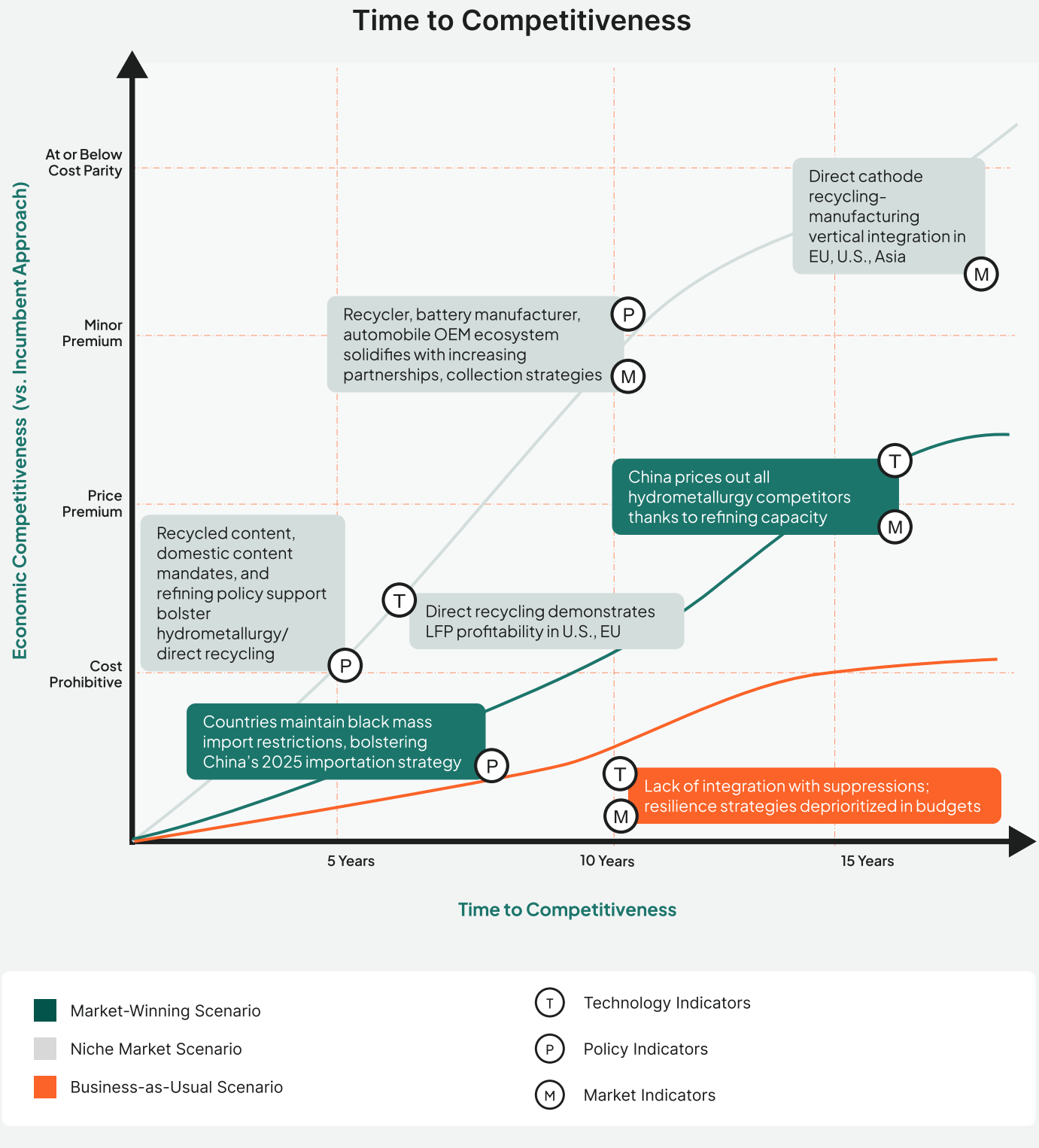
Yet, very quietly, black mass, the shredded battery recycling feedstock, is rising in global trade importance.

China lifted black mass import bans, opening the most efficient metal recycling market in the world to global importation. Both the European and American markets will be forced to limit exports of black mass to support their domestic recycling industries.

Without these bans or support for vertical integration, the American and European recyclers, already struggling to secure reliable and high-quality feedstock, will fail due to undercapacity issues.

Competition is simply not possible in current economic models. Innovators producing their own black mass like Blue Whale Materials or heavily investing in their supply chains like Cyclic Materials, will position themselves for extended success should black mass protections lapse, but these will be temporary success stories.

With battery/magnet recycling already a focus of national security for the U.S. and EU, black mass must become a policy focus for this sector to survive outside of China.



Hydrometallurgy remains the market leader across all geographies mentioned last year, but direct recycling now offers a commercially maturing version of battery recycling that can eliminate refining. Attempts to rapidly modernize American and European refining, a key technological blind spot, come from innovators Nth Cycle and SiTration. The U.S. National Laboratory and U.S. University system have been tremendously effective at producing innovative solutions in this area.

AI, Assets, and the Next Phase of Wastewater Modernization

Wastewater extended a promising 2024 into strong growth on two fronts in 2025: software and novel physical assets. The emergence of artificial intelligence is improving private and public operational efficiency, providing savings that stack up over time and immediately. Novel physical tools are more diverse, including nature-based assets, modularity plays, and traditional manufacturing growth. Importantly, these developments are distributed globally, with emerging technological trends in urban and rural settings.

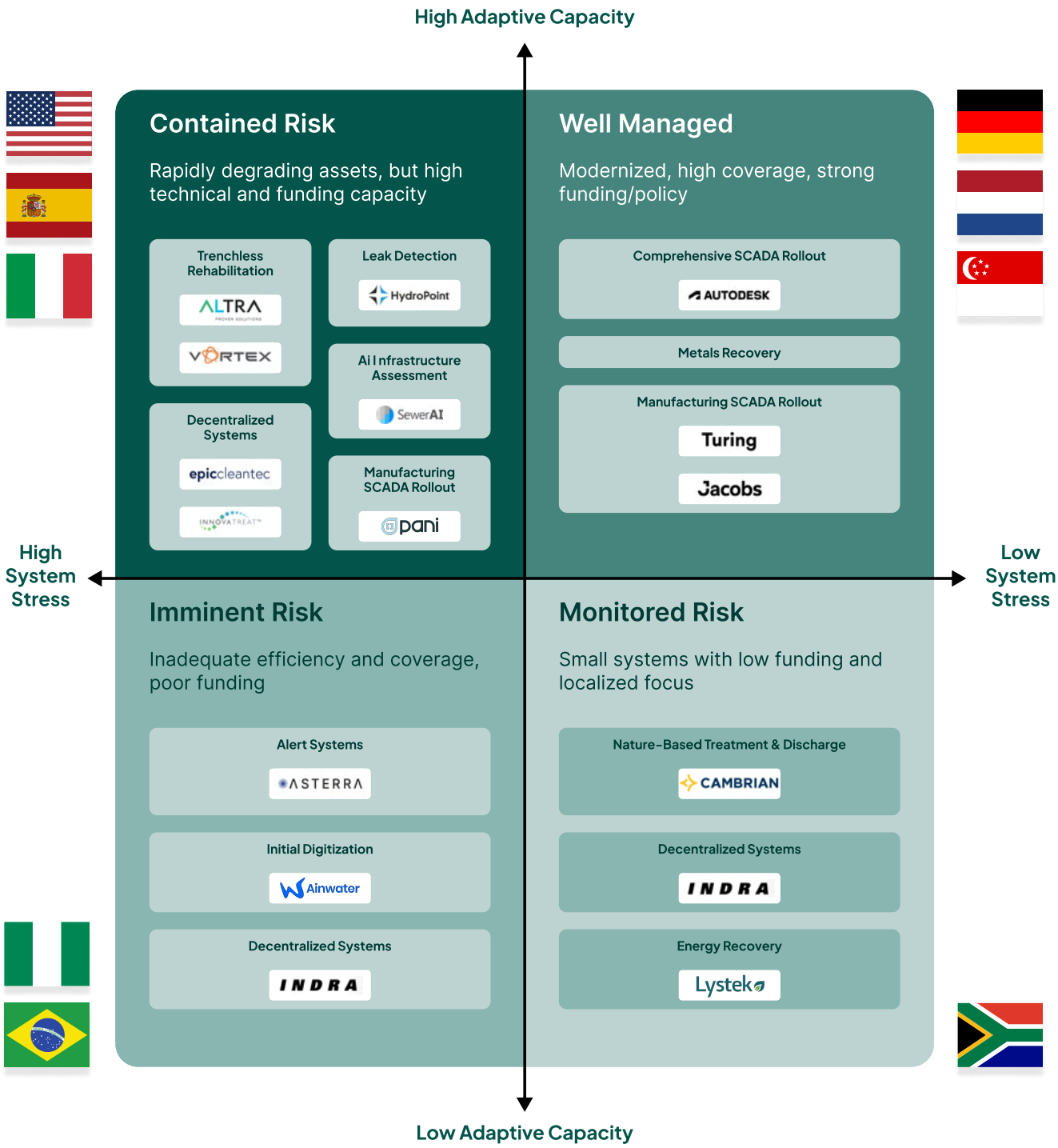
Software's use remains a problem in many public wastewater operations. While innovators like Pani and Transcend have worked with public sector clients, regulatory delays and low budgets prevent rapid innovation uptake despite clear cost savings. Despite this, innovation is penetrating the public sector, with successful pilots in Illinois and California water districts. Private sector operators concerned with PFAS, poor data collection, and automated operation can modernize operations with digital planning and sensor deployment, providing ample data for an operations specialist to mobilize into insights.

An accelerating physical solutions subsector was unexpected. Expanding nature-based assets remains a strong point of growth in Europe where plants are now deployed as an asset in waste streams.

Hyperaccumulating algae, in the case of Gross-Wen, has proven a fantastic means to extract valuable and toxic byproducts from public and private wastewater clients. Meanwhile, Indra Water remains India's forefront water innovator with sustained efforts to reshape the country's current poor rural water quality standards.

Emphasizing small community deployments, the company is rapidly improving quality of life and expected unit-economics for Indian communities and governments. Finally, Aquafortus remains on the technological cutting-edge in its deployment of high-salinity wastewater treatment systems while reverse osmosis membrane manufacturer Aqua Membranes is introducing the technology to the North American market.

Wastewater Technology Market Fits



Innovation Opportunity High Low

Rearchitecting Waste Sortation: Sensors, Software, and Facility Retrofits

Sortation faced a daunting commercialization challenge this year. Investors were unwilling to overcommit to unproven robotic automation and software stacks. Much of this hesitancy stems from profitability concerns raised by AMP, once the commercial leader in American waste robotics, who questioned if "robotics-as-a-service" could ever be a viable business model. Moving past the last decade focused on robotics two core technology themes emerged: sensor-based computer vision and full facility retrofit plays.

Computer vision, an artificial intelligence field training cameras and sensors to interpret visual data, is the underlying technology powering all automated sortation systems. Carefully tailored by software engineers, algorithms learn to identify materials, contamination, and approximate value to maximize sortation efficiency and profitability. As seen in the diagram on the next page, algorithms are not preprogrammed with optimal operational savings; they require extensive data input to inform decision making. Once accurately tuned (a period of months to a year), the solution is exceptionally sticky with high customer retention and OPEX efficiency.

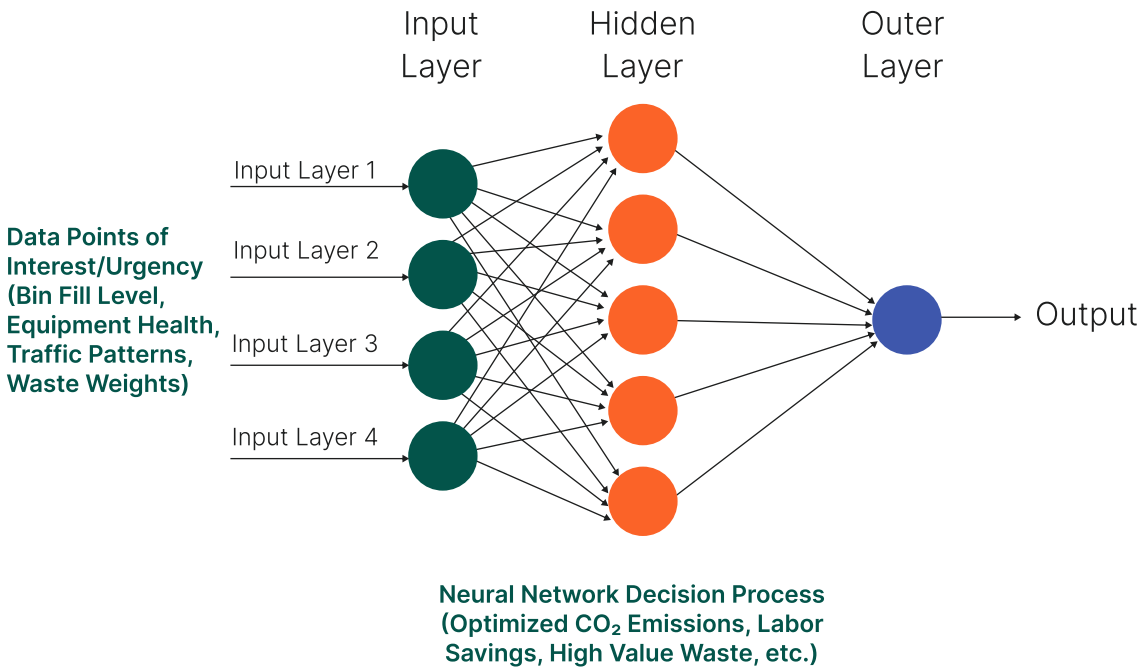
AMP was a real first innovator in this space through robotic arm deployments across the U.S. Perhaps the best example of deploying these software solutions, though, is Greyparrot, an analytics company promising profitable operational analysis for well-collected data.

Interestingly, an additional winner in this space is a ubiquitous tool: compressed air. Early adopters of computer vision, air-jet systems are targeting thin metals, plastic, and paper with exceptional speed and efficiency improvements. Radically changing OPEX, these technology pairings are inevitably going to automate manual sortation.

Here is where AMP decided against a pure robotics play in favor of full Material Recovery Facility (MRF) renovation. AMP no longer sells robotics as an outright product but integrates them alongside Greyparrot-like software and data analytics as a part of larger facility renovations. Customers here include large or mid-sized commercial MRF operators/owners. AMP is open to most waste streams, as their expertise in robotics will prove highly valuable in heavier items.

Sortera is taking data-informed computer vision classification on metals to a new steam, sheet and scrap aluminum waste. First shredding metals to reduce the weight of each piece, Sortera then sorts metals by alloy composition. Providing high-purity metal, the start-up is working with government partners and melters to reduce waste processing time and cost. A strategic blindspot globally, Sortera's alloy sortation may prove transformative as EVs and data centers redefine existing aluminum demand.

Simplified Architecture for AI-Informed Waste Sorting Decision: Two Layer Neural Networks



Less Capital, More Results: Waste's Commercial Shift

The waste sector saw significant slimming this year. Start-ups struggled, potentially failed, or were acquired in quiet transactions. But simultaneously, several sectors achieved remarkable, tangible success like increased deployments, customer retention, or full commercial launches. 2025 was not an eye-popping investment year; it was a year defined by commercial expansion and technological validation testing across the sector.

Global Cleantech 100

07 2025 Graduates

The 2025 Global Cleantech 100 Graduates

Global Cleantech 100 Graduates are companies who have been included in the Global Cleantech 100 at least once, since the first edition in 2009, and then go on to be acquired or become a public company.The cut-off date for graduation events each year is September 30 (as that is the date the list gets struck each year).The past 12 months (October 1, 2024-September 30, 2025) has been a very fallow period for exits in cleantech, certainly ones with any kind of positive flavor. The activity around Global Cleantech 100 alumni, companies who have been on at least one past list since 2009, is testament to that.

We were already in a painful adjustment period required after the overly-hyped and hot investment markets of 2020-2021, which included the "SPACmania" period we commented on last year.This year, we are dealing with the knock-on effects of the Trump administration's assault on all things green, and its dismissal of the climate crisis as an issue. This of course has a chilling effect on capital flows and transactions, and generally speaking, it has deprioritized it as a first order issue across the world. We have to tell the story and deal with the world as it is, versus how we might wish it to be.

This has been a year of increasing bankruptcies and past darlings, past Global Cleantech 100 companies, have, of course, been amongst them.

Here are 3 examples (the years indicate when the company was on the Global Cleantech 100 list):

- **Lilium (2018, 2019, 2020):** The German electric aircraft manufacturer, filed for insolvency in February 2025, after failing to secure necessary funding and government loan guarantees.

- **Plenty (2018, 2019, 2020):** The indoor vertical farming platform company, announced in May 2025 that it had successfully emerged from Chapter 11, after its plan of reorganization reported a 90% reduction in valuation, focused on strawberries, was confirmed.

- **Ynsect (2017, 2018, 2020, 2021):** The French insect protein start-up filed for insolvency in February 2025, to sell off parts of the business.

This year has also seen activity around Global Cleantech 100 alumni companies who already had an initial graduation event.

The three examples below speak to the long life-cycles companies can have, irrespective of whether the initial investors were successful or not:

- **Cpower (2009, 2010):** As part of its plans to meet the need for more supply, especially to meet data center demand, NRG Energy acquired the virtual power plant company CPower, from LS Power (who had acquired the company in 2018). Cpower has roughly 6 GW of capacity across 2,000 commercial and industrial customers, across deregulated markets in the U.S. Grid flexibility will be needed to handle the demand growth.

- **Descartes Labs (2019, 2021):** In October 2024, EarthDaily Analytics acquired Descartes Labs to extend its earth observation offerings into Descartes Labs' established insurance, energy, mining, and U.S. defense and intelligence business segments. That was two years after private equity firm Antarctica Capital had acquired a controlling stake in the company.

- **Li-Cycle (2020, 2021):** In August 2025, Glencore acquired the key assets of bankrupt battery recycler Li-Cycle through a credit bid, integrating Li-Cycle into its battery materials business to bolster its supply chain presence. This acquisition followed Li-Cycle's financial struggles, after the high of its IPO (via SPAC) in August 2021, when the company had achieved a valuation of approximately $1.5B.

Unicorns

We have a rule, whereby companies who have appeared on one of the credible, publicly available unicorn lists (as having a valuation in excess of $1B), or where such is cited in an article from a credible source, or where it simply stands to reason by the size of a round–can no longer qualify for the Global Cleantech 100.

Valuations in the early 2020's had meant more leading private cleantech companies each year who might otherwise have made the Global Cleantech 100, were no longer able to do so. That valuation trend has slowed markedly, as market excitement has shifted elsewhere, predominantly of course, to AI.

That said, there are companies who can massively benefit from the AI era–the best example being our 2025 North American Company of the Year, Fervo Energy, who has joined the unicorn ranks.

- Fervo Energy (a Global Cleantech 100 company in 2022, 2023, 2024, and 2025) has recently raised a $462M over-subscribed Series E round, to advance its deployment plans. Energy markets are demanding dependable, carbon-free power at an unprecedented scale, and Fervo's geothermal power, based on its innovations in drilling, is in high demand.

- The only other Global Cleantech 100 alumnus company we identified as having reached Unicorn status this year was Harbinger (Global Cleantech 100 in 2024 and 2025). Founded in 2021, California-based Harbinger designs and manufactures chassis for electric commercial and specialty vehicles, designed to support all popular medium-duty body types, including commercial walk-in vans, recreational vehicles, box trucks, and others. Its 2025 momentum is evident in having announced both Series B and Series C rounds, the latter $160M round announcement included an initial order for EVs from global delivery giant FedEx, who also co-led the financing round.

Beyond Global Cleantech 100 alumni, two other cleantech unicorn events caught our attention:

- One was Texas-based Base Power's October 2025 $1B round, noting that this company was only founded in 2023. The start-up offers domestically made battery systems to homeowners that can be used as a backup for a monthly fee and sells stored power to utility networks during peak demand.

- Firmus Technologies, founded to "rethink how AI infrastructure is built, deployed, and run"was listed on our 2025 APAC 25 list in April. It recently announced a $330M raise from investors including Nvidia, which values the Singapore-based business at $1.9B. With its focus on sustainable data technologies, including immersion cooled data center platforms, the company is in a sweet spot and has impressive momentum right now.

There are always companies and segments within the global cleantech landscape doing well and experiencing tailwinds, but it is critical for the next generation of funds to be raised, that the overall poor exits picture for clean technology companies starts to change.

Global Cleantech 100 Hall of Fame

The Global Cleantech 100 Hall of Fame was created to recognize the achievements of the few companies whose sustained excellence over many years resulted in being on the Global Cleantech 100 list an impressive seven times. To maintain the support of a strong percentage of investors and technology scouts in the market year-over-year is a great achievement.Once inducted into the Hall of Fame, companies will not be featured on any future editions of the list. We will, of course, continue to keep a close eye on them, as we do all our alumni.

This year, two more companies have reached that milestone and are accordingly inducted into the Global Cleantech 100 Hall of Fame. They have both been past winners of our North American Company of the Year award (AMP in 2022, Boston Metal in 2023).

- **AMP:**
  A pioneer in seeking to transform the economics of recycling via waste sorting AI-guided robotics, computer vision, and deep learning, first appeared on the Global Cleantech 100 in 2020 and has been a mainstay ever since. Over that time, it has pivoted towards a full facility retrofit and optical sortation integration approach, underpinned by a recurring revenue model.

- **Boston Metal:**

  A pioneer of a molten oxide electrolysis (MOE) technology for steel making and other critical metals, has also been on the Global Cleantech 100 every year, starting from 2020. It has a facility in Brazil using MOE to prove out its technology and cost model in recovering high-value materials like niobium, tantalum, and tin from mining waste.

Hall of Fame

Inducted January 2026

AMP

BOSTON METAL

Previously Inducted

AutoGrid

avantium

CARBON CURE

chargepoint

DIGITAL LUMENS

enbala

GaN Systems

kebony

LanzaTech

minesense

ORGANICA

OSTARA

PROTERRA

SKELETON TECHNOLOGIES

sunfire

Svante

tado°

TENDRIL

VESTARON THE POWER OF PEPTIDES

2025 Global Cleantech 100

08 About Cleantech Group

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We help leaders cut through the noise, spot what's coming next and connect with the right partners to move from insight to action.

We're on the ground where cleantech innovation is shaping the future, bringing local knowledge and global perspective to every connection and insight we deliver.

Our insight is built on over 20 years of human intelligence, proprietary data, and direct relationships with the ecosystem leaders driving change.

- Market Intelligence
- Innovation Advisory
- Advocacy
- Events

More than access—membership delivers clarity, connections, and confidence.

Cleantech Group

09 Expert Panelists

78 leading specialists who focus on early-stage start-ups globally provide their inputs into the process.

Christian Hernandez Partner & Co-Founder 2150	**Lynn Murray** Scouting & Research Lead 3M Element - New Growth Ventures	**Nigel Carr** Director Acario Innovation (Tokyo Gas)
Paul Jordan Partner Activate Capital Partners	**Greg Fleming** Investment Director Air Liquide Venture Capital - ALIAD	**Charlie Clark** Manager AP Ventures
Jiten Manglani Managing Partner & Chief Investment Officer Aqualateral	**Cory Steffek** Partner Ara Partners	**Bruce Niven** Chief Investment Officer Aramco Ventures
Chris Thomas Managing Partner & Founder Assembly Ventures	**Fabio Lancellotti** Partner Aster Capital	**Ernst Sack** Partner Blue Bear Capital
Erin Huang Investment Analyst bp Ventures	**Steve Kloos** Partner Burnt Island Ventures	**Shirley Speakman** Managing Partner Climate and Sustainability Venture Funds Business Development Bank of Canada

Ludwig Goris
Partner
Capricorn Partners

Alfred Lam
Partner
Chrysalix Venture Capital

Arjune Shukla
Senior Investment Associate
Circularity Capital

Felicity O'Kelly
Director
Climate Investment

Aly Bryan
Investor
Closed Loop Partners

Min Zhou
Co-Founder & CEO
CM Venture Capital

Tanuj Dutta
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Congruent Ventures

Andrée-Lise Méthot
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Earl Jones
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Decarbonization Partners

Kathleen Jurman
Technology Scout Corporate Ventures
Dow Ventures and New Business Development

Dr. Paul-Josef Patt
Managing Partner & CEO
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Sasha Brown
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Ecosystem Integrity Fund

Frederico Gonçalves
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Innovation Leader
Eneco

Kei Morita
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Ashwin Shashindranath
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Hyundai Motor Company

Grant Allen
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I Squared Capital

Diego Díaz Pilas
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