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2027 Environmental Investment Outlook

The Environmental Investment Opportunity

Capital • Infrastructure • Natural Resources • Technology



$3.4T
Global Energy Investment in 2026
Source: International Energy Agency (IEA), 2026

$2.2T
Clean Energy Investment in 2026
Source: International Energy Agency (IEA), 2026

$106T
Global Infrastructure Investment Needed by 2040
Source: McKinsey Global Institute, 2025

$200B
Global Infrastructure Fundraising in 2025
Source: McKinsey, 2026

SEPTEMBER 2026

IDEAS | INSIGHTS | OPPORTUNITIES

2027 Environmental Investment Outlook

The Environmental Investment Opportunity

Capital | Infrastructure | Natural Resources | Technology

From the Founder

"Environmental investing is evolving beyond a theme and becoming part of the real economy. The opportunities we see today extend across farmland, energy, water, infrastructure, natural resources and emerging technologies—and increasingly across both public and private markets.

We created this Outlook to look beyond the environmental story and examine where real economic value, investment opportunity and measurable environmental outcomes intersect. My hope is that it helps investors better understand this growing investment universe, ask better questions and ultimately make more informed decisions about where they choose to put their capital."

— John E. Collins Jr.
Founder, Ecolence

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Executive Summary

Environmental investing is entering a period in which the investment story increasingly extends beyond publicly traded companies and traditional ESG strategies.
Across energy, infrastructure, agriculture, water, natural resources and environmental technology, substantial amounts of capital are required to build, modernize and operate the physical systems that support the global economy.

For investors, this is expanding the environmental investment universe.
Opportunities can increasingly be found not only in public equities, but across **private equity, private credit, infrastructure, real assets, farmland, venture capital, private funds and individual projects**.
The central theme of the **2027 Environmental Investment Outlook** is therefore straightforward:
Environmental investing is increasingly becoming an investment in the physical economy.
Solar facilities must be constructed. Electrical grids must be expanded. Water systems must be modernized. Farmland must remain productive. Waste must be processed. Natural resources must be managed. New environmental technologies must be financed and commercialized.
Each requires capital.

A Capital-Intensive Transformation
The scale of investment taking place across some of these markets is significant.
The International Energy Agency estimates that worldwide energy investment will reach approximately **$3.4 trillion in 2026**, an increase of about 5% from 2025. Approximately **$2.2 trillion** is expected to flow into renewables, nuclear, electricity grids, storage, low-emissions fuels, energy efficiency and electrification—nearly twice the amount expected to flow into oil, natural gas and coal. IEA
Infrastructure represents an even broader capital requirement.
McKinsey estimates approximately **$106 trillion of cumulative infrastructure investment may be required globally through 2040**, including roughly $23 trillion for energy and power, $6 trillion for waste and water infrastructure and $5 trillion for agriculture. McKinsey & Company
Private markets are responding. Global infrastructure fundraising reached a record of nearly **$200 billion in 2025**, almost 60% higher than in 2024. In McKinsey's survey of approximately 300 global limited partners, 51% indicated plans to increase infrastructure allocations during the following three years. McKinsey & Company
These figures do not mean every environmental sector—or every investment within them—will benefit equally. They demonstrate something more fundamental:
The physical economy requires substantial investment, and private capital is increasingly participating in its financing.
Beyond Energy
Energy is only one component of the environmental investment landscape.
Agriculture represents another enormous real-asset market. USDA estimates that U.S. farm real estate accounted for approximately **$3.67 trillion**, or 83.6%, of total U.S. farm assets in 2025. Average U.S. farm real-estate value reached **$4,350 per acre**, 4.3% higher than in 2024. Economic Research Service
Natural capital presents a very different picture.
UNEP estimates annual investment in forests would need to increase from approximately **$84 billion in 2023 to $300 billion by 2030** to meet the objectives evaluated in its *State of Finance for Forests 2025*. Yet private forest finance totaled only approximately $7.5 billion in 2023. UNEP - UN Environment Programme
That gap is important.
It demonstrates why **environmental need should not be confused with investable opportunity**.

A sector may require hundreds of billions of dollars without necessarily offering investors appropriately structured, economically viable opportunities at the same scale.
That distinction will be a recurring theme throughout this report.

1. The Environmental Investment Landscape

From Environmental Themes to Investable Assets

For many investors, environmental investing historically meant investing in publicly traded companies associated with renewable energy, clean technology or sustainability.
That universe remains important.
But it does not capture the full range of assets required to operate and transform the environmental economy.
Consider what sits behind many environmental objectives:

Land
Power generation
Transmission infrastructure
Battery storage
Water systems
Agricultural infrastructure
Forests
Recycling facilities
Waste-processing facilities
Environmental monitoring systems
Technology companies
Industrial facilities

These assets exist largely outside a stock-market screen.
Some are owned by private companies. Others are held by investment funds, infrastructure vehicles, real-estate structures or project companies.
That distinction changes the way investors can think about environmental investment.
Instead of asking only:
Which environmental companies can I invest in?
the question becomes:

Which assets, businesses and projects comprise the environmental economy, and how can capital participate in them?

The Emerging Environmental Investment Universe

For purposes of Ecolence Research, we divide the environmental investment universe into several interconnected areas:

Sustainable Agriculture & Farmland
Productive farmland, agricultural infrastructure, regenerative agriculture, irrigation, precision agriculture and agricultural technology.
Clean Energy & Power
Renewable generation, storage, grids, electrification and supporting infrastructure.
Water
Water treatment, wastewater, irrigation, conservation, desalination, monitoring and water technology.
Natural Capital
Forestry, ecosystems, biodiversity, conservation and restoration.
Carbon & Environmental Markets
Carbon credits and other developing environmental commodities and market mechanisms.

Circular Economy
Recycling, resource recovery, waste-to-value, sustainable materials and related infrastructure.
Environmental Infrastructure
Physical assets supporting water, waste, energy, resource efficiency and environmental services.
Climate & Environmental Technology
Software, artificial intelligence, sensors, satellite intelligence, environmental measurement and technologies supporting the environmental economy.
These markets frequently overlap.
A sustainable farm may employ environmental technology and water-management infrastructure.
A renewable-energy project may require battery storage and grid infrastructure.
A forest investment may involve timber revenue, land appreciation, biodiversity objectives and carbon markets.
A recycling facility may combine infrastructure, technology and commodity exposure.
Environmental investing should therefore not be viewed as a collection of isolated industries.
It is better understood as an **interconnected investment ecosystem**.

The Infrastructure Connection
One of the most significant developments is the increasing overlap between environmental investing and infrastructure.
McKinsey estimates that energy and power will require approximately **$23 trillion** of cumulative infrastructure investment through 2040. Waste and water infrastructure represents another estimated $6 trillion, while agriculture represents approximately $5 trillion. McKinsey & Company
Private capital is already playing a significant role in the broader infrastructure market. Infrastructure fundraising reached nearly $200 billion globally in 2025, while energy and power represented nearly half of infrastructure deal value during the year. McKinsey & Company
This has implications for how environmental investment may evolve.
The next phase may be less about labeling companies as environmentally responsible and more about financing **assets capable of producing, transporting, conserving, processing or measuring essential resources.**

Real Assets Meet Technology
At the same time, physical assets are becoming increasingly connected to technology.
Agriculture is incorporating satellite imagery, artificial intelligence, sensors and precision equipment.
Energy systems increasingly depend on software, forecasting and digital management.
Water infrastructure is adopting monitoring and leak-detection technologies.
Environmental markets require increasingly sophisticated measurement and verification.
Infrastructure managers are also beginning to use AI for activities ranging from site identification and permitting analysis to construction sequencing and asset performance. McKinsey & Company
This creates another important theme for 2027:
The boundary between environmental infrastructure and environmental technology is becoming increasingly blurred.
The investment opportunity may therefore exist both in the physical asset **and in the technology that makes that asset more productive.**

The Role of Private Capital
Many environmental assets are particularly suited to private-market financing because they require substantial upfront capital and may have long development or operating periods.
The private-market structures investors encounter can include:

Private Equity • Private Credit • Infrastructure Funds • Real Estate • Venture Capital • Private Funds • Project Finance • Regulation D Offerings • Regulation A Offerings

But structure matters.

An investor financing a solar project through secured debt has a fundamentally different risk profile from an investor purchasing equity in an early-stage battery technology company.

Both may be described as environmental investments.

They are not economically equivalent.

The underlying environmental theme tells an investor **what area of the economy an investment participates in**.

The investment structure determines much of **how the investor actually experiences the risk and potential return**.

Opportunity Does Not Eliminate Risk

The capital requirements discussed throughout this report should not be interpreted as forecasts of investment returns.

Large investment needs can attract competition.

Government policy can change.

Projects can experience delays.

Technologies can fail.

Commodity prices can fluctuate.

Interest rates can affect financing.

Private investments can remain illiquid for years.

Environmental benefits may prove difficult to quantify.

And a sector experiencing rapid growth can still contain poorly structured investments.

The environmental investment thesis should therefore never replace traditional investment analysis.

Rather, environmental factors become **another dimension of that analysis**.

2. Capital Is Moving Toward Infrastructure



The Environmental Economy Is Becoming an Infrastructure Story

One of the most important developments shaping environmental investment entering 2027 is the growing connection between **environmental objectives and physical infrastructure**.

The transition is visible across energy generation, electricity grids, battery storage, water systems, waste management, agriculture, transportation and digital infrastructure. In each case, achieving greater efficiency, resilience or environmental performance requires more than policy commitments or technological innovation.

It requires physical assets.

Those assets require capital.

This is helping move environmental investment beyond a narrow focus on publicly traded clean-technology companies and toward a much larger universe of **real assets, infrastructure projects, private businesses and financing strategies**.

For investors, the significance is substantial. Infrastructure can provide exposure to environmental themes through assets that may generate revenue from electricity sales, long-term contracts, leases, service fees, regulated revenues or other operating activities.

But the characteristics of these investments—and their risks—can differ considerably.

The Scale of the Capital Requirement

Infrastructure is inherently capital intensive.

McKinsey estimates approximately **$106 trillion of cumulative infrastructure investment will be required globally through 2040**. Its estimates include approximately:
$23 trillion — Energy & Power
$6 trillion — Waste & Water
$5 trillion — Agriculture
with additional investment required across transportation, telecommunications, social infrastructure and other areas.
These estimates should not be interpreted as the size of an immediately investable market. Infrastructure needs include projects financed by governments, corporations, utilities, banks and other sources in addition to private investment funds.
But the scale illustrates something important:
Many of the world's environmental challenges are ultimately infrastructure challenges.
Generating cleaner electricity requires generation assets.
Electrification requires transmission and distribution.
Greater renewable penetration can require storage.
Water security requires treatment, distribution and monitoring.
Resource recovery requires processing facilities.
Modern agriculture requires irrigation, storage, equipment and increasingly sophisticated technology.
Environmental ambitions eventually have to become **physical investment**.
Private Capital Is Increasing Its Infrastructure Exposure
Private markets are increasingly participating in that investment landscape.
McKinsey reported that global infrastructure fundraising approached **$200 billion in 2025**, nearly 60% above 2024 levels. It also reported that 51% of roughly 300 limited partners surveyed expected to increase their infrastructure allocations over the following three years.
Infrastructure's attraction is broader than environmental investing alone. Investors may seek infrastructure exposure for potential income, long-duration assets, inflation sensitivity, diversification or exposure to essential services.
Nevertheless, several of the forces driving infrastructure investment intersect directly with the environmental economy.
These include:
Electrification
Energy security
Renewable generation
Grid modernization
Battery storage
Water infrastructure
Resource efficiency
Waste management
Agricultural modernization
That overlap is making infrastructure increasingly important to understanding environmental investment.

Energy Is Becoming an Infrastructure Investment
Energy provides perhaps the clearest example.
The International Energy Agency estimates global energy investment will reach approximately **$3.4 trillion in 2026**, with about **$2.2 trillion** flowing into clean-energy technologies and infrastructure.
That investment extends far beyond solar panels and wind turbines.
A modern electricity system requires an interconnected network of:
Generation → Transmission → Distribution → Storage → Management → Consumption
Growth at one point in that system can create investment requirements elsewhere.

Adding renewable generation without adequate transmission, for example, can create grid constraints.
Increasing electricity demand can require additional generation capacity.
More variable generation can increase the importance of storage, grid flexibility and demand management.
Electrification can therefore create **chains of infrastructure investment rather than isolated projects**.

The Grid Becomes Increasingly Important

Electricity grids are particularly significant.
New generation capacity has limited usefulness if electricity cannot efficiently reach the places where it is needed.
Transmission lines, substations, distribution networks, interconnections, transformers and digital grid-management systems therefore represent essential components of the broader energy investment landscape.
This creates an important shift in perspective.
The environmental investment opportunity is not simply:
"Invest in renewable energy."
It can extend across the entire infrastructure ecosystem required to support changing patterns of electricity generation and consumption.

Infrastructure Extends Beyond Energy

Energy attracts significant attention, but environmental infrastructure is considerably broader.

WATER

Water systems require continuing investment in treatment plants, pipelines, wastewater facilities, irrigation, desalination, monitoring and efficiency.
Aging infrastructure, population growth, industrial demand and water scarcity can all create requirements for additional capital.

WASTE & RESOURCE RECOVERY

The circular economy also requires physical infrastructure.
Recycling and resource recovery depend upon collection networks, sorting facilities, processing plants and technologies capable of separating or converting materials.
Without those assets, circular-economy concepts remain difficult to implement at scale.

AGRICULTURE

Agriculture depends upon another extensive infrastructure system.
Irrigation, drainage, storage, transportation, processing, equipment and increasingly digital systems all contribute to agricultural productivity.
Environmental investment in agriculture can therefore extend beyond farmland ownership into the infrastructure and technology supporting the farm itself.

NATURAL CAPITAL

Even nature-based strategies can require infrastructure-like capital.
Forest restoration, land management, environmental monitoring and ecosystem projects can require substantial upfront investment followed by long operating periods.
The assets may look very different from a power plant or water facility, but the investment challenge can share similar characteristics:
Capital today in anticipation of economic value developing over time.

Why Infrastructure Can Appeal to Private Capital

Certain infrastructure characteristics can make the asset class suitable for private-market investment.
Some assets have long useful lives.
Some provide essential services.
Some operate under long-term contractual arrangements.

Some can produce recurring cash flows.
And many require large amounts of upfront capital that may be difficult to finance through a single source.
This creates opportunities for different forms of capital to participate at different points in an asset's lifecycle.
For example:
Development Capital
Financing planning, permitting and early-stage development.
Construction Capital
Funding the physical construction of the asset.
Private Credit
Providing debt financing to projects or operating assets.
Infrastructure Equity
Taking ownership interests in operating or developing assets.
Institutional Capital
Potentially acquiring mature assets once operating risks have declined.
The same infrastructure asset can therefore have **very different investment characteristics depending upon when and how an investor participates.**

The Risk Changes With the Stage of the Asset
This distinction is particularly important.
Consider a solar facility.
An investor financing a proposed solar project before permits, construction and grid connection faces risks very different from an investor acquiring an operating solar facility with established contracts and operating history.
The environmental theme is identical.
The investment risk is not.
Infrastructure investors may encounter:
Development risk — Can the project obtain the necessary approvals?
Construction risk — Can it be completed on schedule and within budget?
Financing risk — Will required debt and equity remain available?
Technology risk — Will the technology perform as expected?
Counterparty risk — Will customers or contractual counterparties meet their obligations?
Operating risk — Will the asset perform economically once operating?
Regulatory risk — Could laws, permitting requirements or incentives change?
Market risk — Are revenues dependent upon changing commodity or electricity prices?
Exit risk — Will a buyer or refinancing opportunity exist when investors seek liquidity?
This reinforces one of the central principles of the Ecolence Research framework:
The sector tells you where you are investing. The structure tells you how you are taking the risk.

Infrastructure Meets Technology
Another development is making the infrastructure landscape more interesting.
Physical assets are becoming increasingly digital.
Artificial intelligence, satellite imagery, sensors, predictive analytics, automation and environmental data are being integrated into infrastructure operations.
A farm can use satellite imagery to monitor crop health.
A water system can use sensors to identify leaks.
A renewable-energy facility can use predictive analytics to anticipate maintenance requirements.
A grid operator can use software to manage increasingly complex electricity flows.

A forest project can use remote sensing to monitor changes across large areas.
The result is a convergence between two areas that were once viewed separately:
Infrastructure + Technology
For investors, this potentially creates opportunities on both sides.
Capital can finance the **physical asset**.
Capital can also finance the **technology company improving the performance of that asset**.

The 2027 Infrastructure Question
Entering 2027, the question is not whether the world requires more infrastructure.
The scale of projected investment requirements makes that relatively clear.
The more important investment questions are:
Which infrastructure needs can be translated into economically viable projects?
Who will ultimately pay for those assets?
Which projects can attract private capital?
How will higher financing costs affect project economics?
Where are permitting and grid constraints creating bottlenecks?
Which technologies can improve asset productivity?
And which investment structures appropriately compensate investors for the risks being assumed?
These distinctions matter because **infrastructure need is not the same as infrastructure opportunity**.
A society may urgently need an asset without that asset necessarily producing an attractive private investment.
The bridge between the two is the economic structure.
ECOLENCE RESEARCH PERSPECTIVE
The environmental investment landscape entering 2027 increasingly appears to be moving from **themes toward assets**.
From commitments toward construction.
From environmental objectives toward the infrastructure required to implement them.
That transition could have important consequences for private markets.
Instead of viewing environmental investment primarily through labels such as “green” or “ESG,” investors may increasingly encounter opportunities built around something much more tangible:
Power plants.
Electrical grids.
Battery facilities.
Water systems.
Recycling plants.
Agricultural infrastructure.
Environmental technology.
These are the physical systems underlying the environmental economy.
And financing those systems may represent one of the defining environmental investment themes of the years ahead.

3. Clean Energy & Power Infrastructure



From Generation to Grid: Financing the Expanding Energy System

The global energy system is undergoing a major period of capital investment.

For environmental investors, however, the opportunity is becoming broader than simply financing solar panels and wind turbines. As renewable generation expands and electricity demand changes, capital is increasingly required throughout the power system—from generation and transmission to distribution, storage, grid management and the technologies connecting these assets.

The International Energy Agency estimates that total global energy investment will reach a record **$3.4 trillion in 2026**, approximately 5% higher than in 2025. Around **$2.2 trillion** is expected to flow collectively into renewables, nuclear, electricity grids, storage, low-emissions fuels, efficiency and electrification, compared with approximately $1.2 trillion for oil, natural gas and coal. IEA

For investors entering 2027, the central question is therefore becoming larger than:

“How much renewable energy will be built?”

It is increasingly:

“What infrastructure will be required to support an increasingly electrified and interconnected energy system?”

Renewable Generation Continues to Expand

The underlying expansion in renewable generation remains significant.

According to the International Renewable Energy Agency, the world added a record **692 gigawatts of renewable power capacity during 2025**, increasing total renewable capacity to approximately **5,149**

GW. Renewables represented **85.6% of all new power-generation capacity added globally during the year**. IRENA
Solar dominated the expansion.
Approximately **511 GW of solar capacity** was added during 2025, while wind contributed approximately **159 GW**. Together, solar and wind represented 96.8% of net renewable additions. IRENA
These figures illustrate how far renewable generation has moved from being a specialized segment of the energy market.
But they also reveal the next investment challenge.
Generating electricity is only one part of an electricity system.
Power must also be **connected, transmitted, distributed, balanced and stored.**

From Generation to an Energy System
The clean-energy investment landscape can increasingly be viewed as an interconnected value chain:
GENERATION → GRID → STORAGE → DISTRIBUTION → MANAGEMENT → END USE
Each component creates different capital requirements and different investment characteristics.
GENERATION
Solar, wind, hydroelectric, geothermal and other generating assets produce electricity.
TRANSMISSION & DISTRIBUTION
Power lines, substations, transformers and other grid infrastructure move electricity from generation assets to customers.
ENERGY STORAGE
Battery systems and other storage technologies can help balance electricity supply and demand across time.
GRID MANAGEMENT
Software, sensors, forecasting systems and digital infrastructure help operators manage increasingly complex electricity flows.
ELECTRIFICATION
Electric vehicles, data centers, buildings and industrial processes can create new sources of electricity demand.
As these systems interact, investment in one area can create requirements elsewhere.
More generation can require more grid capacity.
More variable generation can increase the value of flexibility and storage.
More electricity demand can require additional generation and transmission.
This interconnectedness is one reason clean-energy investment is increasingly becoming an **infrastructure investment story**.
The Grid Is Emerging as a Critical Constraint
Perhaps the most important infrastructure challenge is the electricity grid.
The IEA reports that more than **2,500 GW of renewable-generation, large-load and storage projects are currently stalled in grid-connection queues worldwide**. It describes insufficient grid capacity as a critical bottleneck that can slow the deployment of new electricity supply, storage and demand. IEA
The investment requirement is significant.
Current annual grid investment is approximately **$400 billion**, according to the IEA, and would need to increase by roughly **50% by 2030** to meet projected electricity demand. IEA
The challenge is not simply financial.
Grid projects frequently require considerably longer development periods than the assets seeking to connect to them. The IEA estimates new grid infrastructure can take approximately **5–15 years** to plan, permit and construct, compared with roughly **1–5 years for solar and wind projects** and **1–3 years for data centers**. IEA
This creates an important investment dynamic:

Generation can sometimes be developed faster than the infrastructure required to connect it.
For investors, that means transmission capacity, interconnection availability, permitting and grid access can become material components of project risk.

Storage Becomes Part of the Infrastructure Equation

Electricity has traditionally been produced largely when consumers required it.
Greater deployment of variable renewable generation changes that relationship.
Solar production is concentrated during daylight hours.
Wind production varies with weather conditions.
Electricity demand follows its own patterns.
Storage provides one mechanism for bridging differences between when electricity is produced and when it is needed.
Utility-scale battery systems can potentially provide services including:

Energy shifting
Grid balancing
Congestion management
Reserve capacity
Integration of variable generation
Grid resilience

The IEA specifically identifies expansion of utility-scale battery storage, alongside greater demand-side participation, as an important mechanism for improving system flexibility and managing grid congestion. IEA
For investors, storage therefore should not necessarily be viewed as an isolated clean-technology theme. It can increasingly function as **part of the infrastructure supporting the electricity system itself.**

Geography Matters

The global renewable-energy expansion is not evenly distributed.
China, the United States and the European Union together accounted for approximately **550 GW—or 79.5%—of new renewable capacity installed during 2025**, according to IRENA. Africa added approximately 11.3 GW, representing only 1.6% of global additions. IRENA
This geographic concentration has important investment implications.
The economics of an energy project can depend heavily on:

Local electricity prices
Government policy
Permitting
Grid availability
Financing costs
Resource quality
Land availability
Power-purchase agreements
Regulatory structures
Currency risk

Two otherwise similar solar projects located in different countries—or even different regions of the same country—can therefore have substantially different risk profiles.
Environmental investment may be global.
Energy economics remain highly local.

Different Assets, Different Risk Profiles

Clean energy should not be treated as a single investment category.
Consider three hypothetical investments.

Operating Solar Facility

An established project with operating history and contracted electricity revenues may behave much like an infrastructure asset.

Development-Stage Renewable Project

A project awaiting permits, financing, construction or interconnection may face substantially greater development risk.

Battery Technology Company

An equity investment in a company developing new battery technology introduces technology, commercialization, management and competitive risks that may have little resemblance to an operating power asset.

All three participate in the energy transition.

But they are fundamentally different investments.

This distinction reinforces an important Ecolence Research principle:

An environmental theme describes the opportunity. Investment structure determines much of the risk.

How Private Capital Can Participate

The expanding power system creates multiple entry points for private capital.

Infrastructure Equity

Ownership interests in generating assets, storage systems, transmission or other energy infrastructure.

Private Credit

Debt financing provided to projects, developers or operating companies.

Project Finance

Capital structured around the cash flows and assets of a particular energy project.

Private Equity

Investment in established private companies operating across the energy value chain.

Venture Capital

Earlier-stage investment in technologies such as storage, grid software, advanced materials or energy management.

Real Assets

Direct or fund-based ownership of physical energy assets.

These structures can expose investors to very different combinations of income, growth, leverage, duration, liquidity and risk.

Energy Meets Technology

The physical energy system is also becoming increasingly digital.

Artificial intelligence, forecasting, sensors, automation and data analytics can help operators predict demand, manage assets and optimize electricity flows.

Technology may help:

Forecast renewable generation
Identify equipment failures
Optimize battery dispatch
Manage distributed energy resources
Improve grid utilization
Monitor infrastructure
Coordinate electricity demand

This creates a second layer of investment opportunity.

Investors may finance the infrastructure itself.

Or they may finance the companies building the technologies that make that infrastructure more productive.

In many cases, the future energy system will depend upon both.

What Investors Should Examine

Rapid sector growth does not remove the need for conventional investment analysis.

For an energy investment, important questions can include:

What produces the revenue?
Is revenue contracted or exposed to market prices?
Who is the purchaser of the electricity?
Has the project secured grid interconnection?
What permits remain outstanding?
How much leverage is being used?
What are construction costs and contingencies?
Who bears cost overruns?
What technology is being used?
What is the expected operating life?
Are tax incentives or subsidies important to the economics?
What happens if policy changes?
How does the investor ultimately exit?

A strong macroeconomic theme does not necessarily make an individual project attractive.

The quality of the underlying asset, contractual structure, financing and management remains critical.

The 2027 Clean-Energy Investment Question

Entering 2027, renewable generation continues to expand rapidly. Yet the next stage of the investment story may increasingly involve the systems surrounding generation.

Transmission.
Distribution.
Storage.
Grid flexibility.
Digital infrastructure.
Energy management.
Electrification.

The investment opportunity is therefore becoming broader—and potentially more complex.

ECOLENCE RESEARCH PERSPECTIVE

The clean-energy investment landscape appears to be evolving from a **generation story into a system story**.

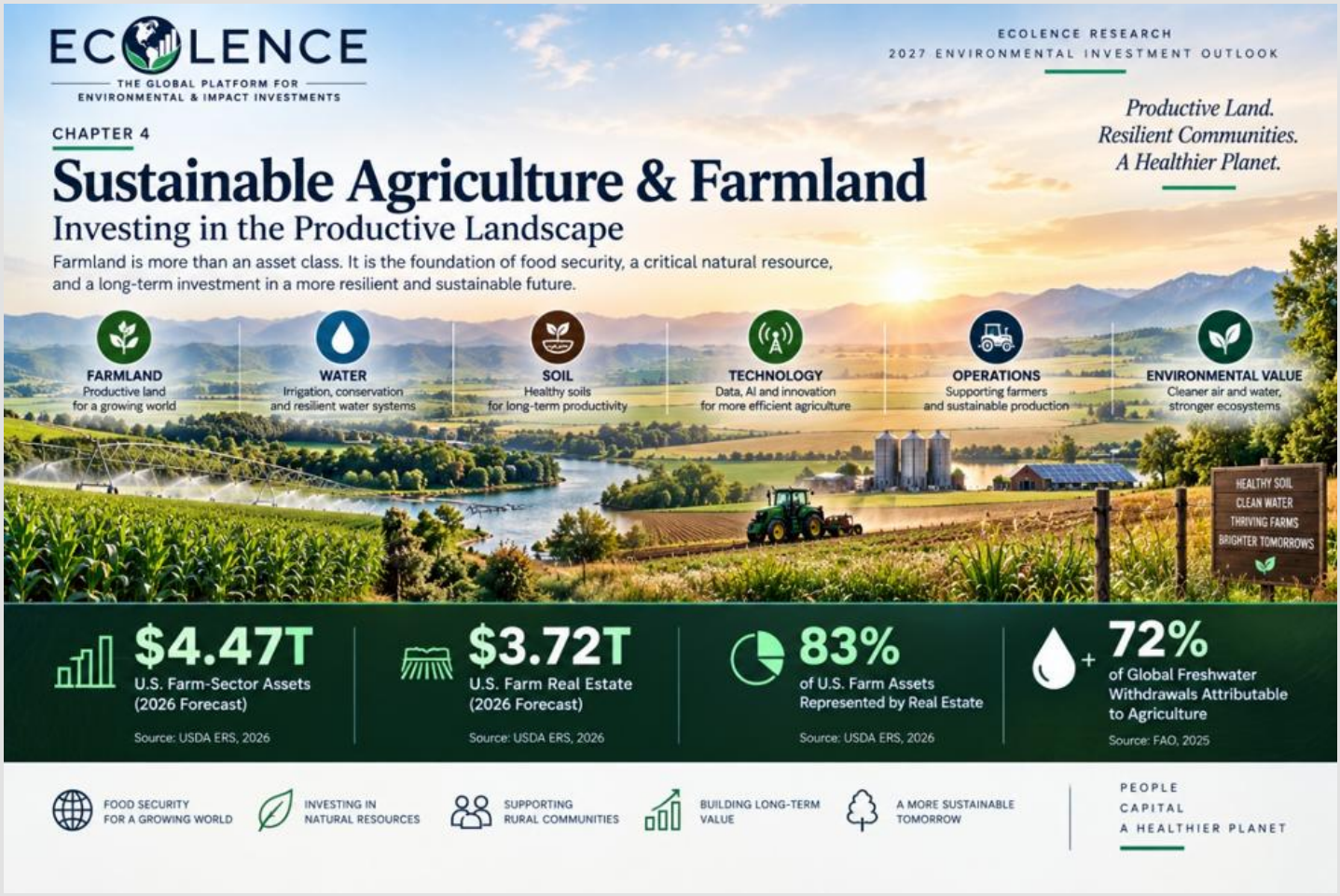
Renewable generation remains central, but the ability to connect, move, store and intelligently manage electricity is becoming increasingly important.

The record **692 GW of renewable capacity added during 2025** demonstrates the scale at which new generation is entering the system. At the same time, more than **2,500 GW of generation, storage and large-load projects sitting in grid queues** illustrates the infrastructure challenge accompanying that growth. IRENA

For investors, that creates a broader way of thinking about the sector:

The opportunity may not simply be in producing cleaner electricity. It may increasingly be in building the infrastructure that makes the entire energy system work.

4. Sustainable Agriculture & Farmland



Investing in the Productive Landscape

Agriculture occupies a distinctive position within the environmental investment economy.

Farmland is simultaneously a **productive real asset, a source of food and fiber, a store of economic value, and a natural-resource system dependent upon soil, water and ecosystems**. Unlike many financial assets, agricultural land has an underlying productive function that cannot be separated from the physical environment in which it operates.

This creates an investment opportunity that extends well beyond simply owning farmland.

Capital can participate in the acquisition and improvement of agricultural land, irrigation and water infrastructure, farm operations, storage and processing, agricultural technology, precision agriculture, renewable energy and potentially emerging environmental markets.

The investment thesis is therefore evolving from:

“Own farmland.”

toward:

“Invest in the productive system surrounding the land.”

Farmland as a Major Real Asset

The scale of the agricultural asset base is substantial.

In the United States alone, USDA forecasts total farm-sector assets of approximately **$4.47 trillion in 2026**. Farm real estate—land and the structures attached to it—is forecast at approximately **$3.72 trillion**, representing about **83% of total U.S. farm-sector assets**. Economic Research Service

That concentration illustrates something fundamental about agricultural economics:
Land remains the financial foundation of the farm sector.
USDA reported that average U.S. farm real-estate value reached **$4,350 per acre in 2025**, 4.3% higher than the previous year in nominal terms. From 2019 through 2024, farmland values increased at a 5.8% compound annual rate in nominal terms, although the inflation-adjusted rate was substantially lower at 2.0%. Economic Research Service
Farmland's investment characteristics can differ considerably from those of public equities.
Returns may potentially come from multiple sources:
Farm income or rent
Land appreciation
Operational improvements
Productivity improvements
Infrastructure development
Alternative land uses
Environmental attributes
That combination can make farmland both an operating asset and a long-duration real asset.
But land appreciation should never be assumed.

The Economics Begin With Agriculture
An investment in farmland ultimately depends upon the economics of farming.
Those economics can be volatile.
USDA's September 2026 forecast places U.S. net farm income at approximately **$158.4 billion for 2026**, down 2.6% from 2025 in nominal terms and 5.5% after adjusting for inflation. At the same time, the forecast remains above the inflation-adjusted 2006–2025 average. Economic Research Service
That illustrates an important distinction for investors.
Farmland value and farm profitability are related, but they are not the same thing.
A property can appreciate while operating margins come under pressure.
Likewise, a productive agricultural operation can experience strong income during a period in which land values remain relatively stable.
Commodity prices, yields, weather, input costs, interest rates, labor availability and local supply-and-demand conditions can all influence agricultural profitability.
This makes underwriting the **productive capacity of the land** as important as evaluating the land itself.

From Land Ownership to Agricultural Infrastructure
Modern agriculture depends upon considerably more than acreage.
Productive farmland can require investment in:
Irrigation
Drainage
Water storage
Farm roads
Grain storage
Processing
Equipment
Electricity
Transportation
Soil improvements
Digital infrastructure
In this sense, farmland can be viewed as the foundation of a larger agricultural infrastructure system.

Capital deployed to improve that system may increase productivity, reduce operating costs or improve the resilience of an agricultural property.
This creates a broader investment model:
LAND
Acquire or finance productive agricultural property.
INFRASTRUCTURE
Improve irrigation, drainage, storage, energy or other physical systems.
OPERATIONS
Generate agricultural income through leases, crop-sharing arrangements or direct operations.
TECHNOLOGY
Introduce tools capable of improving productivity or resource efficiency.
ENVIRONMENTAL VALUE
Where economically and legally viable, explore environmental attributes associated with soil, water, biodiversity or renewable energy.
The result is a more comprehensive approach to agricultural investing.

Water Is Central to Agricultural Value
Few resources are more important to agriculture than water.
The Food and Agriculture Organization reports that agriculture accounts for approximately **72% of global freshwater withdrawals**. FAO also estimates that approximately **1.2 billion people live in agricultural areas facing severe water constraints**. FAOHome
Water therefore represents both an environmental issue and an investment consideration.
The value and productivity of agricultural land can depend significantly upon:
Water availability
Water rights
Irrigation infrastructure
Groundwater conditions
Rainfall
Drainage
Water-use efficiency
Local regulation
For farmland investors, water should not simply appear as another environmental metric.
It can be a fundamental component of asset valuation and long-term operating risk.
In some agricultural markets, understanding the water may ultimately be as important as understanding the land.

Soil Is Productive Infrastructure
Agricultural land is also different from many other real assets because the productive asset itself can change over time.
Soil structure, organic matter, nutrient availability, erosion, compaction and water retention can influence agricultural productivity.
FAO's 2025 assessment emphasizes the pressure facing agricultural land and water resources, reporting that more than 60% of human-induced land degradation occurs on agricultural lands. FAOHome
This creates an important investment concept:
Soil can be treated as productive infrastructure.
Practices intended to maintain or improve soil function may include:
Cover crops
Crop rotation
Reduced tillage

Nutrient management
Erosion control
Improved grazing management
Organic-matter management
However, the financial results of these practices vary by crop, geography, soil conditions, implementation costs and time horizon.
Environmental benefit should therefore not automatically be assumed to produce financial return.
The investment case must still be demonstrated.

Agriculture Is Becoming a Technology Platform
The modern farm is also becoming increasingly data-driven.
Satellite imagery, sensors, GPS-guided machinery, drones, artificial intelligence, soil analytics, automated irrigation and farm-management software can provide farmers and asset managers with increasingly detailed information about land and crop conditions.
Technology can potentially help answer questions such as:
Where is water being used inefficiently?
Which portions of a field are underperforming?
Where are nutrients required?
Are crops experiencing stress?
How is soil condition changing?
When should irrigation occur?
Where could input use potentially be reduced?
This creates an intersection between two environmental investment sectors:
Agriculture + Technology
Investors can participate through ownership of agricultural assets incorporating these technologies—or through companies developing the technologies themselves.

Farmland Can Produce More Than Crops
One of the more interesting developments in agricultural investment is the possibility of generating economic value from uses beyond traditional crop production.
Depending upon the property, regulations, contracts and market conditions, farmland may potentially support:
Renewable-energy leases
Solar installations
Wind-energy agreements
Conservation programs
Water-management initiatives
Habitat restoration
Biodiversity projects
Soil-carbon projects
Other environmental commodities
These opportunities can potentially create additional revenue streams.
But they require careful analysis.
Carbon credits, biodiversity credits and similar environmental assets should not automatically be incorporated into farmland valuations simply because they may theoretically exist.
Their value can depend upon measurement methodologies, additionality requirements, permanence, verification, registries, contractual restrictions and the existence of willing buyers.
For investors, environmental value should therefore be treated as:
A potential economic layer—not guaranteed investment income.

Different Farmland Strategies Create Different Investments
As with clean energy, the environmental theme alone does not determine the investment profile.
Consider several approaches.
CORE FARMLAND
Acquire established productive farmland and lease it to experienced farmers.
Potential return drivers may include rent and long-term land appreciation.
VALUE-ADD FARMLAND
Acquire agricultural properties where infrastructure, soil, water management or operational improvements could increase productivity or value.
The strategy may offer greater upside—but usually introduces greater execution risk.
DIRECT FARM OPERATIONS
The investment owns land while also participating directly in agricultural operations.
This can increase exposure to commodity prices, yields and operating expenses.
AGRICULTURAL PRIVATE CREDIT
Capital is provided to farmers, agricultural businesses or projects through loans rather than ownership.
Return characteristics may be driven primarily by interest payments and credit performance.
AGRICULTURAL TECHNOLOGY
Investment is made in businesses developing technologies for agriculture.
These investments can have significantly different risk characteristics from farmland itself.
All five can be described as agricultural investments.
They should not be evaluated as though they were interchangeable.

The Farmer Remains Central
Institutional investment in agriculture can sometimes be described primarily in terms of land, capital and technology.
But agriculture remains an operating business.
The farmer is central to that business.
Successful agricultural investment models may involve partnerships with experienced local operators through:
Cash leases
Crop-share arrangements
Management agreements
Operating partnerships
Other contractual structures
The incentives between landowner and operator matter.
A farmland investment strategy that improves the asset while weakening the economics of the farmer operating it may be difficult to sustain over the long term.
This creates a broader principle for sustainable agricultural investment:
The productivity of the land and the economic viability of the farmer are interconnected.

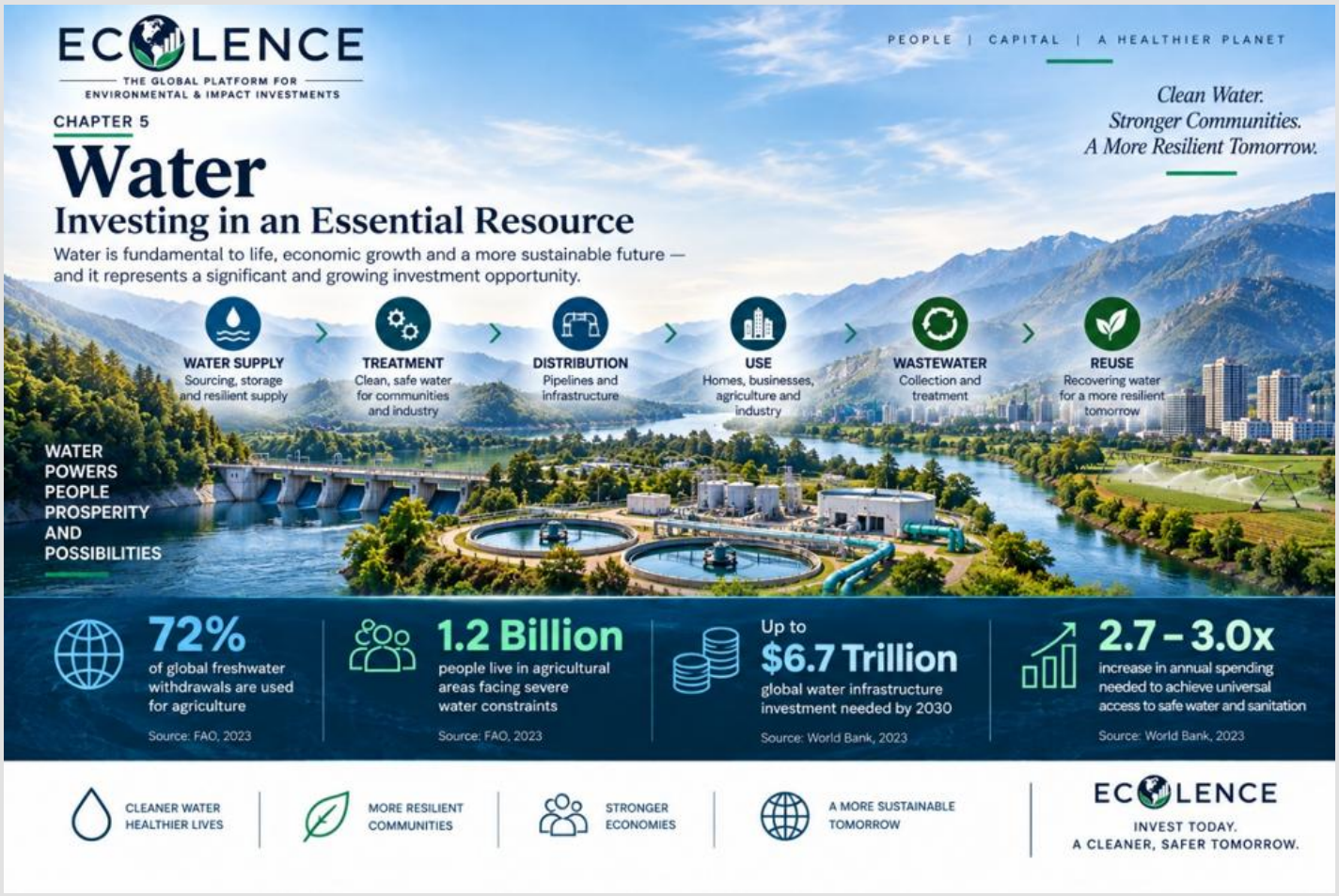
What Investors Should Examine
Farmland due diligence requires analysis at both the financial and physical-asset level.
Important questions include:
Where is the property located?
What crops can economically be produced?
What is the historical productivity of the land?
What are the water sources and water rights?
What condition is the soil in?

Who operates the farm?
How is the operator compensated?
What infrastructure improvements are required?
How concentrated is revenue among crops or tenants?
How sensitive are returns to commodity prices?
What insurance is available?
What leverage is being used?
How is the property valued?
Are environmental revenues included in projected returns?
If so, how certain are those revenues?
What is the expected exit strategy?
The physical characteristics of the asset can matter as much as the financial model.

The 2027 Sustainable Agriculture Investment Question
Agriculture enters 2027 facing a combination of opportunities and pressures.
Farmland remains a substantial real-asset category, while land, water and soil resources face increasing constraints.
Technology is creating new ways to manage agricultural assets.
Infrastructure investment can improve productivity.
And emerging environmental markets may eventually provide additional economic value to certain properties.
At the same time, agricultural profitability remains exposed to commodity markets, weather, input costs, interest rates and operating conditions. USDA's current forecast for declining inflation-adjusted net farm income in 2026 provides a useful reminder that agricultural assets are not insulated from economic cycles. Economic Research Service
The investment opportunity therefore should not be framed simply as:
“Farmland is sustainable.”
The more useful question is:
Can capital improve the productivity, resilience and long-term economic value of the land while preserving the natural resources upon which that productivity depends?
ECOLENCE RESEARCH PERSPECTIVE
Sustainable agriculture may represent one of the clearest examples of the convergence occurring across the environmental investment economy.
It brings together:
Real Assets
Infrastructure
Food Production
Water
Soil
Technology
Natural Capital
Environmental Markets
For investors, this creates opportunities extending from direct farmland ownership and agricultural credit to infrastructure, technology and environmental assets.
But the fundamental investment discipline remains unchanged.
The land must be productive.
The economics must work.
The farmer must be able to operate successfully.
The water must be available.

And environmental benefits must be evaluated independently rather than assumed.
That leads to the central investment thesis for this chapter:
The future of farmland investment may be less about simply owning acreage—and increasingly about improving the productive system that surrounds it.

5. Water



Investing in an Essential Resource
Water occupies a unique position within the environmental investment economy.
It is essential to human life, agriculture, manufacturing, energy production, cities and ecosystems. Yet the systems that collect, transport, treat, distribute and reuse water require enormous amounts of physical infrastructure.
That makes water more than an environmental issue.
It is also an **infrastructure, economic-development and investment issue**.
The World Bank has estimated that as much as **$6.7 trillion of water infrastructure investment could be required globally by 2030**, rising to $22.6 trillion by 2050. At the same time, much of the world's water infrastructure continues to be financed by governments and public entities rather than private capital.
World Bank Blogs
This creates one of the central questions for environmental investors entering 2027:
How can the enormous need for water infrastructure increasingly be translated into economically viable and investable opportunities?

Water Is an Economic System
Water investment is sometimes discussed primarily in terms of scarcity.
But scarcity represents only one component of a much larger market.
Before water reaches a home, farm or industrial facility, an extensive physical system may be required to source it, transport it, treat it, store it and distribute it.
After use, another infrastructure system may collect, treat and potentially reuse the wastewater.
The investment ecosystem therefore extends across:
WATER SUPPLY → TRANSMISSION → TREATMENT → DISTRIBUTION → USE → WASTEWATER → REUSE
Surrounding that physical infrastructure is an increasingly important technology layer involving sensors, filtration, monitoring, leak detection, automation and data analytics.
For investors, water should therefore be viewed not simply as a commodity.
It is an **infrastructure ecosystem**.

The Investment Requirement Is Significant
The scale of the need can already be seen in the United States.
The U.S. Environmental Protection Agency's latest Drinking Water Infrastructure Needs Survey estimates approximately **$625 billion** of drinking-water infrastructure investment will be required over a 20-year period.
Approximately **67%—$420.8 billion—relates to distribution and transmission infrastructure**, while another $106.4 billion relates to treatment and $55.3 billion to storage. US EPA
That breakdown is particularly important.
Much of the water investment challenge involves assets that consumers rarely see:
Pipelines
Pumping systems
Treatment facilities
Storage tanks
Distribution networks
Monitoring equipment
These systems may operate quietly beneath cities and communities, but they are essential economic infrastructure.

A Global Financing Gap
The challenge extends far beyond the United States.
The World Bank estimates an annual spending shortfall of approximately **$131 billion to $141 billion** for achieving universal access to safe water and sanitation in developing countries. Closing the gap would require annual spending approximately **2.7 to 3 times current levels**. World Bank
Multilateral development banks approved approximately **$19.6 billion of water-related financing during 2024**, including $14.4 billion directed toward low- and middle-income countries. World Bank
Yet public finance continues to dominate.
The World Bank has reported that approximately **91% of annual water spending comes from the public sector**, while private-sector contributions remain below 2%. World Bank Blogs
This creates both an opportunity and a constraint.
Water may have enormous capital requirements, but infrastructure need does not automatically create an investable asset.
Projects must still develop sustainable revenue models, appropriate regulation, capable operators and financing structures that can attract private capital.
Water and Agriculture Are Inseparable
Agriculture provides perhaps the clearest example of water's economic importance.

The Food and Agriculture Organization reports that agriculture accounts for approximately **72% of global freshwater withdrawals**.
Approximately **1.2 billion people live in agricultural areas facing severe water constraints**. FAOHome
This connects the Water chapter directly to our previous discussion of Sustainable Agriculture & Farmland.
For an agricultural investor, water availability can influence:
Land productivity
Crop selection
Yield stability
Operating costs
Land valuation
Long-term resilience
Investment risk
Irrigation efficiency, water storage, groundwater management and monitoring technologies can therefore become both agricultural and water investments.
The sectors overlap.

Water Infrastructure Extends Across Multiple Markets
Water investing should not be viewed as one asset class.
WATER SUPPLY & DISTRIBUTION
Reservoirs, pipelines, pumping systems and distribution networks move water from its source to the end user.
These assets often have long useful lives and significant capital requirements.
WATER TREATMENT
Treatment facilities remove contaminants and prepare water for residential, commercial and industrial use.
Changing standards and emerging contaminants can create additional infrastructure requirements.
WASTEWATER
Wastewater systems collect and treat used water before discharge or reuse.
This includes sewer networks, treatment plants and associated infrastructure.
WATER REUSE
Treated wastewater can increasingly become a resource rather than simply a waste stream.
Reuse systems may supply agriculture, industry, landscaping or—in appropriate systems and jurisdictions—potable water.
DESALINATION
In water-constrained regions, desalination can convert seawater or brackish water into usable freshwater.
However, desalination can require substantial energy and capital, making project economics highly location-specific.
AGRICULTURAL WATER
Irrigation, drainage, water storage and precision irrigation represent another significant infrastructure category.
INDUSTRIAL WATER
Manufacturing, semiconductor production, mining, energy and other industries can require substantial volumes of water and sophisticated treatment systems.
Each market presents different economic structures and risks.

Technology Is Changing the Water System
As with energy and agriculture, water infrastructure is becoming increasingly digital.

Historically, water systems depended primarily upon large physical assets.
Those assets remain essential.
But technology can increasingly help operators understand **what is happening inside the system**.
Sensors can monitor water quality.
Smart meters can measure consumption.
Leak-detection systems can identify losses.
Satellite data can monitor watersheds.
Artificial intelligence can analyze system performance.
Automated systems can optimize treatment processes.
Predictive maintenance can identify infrastructure problems before failure.
This creates another convergence within the environmental economy:
WATER + INFRASTRUCTURE + TECHNOLOGY
Investors may therefore gain water exposure through both physical assets and the companies developing technologies used to operate those assets.

Efficiency Can Be an Investment
One of the more interesting aspects of water is that additional supply is not always the only solution.
Sometimes the opportunity is to use existing water more efficiently.
That can include:
Leak reduction
Precision irrigation
Industrial water recycling
Wastewater reuse
Smart metering
Efficient treatment
Advanced filtration
Water-management software
This changes the investment question from:
“Where can we find more water?”
to:
“How can existing water resources be managed more productively?”
That distinction could become increasingly important as water constraints increase in certain regions.

Water Has a Different Investment Model
Water also differs from sectors such as renewable energy.
A solar facility can sell electricity.
A farm can sell crops.
A recycling facility can sell recovered materials.
Water infrastructure often operates within heavily regulated municipal or utility systems where pricing, public affordability and government policy play important roles.
That can make financing more complicated.
Potential structures include:
Municipal and government finance
Utility investment
Public-private partnerships
Infrastructure funds
Private equity
Private credit
Project finance

Technology venture capital
Industrial water-service contracts
The appropriate structure depends heavily upon the underlying asset and jurisdiction.

The Private-Capital Challenge
The comparatively small private-sector share of global water spending reveals one of the industry's biggest challenges.
Water is unquestionably essential.
But essential does not necessarily mean easy to monetize.
Rates may be regulated.
Infrastructure can be expensive.
Assets can have extremely long operating lives.
Political considerations may influence pricing.
Projects may require government participation.
Affordability must be considered.
These characteristics can make certain water projects difficult to finance solely through conventional private-market structures.
Consequently, **blended finance** may become increasingly important.
Government funding, development-bank financing, guarantees, concessional capital and private investment can sometimes be combined to make projects economically feasible.
The opportunity for private capital may therefore involve participating alongside public institutions rather than replacing them.

Water Risk Is Geographic
Water is fundamentally local.
A global statistic cannot tell an investor whether a particular property or infrastructure project has adequate water.
Conditions can vary dramatically between watersheds—and even between neighboring properties.
Investors should therefore examine:
Water source
Water rights
Historical availability
Groundwater conditions
Drought exposure
Flood exposure
Infrastructure condition
Regulation
Competing users
Population growth
Industrial demand
Agricultural demand
Long-term supply projections
This makes location-specific due diligence particularly important.

What Investors Should Examine
For a water-related investment, investors may want to understand:
What asset or technology is actually being financed?
Who owns the infrastructure?
Who operates it?

Who pays for the service?
How are water rates determined?
Is revenue contracted, regulated or market-based?
What capital improvements are required?
What is the condition and age of the infrastructure?
What permits are necessary?
Are there environmental liabilities?
What are the energy requirements?
How exposed is the project to drought or flooding?
Does the investment depend upon government subsidies or guarantees?
What technology risks exist?
What is the expected investment duration?
How does the investor ultimately exit?
Once again, a compelling environmental need does not eliminate investment risk.

The 2027 Water Investment Question
The investment case for water entering 2027 begins with an unavoidable reality:
Modern economies cannot function without reliable water infrastructure.
Yet enormous investment requirements remain.
The World Bank's estimate of up to **$6.7 trillion in global water infrastructure needs through 2030**, the EPA's **$625 billion U.S. drinking-water infrastructure requirement**, and the continuing global financing gap demonstrate the scale of the challenge. World Bank Blogs
At the same time, the sector illustrates one of the recurring themes of this report:
Need alone does not create an investment.
For private capital to participate at greater scale, water projects must increasingly bridge the gap between public necessity and private investability.
That may require new financing structures, better technology, stronger public-private partnerships and more economically sustainable infrastructure models.
ECOLENCE RESEARCH PERSPECTIVE
Water sits at the intersection of nearly every major environmental investment sector.
Agriculture requires water.
Cities require water.
Industry requires water.
Energy systems interact with water.
Natural ecosystems depend upon water.
Technology can improve how water is managed.
That makes water less a standalone environmental sector and more a fundamental layer of the environmental economy.
For investors, the opportunity may extend from treatment plants and pipelines to irrigation systems, wastewater reuse, filtration technologies, monitoring systems and water-management software.
But water investing also requires discipline.
The existence of scarcity does not guarantee profitability.
The existence of infrastructure needs does not guarantee investability.
And the social importance of water means that economics, regulation and affordability will always be intertwined.
The central investment thesis is therefore straightforward:
Water is not simply a resource to be consumed. It is essential infrastructure that must continually be financed, managed, protected and renewed.

And as the world attempts to build more resilient cities, industries and food systems, investment in that infrastructure is likely to become an increasingly important part of the environmental investment landscape.

6. Natural Capital, Forestry & Biodiversity



When Nature Becomes an Economic Asset

For most of modern financial history, nature has existed largely outside conventional investment analysis.

Forests were valued for timber. Land was valued for agriculture or development. Water was treated as an input. Biodiversity and ecosystem health were often considered environmental concerns rather than economic assets.

That perspective is beginning to change.

Forests, wetlands, soils, watersheds and ecosystems provide services that support economic activity: storing carbon, regulating water, protecting soil, supporting pollination, reducing certain physical risks and providing renewable biological resources.

The emerging field of **natural capital investing** attempts to recognize that economic value—and, where appropriate, develop investment structures capable of financing its protection, restoration or sustainable use.

This represents an important evolution in environmental investing:

Nature is increasingly being examined not simply as something to protect, but as productive capital upon which economic activity depends.

The World's Natural Asset Base
Forests provide one of the clearest examples.
The FAO's 2025 Global Forest Resources Assessment estimates that forests cover approximately **4.14 billion hectares**, or roughly **32% of the world's land area**. More than 90% of forests are naturally regenerating, while primary forests account for about one-third of reported forest area. FAOHome
Those forests perform multiple economic and environmental functions.
They produce timber and other forest products.
They influence watersheds.
They protect soils.
They store carbon.
They provide habitat.
They support communities and livelihoods.
And they form part of larger ecological systems upon which agriculture and other economic activities can depend.
This makes forests simultaneously:
A productive asset
A natural resource
An ecosystem
A potential environmental asset
The investment challenge is determining how those different forms of value can coexist economically.

Forestry Is Already an Established Real-Asset Strategy
Not every natural-capital investment represents a new financial concept.
Commercial forestry has existed as an institutional real-asset strategy for decades.
A sustainably managed timber property may potentially generate value through:
Timber growth
Timber harvesting
Land appreciation
Recreational uses
Conservation agreements
Renewable-energy leases
Carbon projects
Other environmental attributes
One characteristic distinguishes timber from many traditional commodities: the underlying biological asset continues growing.
Trees can potentially increase in physical volume while they remain standing.
That does not eliminate commodity-price risk, operating expenses, wildfire, storms, disease or other risks. But it creates a distinctive relationship between **biology, time and economic value**.
For investors, forestry therefore provides a useful bridge between traditional real-asset investing and the emerging natural-capital market.

The Natural-Capital Opportunity Extends Beyond Timber
The broader natural-capital universe is considerably larger.
Potential areas include:
Forestry
Reforestation
Wetlands
Watersheds
Habitat conservation

Biodiversity
Soil restoration
Sustainable agriculture
Coastal ecosystems
Carbon sequestration
Environmental commodities
Some investments may generate revenue directly from the productive use of natural resources.
Others may depend upon payments for environmental outcomes.
And some projects may combine the two.
A forest, for example, might produce timber while simultaneously participating in conservation or carbon programs.
A farm may generate agricultural income while implementing habitat or soil-restoration programs.
A wetland restoration project may potentially generate environmental credits where an appropriate regulatory or voluntary market exists.
This introduces an important concept:
A natural asset may potentially produce several forms of economic value from the same landscape.
But investors should be careful not to count hypothetical environmental revenues as though they were guaranteed.

A Large Financing Gap Remains
Despite increasing interest in natural capital, financing remains small relative to estimated needs.
UNEP's **State of Finance for Forests 2025** estimates annual forest investment at approximately **$84 billion in 2023**.
It estimates that annual investment would need to rise to approximately **$300 billion by 2030** to meet global forest-related goals—a gap of approximately **$216 billion annually**. UNEP - UN Environment Programme
The composition of existing finance is equally revealing.
Of the approximately $84 billion invested in forests in 2023, UNEP estimates only about **$7.5 billion came from private finance**. Domestic public sources accounted for approximately $75 billion. UNEP - UN Environment Programme
That means the natural-capital investment challenge is not simply:
“How much money is needed?”
It is:
“How can more conservation and restoration activity be structured in ways capable of attracting investment capital?”

Biodiversity Creates an Even Larger Challenge
Biodiversity is fundamental to functioning ecosystems, but translating biodiversity into investable economic structures remains difficult.
IPBES has estimated that approximately **one million animal and plant species are threatened with extinction**. Its 2026 World Wildlife Day statement continued to cite that figure. IPBES Files
At the same time, the financing requirements are substantial.
The World Bank notes that implementing the Kunming-Montreal Global Biodiversity Framework requires approximately **$700 billion annually**, while current spending has been estimated at only $120–140 billion, with much of that coming from domestic public sources. World Bank
This creates an unusual investment problem.
The economic importance of biodiversity can be enormous.
But many of its benefits resemble **public goods**.
A healthy ecosystem may benefit farmers, communities, businesses and governments simultaneously.

Who pays for preserving it?
That question sits at the center of biodiversity finance.

From Environmental Benefit to Revenue
For natural capital to attract conventional investment capital, environmental value generally needs a mechanism through which it can generate revenue or enhance an existing asset.
Potential mechanisms can include:
SUSTAINABLE FORESTRY
Revenue from timber or other forest products provides the underlying economic activity while management practices seek to preserve long-term forest productivity.
CARBON MARKETS
Qualifying projects may generate carbon credits representing verified emissions reductions or removals.
BIODIVERSITY CREDITS
Emerging markets are attempting to assign economic value to measurable improvements in biodiversity. These markets remain comparatively early-stage and should not be treated as equivalent to established commodity or securities markets.
CONSERVATION AGREEMENTS
Landowners may receive payments or economic benefits in exchange for restricting development or maintaining particular environmental characteristics.
ECOSYSTEM-SERVICE PAYMENTS
Governments, utilities, companies or other beneficiaries may pay for outcomes such as watershed protection.
SUSTAINABLE COMMODITIES
Agriculture and forestry supply chains may reward certain verified production practices.
BLENDED FINANCE
Public, philanthropic and private capital may be combined to improve project economics or reduce particular risks.
These mechanisms attempt to accomplish something economically significant:
Turn an environmental outcome into a financial cash flow.

The Measurement Problem
Natural-capital investing creates a challenge that is less pronounced in many traditional asset classes. The investor must often measure not only financial performance but also **changes in nature itself**.
If a project claims to restore biodiversity, what exactly improved?
If a forest project generates carbon credits, how much additional carbon was actually stored?
If a habitat project claims conservation benefits, would the habitat have remained intact without the project?
These questions introduce concepts such as:
Baseline
What would have happened without the project?
Additionality
Did the investment create an environmental outcome beyond what would otherwise have occurred?
Permanence
Will the environmental benefit endure?
Leakage
Did protecting one location simply move the damaging activity somewhere else?
Measurement
Can the environmental outcome be quantified?
Verification

Can an independent party confirm the result?
These are not merely environmental questions.
They can directly affect the economic value of environmental assets.

Technology Is Making Nature More Measurable
Technology could play an increasingly important role in addressing this problem.
Satellite imagery can monitor forest cover.
Remote sensing can detect land-use changes.
Drones can collect detailed site information.
Sensors can monitor environmental conditions.
Artificial intelligence can analyze large environmental datasets.
Digital measurement, reporting and verification systems can help track project outcomes.
This creates another convergence within the environmental investment economy:
NATURE + DATA + TECHNOLOGY
Better measurement does not automatically make an environmental asset valuable.
But credible measurement can make environmental claims more transparent and potentially more useful to investors, regulators and purchasers.

Restoration Can Become an Investment Activity
Natural-capital investing does not have to involve protecting an ecosystem in its existing condition.
Capital can also be used to improve degraded landscapes.
Potential activities include:
Reforestation
Afforestation where ecologically appropriate
Wetland restoration
Habitat restoration
Watershed rehabilitation
Soil restoration
Improved forest management
Conservation infrastructure
This introduces an investment model similar in some respects to value-add real estate or farmland.
An investor acquires or finances an asset where improvements are expected to enhance its economic or environmental characteristics.
However, the analogy has limits.
Restoring an ecosystem can take years or decades, environmental outcomes may be uncertain, and markets for monetizing those outcomes may still be developing.
Long investment horizons may therefore be particularly relevant.

Natural Capital Is Not the Same as Carbon
One distinction should be especially clear.
Natural capital and carbon markets are not interchangeable.
A forest can store carbon while simultaneously supporting biodiversity, water regulation, soil protection and local livelihoods.
A carbon credit generally attempts to monetize one particular environmental attribute.
Reducing the entire value of an ecosystem to its carbon content can therefore miss important dimensions of the asset.
For investors, this distinction matters.
A project with credible carbon economics is not automatically a strong biodiversity project.

Likewise, an ecologically valuable conservation project may not necessarily generate attractive carbon revenues.
Environmental outcomes should be evaluated individually.

Communities Matter
Natural assets frequently exist in landscapes where people live and work.
Forests may support local communities through timber, food, fuelwood, tourism and other economic activities. UNEP's 2025 analysis of high-risk tropical forests notes that these ecosystems provide important benefits including water and soil regulation, rainfall recycling, pollination, food security and livelihoods. UNEP - UN Environment Programme
This makes community relationships particularly important.
Investors should understand:
Who owns the land?
Who has legal or customary rights to use it?
Who receives project revenues?
Who bears restrictions created by conservation?
How are Indigenous Peoples and local communities involved?
What happens if project economics conflict with existing livelihoods?
An environmental project that ignores land tenure or community economics can introduce substantial legal, operational and reputational risks.

Nature Is Economically Important—but Not Automatically Investable
One of the most important distinctions in this chapter is between **economic value and investment value**.
Nature can provide enormous benefits to society without generating a direct cash flow for an investor.
A forest may reduce flooding.
A wetland may improve water quality.
Pollinators may support agriculture.
Biodiversity may improve ecosystem resilience.
These benefits can be economically significant.
But unless a mechanism exists through which some portion of that value can be captured by the project, they may not support a conventional private investment.
This is why natural-capital markets are still developing.
The challenge is not proving that nature matters.
The challenge is building credible financial structures around that value.

What Investors Should Examine
Natural-capital investments require conventional financial due diligence alongside environmental analysis.
Important questions include:
Who owns the underlying land or natural asset?
Are ownership and usage rights legally established?
What generates the project's revenue?
Is there an existing operating business?
Are environmental credits included in projected returns?
Who is expected to purchase those credits?
What methodology is being used?
How is additionality established?
How is permanence addressed?

Who performs verification?
What happens if environmental outcomes are not achieved?
Does the project depend upon future environmental-market prices?
What are the restoration or management costs?
How are local communities affected?
What insurance is available?
What is the expected holding period?
How does the investor exit?
Perhaps most importantly:
Would the investment still make economic sense if the most optimistic environmental-revenue assumptions were reduced?
That can be a useful stress test.

The 2027 Natural-Capital Investment Question
Entering 2027, the investment case for natural capital presents an unusual combination.
The underlying resources are enormous.
Forests alone cover approximately **4.14 billion hectares** of the planet. FAOHome
The environmental financing requirement is substantial.
Annual forest investment would need to rise from approximately **$84 billion to $300 billion by 2030** under UNEP's estimate. UNEP - UN Environment Programme
Biodiversity financing requirements are larger still.
Yet private capital remains a relatively small part of current nature finance.
This means the opportunity is not simply the size of nature.
The opportunity lies in developing **credible investment structures capable of connecting capital with measurable environmental outcomes and sustainable economic activity.**
ECOLENCE RESEARCH PERSPECTIVE
Natural capital may ultimately become one of the most important—and most difficult—areas of environmental investing.
The underlying economic logic is compelling:
Healthy forests have value.
Clean watersheds have value.
Productive soils have value.
Biodiversity has value.
Resilient ecosystems have value.
But recognizing value and monetizing value are different things.
For private investors, successful natural-capital strategies will likely require more than compelling environmental narratives. They will require clearly defined property rights, credible measurement, identifiable revenue sources, disciplined valuation and realistic exit strategies.
That leads to the central thesis of this chapter:
Nature can be economically valuable without automatically being an investment. The opportunity for natural capital is to build credible financial structures that connect the two.
If that bridge continues to develop, forests, biodiversity and ecosystem restoration could become a considerably more significant component of the private environmental investment universe.

7. Carbon & Environmental Markets



Turning Environmental Outcomes Into Economic Assets

Carbon markets represent one of the most ambitious experiments in environmental finance.

The underlying concept is relatively straightforward: if reducing or removing greenhouse-gas emissions has measurable value, that environmental outcome can potentially be quantified, verified and converted into an economic instrument.

In practice, however, carbon markets have proven considerably more complicated.

They encompass government-mandated emissions trading systems, carbon taxes, voluntary carbon credits, international mechanisms and an expanding ecosystem of registries, project developers, verification firms, ratings providers and trading platforms.

Entering 2027, carbon markets therefore present investors with an unusual combination of **economic opportunity, environmental purpose, evolving regulation and significant integrity risk**.

The central question is no longer simply whether carbon can have a price.

It is:

Can environmental outcomes be measured and traded with enough integrity that investors, companies, governments and communities can trust the asset being created?

Carbon Pricing Has Become a Significant Economic Mechanism

Carbon pricing is no longer a small policy experiment.

According to the World Bank's 2026 *State and Trends of Carbon Pricing*, **87 direct carbon-pricing policies now cover approximately 29% of global greenhouse-gas emissions**. Carbon pricing generated more than **$107 billion for public budgets in 2025**. World Bank
This represents substantial growth over the past decade.
But the term **"carbon market"** can describe several very different systems.

EMISSIONS TRADING SYSTEMS
Governments establish limits or requirements around emissions and allow regulated entities to trade emissions allowances.

CARBON TAXES
Governments directly establish a price on certain greenhouse-gas emissions.

COMPLIANCE CARBON CREDITS
Certain regulatory systems permit qualifying carbon credits to satisfy part of a regulated entity's obligations.

VOLUNTARY CARBON MARKETS
Companies and other organizations voluntarily purchase credits representing claimed emissions reductions or removals.

INTERNATIONAL CARBON MARKETS
Mechanisms including those associated with Article 6 of the Paris Agreement can facilitate international cooperation involving emissions reductions.
These markets should not be treated as interchangeable.
Their rules, participants, prices and underlying economic drivers can differ substantially.

What Exactly Is a Carbon Credit?
At its simplest, a carbon credit generally represents **one metric ton of carbon-dioxide equivalent reduced or removed from the atmosphere**, subject to the rules of the applicable program or methodology.
Projects generating credits can include activities such as:
Reforestation
Forest conservation
Improved forest management
Methane capture
Landfill-gas projects
Household and community technologies
Agricultural practices
Biochar
Direct air capture
Carbon capture and storage
Other emissions-reduction or removal activities
The process generally follows a chain:
PROJECT → MEASUREMENT → VALIDATION → VERIFICATION → ISSUANCE → REGISTRY → SALE → RETIREMENT
Once issued, credits may be sold to buyers.
When a buyer uses a credit for an eligible claim or purpose, the credit is generally **retired**, preventing that particular unit from being used again.
Registries are therefore a critical part of the market infrastructure.
The Berkeley Carbon Trading Project's database now tracks projects, issuances and retirements across six major voluntary registries that it says account for almost all voluntary-market offsets. Goldman School of Public Policy

A Credit Is Only as Valuable as the Claim Behind It

Carbon credits present an unusual investment challenge.

Two credits may both represent one metric ton of carbon dioxide equivalent.

That does **not** necessarily make them economically or environmentally equivalent.

Their value can depend upon:

Project type
Methodology
Location
Vintage
Additionality
Permanence
Measurement uncertainty
Verification
Registry
Community safeguards
Corresponding adjustments or authorization where relevant
Eligibility for particular compliance or international uses
Buyer perception

This explains why carbon should not be viewed as a single standardized commodity in the same manner as a barrel of a specified grade of oil.

A carbon credit contains a significant amount of information about **how the environmental outcome was produced**.

Integrity Has Become the Central Issue

The voluntary carbon market has faced sustained criticism over whether some credits represent the environmental benefits claimed.

The principal concerns include several recurring issues.

ADDITIONALITY

Would the emissions reduction or removal have occurred even without carbon-credit revenue?

If so, issuing credits may not represent an additional environmental outcome.

BASELINES

What would emissions have been without the project?

An overly generous baseline can potentially produce more credits than the underlying environmental benefit warrants.

PERMANENCE

If carbon is stored in a forest and that forest later burns or is cleared, what happens to the claimed carbon benefit?

LEAKAGE

If deforestation is prevented in one location but simply moves elsewhere, how much environmental benefit has actually occurred?

QUANTIFICATION

Can the emissions reduction or removal be measured accurately?

DOUBLE COUNTING

Could more than one party claim the same environmental outcome?

VERIFICATION

How independent and rigorous is the process used to confirm project performance?

These issues directly affect the economic credibility of the underlying asset.

The Market Has Already Experienced a Credibility Shock

The voluntary carbon market's recent history demonstrates the consequences of these concerns. Ecosystem Marketplace reported that the value of voluntary carbon-market transactions fell to approximately **$535 million in 2024**, a 29% decline from 2023. Transaction volume declined 25%, while average prices declined 5.5%. 3298623.fs1.hubspotusercontent-na1.net
That decline did not mean carbon-credit activity disappeared.
Approximately **182 million metric tons of credits were retired in 2024**, and retirements remained relatively elevated compared with historical levels. Forestry and land-use credits accounted for approximately 68 million tons of those retirements. 3298623.fs1.hubspotusercontent-na1.net
Instead, the market increasingly began differentiating among credits.
The World Bank reported that carbon-credit supply continued to exceed demand in 2024, pushing the global inventory of unretired credits toward **one billion tons**. Its 2026 update reports that issuances increased 8% from 2024 to 2025 while prices softened slightly, although certain categories—including highly rated forest conservation and reforestation credits—continued to command premiums. World Bank
This points toward an important evolution:
The carbon market may increasingly be moving from a market focused on the quantity of credits toward one that differentiates more aggressively based on quality.

Not All Carbon Credits Should Trade at the Same Price
That development is economically logical.
Consider two hypothetical credits.
One originates from a project with uncertain additionality, limited monitoring and questionable permanence.
Another comes from a project with conservative accounting, transparent data, strong independent verification, durable carbon storage and credible community safeguards.
Both may nominally represent one ton.
Their underlying risk characteristics are different.
Carbon markets are therefore beginning to develop something resembling **quality differentiation**.
This can affect pricing.
The question for an investor or purchaser becomes not merely:
“What is the price of carbon?”
but:
“What environmental outcome does this particular credit represent, and how confident are we that the outcome is real?”

Standards Are Attempting to Raise the Bar
One response to the market's integrity problems has been the development of stronger quality frameworks.
The Integrity Council for the Voluntary Carbon Market established the **Core Carbon Principles**, or CCPs, as a benchmark for high-integrity credits.
Its framework includes requirements addressing:
Effective governance
Tracking
Transparency
Independent validation and verification
Additionality
Permanence

Robust quantification
No double counting
Sustainable-development safeguards
Contribution toward net-zero transition ICVCM
By late 2025, approximately **51 million unretired credits** had been approved to use the CCP label, representing only about **4% of credits in the market** according to ICVCM's 2025 impact report. ICVCM
That figure illustrates both progress and the size of the challenge.
Higher-integrity standards are emerging, but they do not yet encompass the entire market.

Regulation Is Increasing
Carbon markets are also receiving greater attention from financial regulators.
In the United States, the Commodity Futures Trading Commission issued final guidance in 2024 for derivatives exchanges listing contracts based on voluntary carbon credits. Among its objectives were improving transparency, liquidity and market integrity. CFTC
The risks are not theoretical.
Also in 2024, the CFTC brought what it described as its **first fraud enforcement actions involving the voluntary carbon-credit market**, alleging false, misleading or inaccurate information relating to credits. CFTC
For investors, this reinforces an important point:
Carbon credits may represent environmental outcomes, but once those outcomes become financial assets, **traditional financial-market concerns—fraud, disclosure, conflicts, pricing and market integrity—also become relevant.**

Carbon Markets Can Finance Real-World Projects
Despite these challenges, carbon markets can perform an important financing function.
Consider a reforestation project.
Planting and maintaining a forest requires capital today.
The potential environmental benefit may occur over many years.
If verified carbon removals can generate credits, future environmental performance can potentially create a revenue stream supporting the project's economics.
The same concept can apply to methane capture, improved forest management, biochar and engineered carbon removal.
Carbon markets can therefore connect:
CAPITAL → PROJECT → ENVIRONMENTAL OUTCOME → CREDIT → BUYER
When the system functions properly, the buyer receives a verified environmental asset while capital reaches the project responsible for generating the underlying outcome.
That is the fundamental economic promise of environmental markets.

Carbon Removal Is Emerging as a Distinct Market
Another development investors should watch is the distinction between **avoided emissions** and **carbon removals**.
An avoidance project attempts to prevent emissions that otherwise would have occurred.
A removal project takes carbon dioxide from the atmosphere and stores it.
Removal approaches can include:
Reforestation
Afforestation
Soil carbon
Biochar
Bioenergy with carbon capture and storage

Direct air capture
Enhanced mineralization and other emerging approaches
These approaches have very different costs, durability characteristics and technological risks.
The market is beginning to incorporate newer engineered-removal categories as well. Berkeley's registry database, for example, added its first bioenergy-with-carbon-capture-and-storage and direct-air-capture projects during 2025. Goldman School of Public Policy
For investors, carbon removal could therefore become both an environmental market and a technology market.

Beyond Carbon: Environmental Markets Are Expanding
Carbon is unlikely to remain the only environmental attribute that markets attempt to monetize.
Emerging environmental markets include:
Biodiversity credits
Water-quality credits
Nutrient credits
Wetland mitigation
Habitat credits
Renewable-energy certificates
Other ecosystem-service payments
Each attempts, in different ways, to convert an environmental outcome into something measurable and economically valuable.
The underlying idea is similar:
If an environmental improvement can be defined, measured, verified and legally attributed, markets may be able to assign economic value to it.
But the lessons of carbon markets should serve as a warning.
Creating a unit is relatively easy.
Creating a unit that markets can **trust** is considerably harder.

The Investment Opportunity Exists at Multiple Levels
Investors do not necessarily have to purchase carbon credits directly to participate in environmental markets.
Investment opportunities may exist across the broader market infrastructure.
PROJECT DEVELOPMENT
Financing forestry, methane, agricultural, restoration or carbon-removal projects.
PROJECT FINANCE
Providing debt or structured capital to projects expecting future environmental-credit revenue.
TECHNOLOGY
Investing in measurement, monitoring, verification, satellite, sensor and environmental-data companies.
MARKET INFRASTRUCTURE
Registries, trading platforms, ratings providers and other systems supporting environmental markets.
NATURAL ASSETS
Owning forests, farmland or other properties capable of generating environmental attributes.
CARBON REMOVAL
Financing technologies or projects capable of physically removing and storing atmospheric carbon.
This makes environmental markets broader than simply trading credits.

Environmental Revenue Should Be Underwritten Carefully
For real-asset investments such as farmland and forestry, carbon revenue can be attractive.
But it can also create valuation risk.

Suppose a project's projected investment return depends heavily upon carbon credits selling at substantially higher prices five years from now.
The investor is making at least two investments:
An investment in the underlying asset
and
An investment in the future carbon market.
Those risks should be analyzed separately.
A prudent underwriting process may therefore examine:
Base case without carbon revenue
Conservative carbon-price case
Expected carbon-price case
Project costs required to generate credits
Verification and registry expenses
Credit issuance timing
Potential reversals
Buyer demand
Regulatory eligibility
This can reveal whether carbon represents supplementary upside or whether the entire investment thesis depends upon an uncertain environmental market.

What Investors Should Examine
Carbon and environmental-market due diligence can be particularly demanding.
Important questions include:
What exactly does the credit represent?
Which methodology created it?
Which registry issued it?
Who owns the underlying environmental rights?
How was the baseline established?
Is the project genuinely additional?
How is the environmental outcome measured?
Who validates and verifies the project?
How frequently is verification performed?
How is permanence addressed?
What happens following a reversal?
How is leakage addressed?
Could the environmental benefit be counted more than once?
What rights do local communities possess?
What portion of revenue reaches the project?
Who is expected to buy the credits?
Is there a contracted buyer or only projected market demand?
What happens if credit prices decline?
And perhaps most importantly:
Does the investment still work if projected carbon revenues are materially lower than expected?

The 2027 Carbon-Market Question
Entering 2027, carbon markets appear to be undergoing a transition rather than simply expanding in a straight line.
Government carbon pricing continues to broaden, with direct carbon prices now covering approximately **29% of global greenhouse-gas emissions**. World Bank

The voluntary market, meanwhile, has experienced weaker transaction volumes, excess supply and significant scrutiny of credit quality. 3298623.fs1.hubspotusercontent-na1.net
At the same time, stronger integrity frameworks, increased regulatory attention, improved data and new carbon-removal technologies are attempting to address some of the weaknesses exposed during the market's earlier growth.
The central question for 2027 therefore may not be:
“How large can the carbon market become?”
It may be:
“Can carbon markets become sufficiently transparent, measurable and credible that high-quality environmental outcomes become durable financial assets?”

ECOLENCE RESEARCH PERSPECTIVE
Carbon markets illustrate both the promise and the difficulty of environmental finance.
Their promise is powerful.
An environmental outcome that historically had little direct economic value can potentially be measured, verified and monetized.
That can direct private capital toward forests, restoration, methane reduction, cleaner technologies and carbon removal.
But the same mechanism creates substantial responsibility.
If the underlying environmental outcome is overstated, the financial asset built upon it is weakened.
If measurement is unreliable, pricing becomes unreliable.
If claims exceed what the credit actually represents, market confidence deteriorates.
And if investors cannot distinguish high-quality environmental assets from weak ones, capital may not reach the projects capable of producing the greatest impact.
For Ecolence, that leads to one of the most important principles in the entire 2027 Outlook:
Environmental markets do not create value simply by putting a price on nature. They create durable value only when the environmental outcome behind that price is credible.
The next stage of carbon markets may therefore be defined less by **how many credits can be created** and more by **which credits investors and buyers are willing to trust**.
That evolution—from quantity toward quality—could ultimately determine whether carbon and other environmental markets mature into a durable component of the global environmental investment economy.

8. Circular Economy & Resource Efficiency



Turning Waste Into Economic Value

For much of the industrial era, economic growth has followed a largely linear model:

EXTRACT → PRODUCE → CONSUME → DISCARD

Raw materials are removed from the earth, converted into products, used and eventually disposed of.

The circular economy proposes a different model.

Instead of treating discarded products and materials as the end of an economic process, it attempts to keep products, components and materials in productive use for as long as economically practical—through reuse, repair, refurbishment, remanufacturing, recycling and recovery.

The investment thesis extends beyond reducing waste.

It is about **recovering economic value that the linear economy routinely throws away.**

That distinction is becoming increasingly important. UNEP reports that natural-resource extraction has tripled over the past five decades and, without significant changes, could increase another **60% from 2020 levels by 2060**. UNEP - UN Environment Programme

At the same time, the World Bank reports that the world generated approximately **2.56 billion tonnes of solid waste in 2022** and projects that amount could reach **3.86 billion tonnes annually by 2050** under a business-as-usual scenario. World Bank

This creates the central investment question for the circular economy:

What if materials traditionally considered waste could instead become productive economic inputs?

Waste Is Becoming an Infrastructure Problem
The scale of global waste is creating a significant requirement for infrastructure.
Waste must be:
Collected
Transported
Sorted
Processed
Recycled
Composted
Recovered
Reintroduced into production
Or safely disposed of
Each step requires physical assets, technology, labor and capital.
The World Bank estimates that bridging waste-management infrastructure gaps across low- and lower-middle-income countries could require approximately **$556 billion of investment between 2022 and 2050**. World Bank
This means the waste challenge increasingly resembles other sectors examined in this report.
Like electricity, water and agriculture, it requires a physical system.
For investors, that creates an important shift in perspective:
Waste is not merely an environmental problem. It is an infrastructure system with potential economic value embedded within its material flows.

The Economics of Waste Are Already Significant
Waste carries costs whether societies invest in managing it or not.
UNEP's *Global Waste Management Outlook 2024* estimated the direct global cost of waste management at approximately **$252 billion in 2020**.
When broader costs associated with pollution, health effects and climate impacts were included, UNEP estimated the cost at approximately **$361 billion**.
Without substantial changes, UNEP projected that annual global costs could reach approximately **$640 billion by 2050**. UNEP - UN Environment Programme
But its modelling also demonstrates why circularity can become an economic question rather than solely an environmental one.
Under UNEP's circular-economy scenario—incorporating waste avoidance, improved management and more sustainable business practices—the organization estimated a potential **net annual economic gain of $108.5 billion by 2050** rather than escalating net costs. UNEP - UN Environment Programme
That represents a fundamental change in thinking:
Waste management asks how we dispose of materials.
Circular economics asks how we preserve their value.

Circular Economy Is More Than Recycling
One of the most common misconceptions is that the circular economy is simply another term for recycling.
It is considerably broader.
The Ellen MacArthur Foundation defines the circular economy around three principles:
Eliminate waste and pollution.
Circulate products and materials at their highest value.
Regenerate nature. Ellen MacArthur Foundation
Recycling remains important, but it often occurs after much of a product's original economic value has already been lost.

Consider a piece of industrial equipment.
Keeping the equipment operating through maintenance can preserve most of its value.
Refurbishing it preserves less, but still retains much of the product.
Remanufacturing its components captures additional value.
Breaking the equipment down into raw materials for recycling may preserve some material value—but loses much of the energy, labor, engineering and manufacturing embedded in the original product.
A circular hierarchy therefore looks more like:
REDUCE → REUSE → REPAIR → REFURBISH → REMANUFACTURE → RECYCLE → RECOVER
The closer capital can remain to the original product, component or material, the greater the potential to preserve embedded economic value. Ellen MacArthur Foundation

Waste Can Become Feedstock
The traditional economy generally considers raw materials and waste to be separate categories.
The circular economy attempts to narrow that distinction.
Recovered materials can potentially become inputs for another production process.
Examples include:
Scrap metal → new metal products
Used batteries → recovered lithium, nickel, cobalt and other materials
Plastic waste → recycled polymers
Construction debris → aggregates and building materials
Food waste → compost, fertilizer or biogas
Wastewater → reclaimed water and recovered nutrients
Textile waste → recycled fibers
Electronic waste → recovered metals and components
Used industrial equipment → refurbished or remanufactured machinery
This can create an industrial ecosystem in which one company's waste stream becomes another company's raw-material supply.
The economic objective is straightforward:
Capture the remaining value before the material leaves the productive economy.

Resource Security Strengthens the Investment Case
Circularity can also have implications beyond waste reduction.
It can influence **supply-chain resilience**.
Modern industries depend upon complex global supplies of metals, minerals, chemicals and manufactured components.
When those materials are discarded after a single economic cycle, the economy must return to primary extraction for replacement supply.
Recovering materials domestically can potentially reduce dependence on virgin resources and provide alternative sources of supply.
The Ellen MacArthur Foundation argues that keeping products and materials in circulation can reduce exposure to raw-material price volatility and supply disruption. Ellen MacArthur Foundation
This gives circular-economy investment a strategic dimension.
It can potentially connect:
RESOURCE EFFICIENCY
with
SUPPLY-CHAIN SECURITY
and
INDUSTRIAL RESILIENCE
For certain critical materials, the economic importance of those connections may increase substantially.

Recycling Infrastructure Is Becoming Industrial Infrastructure
At scale, recycling is not simply a collection activity.
Modern recycling can involve sophisticated industrial facilities incorporating:
Automated sorting
Optical recognition
Robotics
Artificial intelligence
Chemical processing
Mechanical separation
Metallurgical recovery
Material purification
Digital tracking
Quality-control systems
A facility capable of recovering valuable materials from batteries, electronics or industrial waste may resemble a manufacturing or processing facility more than a traditional landfill operation.
This creates another convergence within the environmental economy:
WASTE + INFRASTRUCTURE + TECHNOLOGY + MANUFACTURING
For investors, that expands the opportunity beyond traditional waste companies.

Technology Is Making Waste More Valuable
Technology can improve both the identification and recovery of materials.
Artificial intelligence can help identify materials on sorting lines.
Computer vision can distinguish different waste streams.
Robotics can automate sorting.
Sensors can improve material identification.
Digital platforms can connect suppliers of waste materials with potential buyers.
Material passports can potentially track the composition and history of products.
Predictive analytics can improve collection routes and facility operations.
Technology may therefore increase the percentage of material that can be economically recovered.
But perhaps more importantly, it can improve information about the material itself.
A material with unknown composition may be waste.
A material with verified composition, quantity and quality may become a **commodity**.

The Battery Economy Illustrates the Opportunity
Few sectors illustrate circular economics as clearly as batteries.
Electric vehicles, grid storage, consumer electronics and industrial equipment increasingly rely upon battery systems containing economically valuable materials.
When a battery reaches the end of its useful life, those materials do not necessarily cease to have value.
They can potentially be recovered and returned to battery supply chains.
This creates a circular system:
MINERALS → BATTERY → USE → COLLECTION → RECYCLING → RECOVERED MATERIALS → NEW BATTERY
The investment opportunity can therefore exist across:
Collection
Transportation
Battery diagnostics
Second-life applications
Disassembly

Recycling technology
Material recovery
Refining
Reintegration into manufacturing
The economics depend heavily on commodity prices, technology, recovery rates, feedstock availability and regulation.
But the principle is important.
The end of a product's first life does not necessarily represent the end of its economic life.

Food and Organic Waste Create a Different Circular Economy
Not all circular materials are industrial.
Organic waste creates another opportunity.
Food scraps, agricultural residues and other biological materials can potentially be transformed through:
Composting
Anaerobic digestion
Biogas production
Nutrient recovery
Soil amendments
Animal-feed applications where appropriate
Bio-based materials
These systems attempt to return biological nutrients to productive use rather than sending them to disposal.
This links the circular economy directly back to agriculture and natural capital.
The environmental investment economy is increasingly interconnected.

Buildings Represent Material Banks
Buildings contain enormous quantities of steel, concrete, glass, timber, wiring, equipment and other materials.
Traditionally, demolition can turn much of this material into waste.
A circular approach asks whether buildings can instead be viewed as **material banks**.
That could involve:
Designing structures for disassembly
Reusing structural components
Recovering metals
Recycling concrete
Reusing timber
Refurbishing equipment
Tracking materials through digital systems
The investment opportunity therefore extends beyond waste facilities.
It can begin at the **design stage of the asset itself**.
This is a recurring circular-economy principle:
The cheapest waste to manage may be the waste that was never created.

New Business Models Can Be Circular
Circularity can also change the way companies generate revenue.
Traditional manufacturing often follows:
Produce → Sell → Replace
Circular models may instead use:
Rental

Leasing
Subscription
Product-as-a-service
Repair
Resale
Refurbishment
Remanufacturing
In these models, the producer may maintain an economic relationship with the product throughout more of its useful life.
That can create incentives to design products that last longer, are easier to repair and retain higher residual value.
The Ellen MacArthur Foundation estimates circular markets in Europe alone could reach approximately **€1.5 trillion by 2040**, although this is a forward-looking estimate rather than guaranteed market growth.
Ellen MacArthur Foundation

Circularity Can Create Multiple Revenue Streams
A circular-economy business may potentially generate revenue from several sources.
A recycling facility, for example, could receive:
Tipping or processing fees
plus
Revenue from recovered materials
plus, in some circumstances,
Environmental attributes or incentives
A refurbishment business may acquire used equipment at relatively low cost and resell restored equipment.
A product-as-a-service business may generate recurring revenue while retaining ownership of the underlying asset.
A waste-to-resource facility may collect disposal fees while producing a saleable output.
This can create attractive economics.
But it can also create complicated underwriting.

Waste Does Not Automatically Equal Value
The existence of enormous amounts of waste does not mean every waste stream represents an attractive investment.
This distinction is essential.
A material may technically be recyclable but economically uneconomic to recover.
The economics depend upon:
Collection costs
Transportation
Contamination
Sorting costs
Processing costs
Energy requirements
Recovery rates
Quality of recovered material
Commodity prices
Scale
Regulation
Customer demand

Competition with virgin materials
If producing a virgin material costs substantially less than recovering the recycled alternative, the environmental benefit alone may not create a sustainable private investment.
That means the key question is not:
“Can this material be recycled?”
It is:
“Can this material be recovered, processed and resold economically at scale?”

Feedstock Risk Matters
Many circular-economy facilities depend upon a consistent supply of waste material.
That creates a risk investors may initially overlook.
A recycling plant may have excellent technology but insufficient material to process.
Or it may obtain adequate volume but receive contaminated or inconsistent feedstock.
Investors should therefore examine:
Where does the material originate?
Are supply agreements in place?
How long are those contracts?
What quality standards apply?
What happens if feedstock volumes decline?
Who pays transportation costs?
A waste-processing facility without dependable feedstock can face the same problem as a factory without raw materials.

Commodity Prices Can Affect Project Economics
Recovered materials often compete with virgin commodities.
That creates price exposure.
If the price of virgin plastic falls, recycled plastic may become less competitive.
If metal prices decline, the value of recovered metals can fall.
If battery-material prices change significantly, recycling economics can change with them.
Circular-economy investments can therefore contain an environmental narrative while remaining fundamentally exposed to **commodity economics**.
Long-term purchase agreements, processing fees and diversified revenue streams may reduce some of that exposure, but they do not eliminate it.

Regulation Can Be a Major Market Driver
Government policy can materially influence circular-economy economics.
Examples include:
Recycling mandates
Landfill restrictions
Deposit-return systems
Extended Producer Responsibility
Minimum recycled-content requirements
Right-to-repair rules
Packaging regulations
Waste-disposal fees
Public procurement standards
These policies can create demand for collection, repair, reuse and recycled materials.
But policy dependence creates its own risk.

Investors should distinguish between businesses whose economics remain viable independently and those whose profitability relies heavily upon regulatory support.

How Private Capital Can Participate

The circular economy can support several investment structures.

INFRASTRUCTURE

Waste-processing, recycling, composting and material-recovery facilities.

PRIVATE EQUITY

Established businesses providing recycling, reuse, repair, remanufacturing or resource-efficiency services.

PRIVATE CREDIT

Loans financing facilities, equipment and operating companies.

VENTURE CAPITAL

Emerging technologies involving materials science, recycling, digital marketplaces, tracking systems and waste analytics.

REAL ASSETS

Facilities and infrastructure associated with resource recovery.

PROJECT FINANCE

Individual recycling, waste-to-resource and recovery facilities with identifiable cash flows.

As with the other sectors in this report:

The sector identifies the environmental opportunity. The investment structure determines much of the financial risk.

What Investors Should Examine

Circular-economy investments require analysis of both the technology and the material economics.

Important questions include:

What material is being recovered?
Where does the feedstock come from?
Is supply contractually secured?
What does the facility charge to accept material?
What percentage of material can actually be recovered?
What is the recovered material worth?
Who buys it?
Are purchase agreements in place?
Does the output meet customer specifications?
How does it compete with virgin materials?
How proven is the processing technology?
What capital expenditure is required?
How energy-intensive is the process?
What permits are required?
What residual waste remains after processing?
How dependent is the business on regulation or subsidies?
What happens if commodity prices decline?
Can the facility operate profitably at lower throughput?

Those questions help distinguish a compelling circular concept from an economically viable circular investment.

The 2027 Circular-Economy Investment Question

The global economy is consuming increasing quantities of resources while producing increasing quantities of waste.
UNEP warns that natural-resource extraction could increase another **60% by 2060** from 2020 levels without significant changes. UNEP - UN Environment Programme
The World Bank's latest data indicate global solid waste could rise from approximately **2.56 billion tonnes in 2022 to 3.86 billion tonnes by 2050** under business as usual. World Bank
Those trends create pressure on both ends of the economic system:
Obtaining materials at the beginning.
and
Managing discarded materials at the end.
The circular economy attempts to connect the two.
Instead of continually expanding extraction and disposal capacity, capital can potentially be invested in keeping more of the materials already circulating through the economy in productive use.
This leads to the central question entering 2027:
Can waste increasingly become a competitive source of raw materials, products and economic value?

ECOLENCE RESEARCH PERSPECTIVE

The circular economy may ultimately be one of the most economically intuitive areas of environmental investment.
A discarded battery can contain valuable minerals.
An obsolete piece of equipment can contain reusable components.
A demolished building can contain recoverable materials.
Food waste can contain energy and nutrients.
Industrial by-products can become manufacturing inputs.
And products designed to be repaired, reused or remanufactured can retain economic value far longer than products designed for disposal.
The environmental benefit is significant.
But the investment thesis is even more fundamental:
Waste often represents economic value that has been allowed to escape the productive economy.
The opportunity for investors is to identify the businesses, technologies and infrastructure capable of capturing that value **economically and at scale**.
The strongest circular-economy investments will therefore not necessarily be the projects that recycle the greatest quantity of material.
They may be the projects that most effectively answer three questions:
What valuable resource is being lost?
Can it be recovered economically?
Is there a reliable market willing to buy it?
When those three elements align, circularity can move beyond an environmental objective and become a functioning investment model.
And that may ultimately be the most important development in this sector:
The transition from paying to dispose of waste to investing in the value contained within it. UNEP - UN Environment Programme

9. Climate & Environmental Technology



The Technology Layer Transforming the Environmental Economy

Environmental investment is often associated with physical assets: solar farms, agricultural land, forests, water systems, recycling facilities and energy infrastructure.

But increasingly, another layer sits above those assets.

Technology.

Sensors can monitor soil moisture. Satellites can observe forests. Artificial intelligence can forecast electricity demand. Software can manage distributed energy resources. Smart meters can identify consumption patterns. Robotics can sort recyclable materials. Digital systems can measure environmental outcomes.

Technology is therefore becoming the connective tissue between many of the sectors examined throughout this report.

The opportunity is not simply to build more environmental infrastructure.

It is increasingly to make that infrastructure **smarter, more measurable, more productive and more efficient.**

The next phase of environmental investment may be driven as much by intelligence applied to physical assets as by the assets themselves.

The Environmental Economy Is Becoming Digital

The physical environmental economy produces enormous amounts of information.

A solar facility produces generation data.

A farm produces soil, weather and crop data.
A water network produces pressure, flow and quality data.
A forest produces satellite and ecological data.
An electricity grid produces millions of measurements describing supply and demand.
Historically, much of this information was difficult or expensive to collect.
That is changing.
A combination of technologies is making physical systems increasingly observable:
Artificial Intelligence
Satellite Imaging
Remote Sensing
Internet of Things
Sensors
Robotics
Drones
Digital Twins
Cloud Computing
Advanced Analytics
Automation
The result is an important transformation:
PHYSICAL ASSET → DATA → ANALYSIS → DECISION → OPTIMIZATION
The asset remains physical.
But increasingly, technology determines how efficiently that asset can be operated.

Energy Provides the Clearest Example
The electricity system illustrates this convergence particularly well.
As discussed earlier in this report, renewable generation is expanding rapidly. But wind and solar output varies with weather conditions, while electricity supply and demand must remain continuously balanced.
Digital technology can help manage that complexity.
IRENA identifies several areas where digitalization and artificial intelligence can add value to power systems, including **monitoring, forecasting, operational optimization, end-user automation and transparency**. IRENA
Applications can include:
Renewable-generation forecasting
Electricity-demand forecasting
Predictive maintenance
Battery optimization
Grid congestion forecasting
Distributed-energy management
Demand response
Dynamic pricing
Smart-meter analysis
Automated grid operations
IRENA notes that digital twins and AI algorithms can help grid operators forecast congestion, coordinate distributed energy resources and optimize dispatch in near real time. IRENA
This creates an important investment insight.
The value of the future electricity system may reside not only in generating power, but increasingly in the technology used to coordinate it.

AI Could Become an Infrastructure Optimization Tool

Artificial intelligence deserves particular attention because its role within environmental investment can operate in two directions.

First, AI can potentially improve the operation of physical infrastructure.

The IEA identifies applications intended to improve production, lower costs, increase efficiency and uptime, reduce emissions, and improve reliability and resilience across energy systems. It also cautions that many system-wide benefits remain difficult to quantify beyond individual applications. IEA

Potential environmental applications extend well beyond energy:

AGRICULTURE

AI can analyze weather, soil, satellite and crop information to support irrigation, planting and input decisions.

WATER

Algorithms can help identify leaks, predict equipment failures and optimize treatment processes.

FORESTRY

Satellite data and AI can help identify changes in forest cover and potentially support monitoring of restoration projects.

CIRCULAR ECONOMY

Computer vision and robotics can identify and sort materials within recycling facilities.

ENVIRONMENTAL MARKETS

Technology can help process the data used in measurement, reporting and verification.

INFRASTRUCTURE

Predictive-maintenance systems can identify equipment problems before failures occur.

The common theme is **optimization**.

Measurement May Become as Important as Management

Technology is also changing how environmental performance can be measured.

This is especially important for natural capital and environmental markets.

Consider a forestry project claiming to generate carbon removals.

Investors and buyers may want to know:

Did forest cover actually increase?

How much biomass exists?

Has the land been disturbed?

Did a wildfire occur?

Are project boundaries being respected?

Historically, answering these questions could require expensive field surveys.

Field verification remains important, but satellites, drones, sensors and remote-sensing systems can supplement those methods with increasingly frequent observations.

This creates an emerging environmental-technology category often described as:

MRV — Measurement, Reporting and Verification.

Better MRV could become important infrastructure for carbon, biodiversity and other environmental markets because those markets depend upon credible information about underlying environmental outcomes.

Technology does not eliminate integrity problems.

But it can potentially make environmental claims more transparent and auditable.

Agriculture Is Becoming Precision Agriculture

Agriculture provides another clear example of technology meeting real assets.

A traditional farmer manages acreage.

A technology-enabled agricultural operation can increasingly manage **individual sections of that acreage differently**.
Satellite imagery may identify crop stress.
Soil sensors can monitor moisture.
GPS-guided equipment can apply inputs more precisely.
Automated irrigation can respond to field conditions.
Drones can provide high-resolution imagery.
Farm-management software can integrate operating data.
Artificial intelligence can analyze multiple datasets simultaneously.
This can potentially reduce unnecessary inputs while improving productivity.
For investors, agricultural technology therefore creates two distinct opportunities:
Technology companies serving agriculture
and
Agricultural assets using technology to improve operations.
The distinction matters because the investment risks are very different.
A farmland investment remains fundamentally a real-asset investment.
An early-stage agricultural software company may resemble venture capital.
Both participate in the same environmental system.

Water Is Becoming a Data System
Water infrastructure can also benefit from greater visibility.
Many water systems contain aging pipelines and equipment distributed across enormous geographic areas.
Utilities may not always know precisely where water is being lost.
Smart meters, pressure sensors, acoustic monitoring and analytics can help identify leaks and abnormal consumption patterns.
Digital systems can also support:
Water-quality monitoring
Treatment optimization
Predictive maintenance
Irrigation management
Industrial-water efficiency
Wastewater reuse
Watershed monitoring
This creates an interesting economic principle.
Producing additional water can require expensive infrastructure.
Preventing existing water from being lost may sometimes provide a more efficient alternative.
Technology can therefore transform **conservation into operational efficiency**.

Circular Economy Technology Can Identify Hidden Value
The circular economy presents a similar information problem.
Waste streams contain many different materials with different economic values.
Technology can help identify them.
Computer vision can recognize objects.
Artificial intelligence can classify materials.
Robotics can automate sorting.
Digital marketplaces can connect waste producers with potential users.
Tracking systems can document material composition and origin.
In this context:

Better information can transform an unidentified waste stream into a measurable inventory of economic resources.
That creates potential investment opportunities across recycling technology, industrial automation, materials identification and supply-chain software.

Environmental Data May Become an Asset Class of Its Own
As environmental systems become more measurable, the information generated by them can itself become economically valuable.
Potential datasets include:
Weather
Soil
Water
Energy consumption
Electricity generation
Forest cover
Biodiversity
Carbon
Agricultural productivity
Infrastructure condition
Material flows
Companies able to collect, organize, analyze and interpret these datasets may become important participants in environmental markets.
This resembles what occurred in traditional financial markets.
Financial markets developed extensive information infrastructure:
Market data.
Ratings.
Analytics.
Research.
Risk systems.
Trading platforms.
Environmental markets may require a similar information ecosystem.
That creates an investment opportunity that is less visible than a solar farm or forest—but potentially just as important.

Digital Twins Could Change Infrastructure Management
Another emerging technology is the **digital twin**.
A digital twin is a digital representation of a physical system that can incorporate operating data and help model how the real asset behaves.
Potential applications include:
Electricity grids
Power plants
Buildings
Water networks
Industrial facilities
Transportation systems
IRENA specifically identifies digital twins among the tools that can help power-system operators forecast congestion, coordinate distributed resources and optimize operations. IRENA
For infrastructure investors, the concept is significant.
Historically, investors could finance a physical asset and monitor its financial performance.

Increasingly, digital systems may provide continuous information about the **physical performance of the asset itself**.
That could improve maintenance, asset management and eventually underwriting.

Technology Can Extend the Life of Existing Assets
Environmental investment does not always require building something new.
Technology can sometimes increase the productivity or operating life of infrastructure that already exists.
Predictive maintenance is a good example.
Instead of waiting for equipment to fail, sensors and analytics can identify changes in vibration, temperature, pressure or performance that indicate developing problems.
Maintenance can then be performed earlier.
IRENA identifies predictive maintenance and real-time monitoring as tools capable of improving renewable-asset efficiency, lowering costs and extending operating lifetimes. IRENA
This produces another important investment principle:
One of the most resource-efficient investments may be making an existing asset work better and last longer.

Technology Creates New Investment Structures
Environmental technology also expands the ways investors can participate in the environmental economy.
VENTURE CAPITAL
Early-stage companies developing new environmental technologies.
GROWTH EQUITY
Companies with proven technologies attempting to scale.
PRIVATE EQUITY
Established environmental-technology and service businesses.
PRIVATE CREDIT
Financing equipment, technology deployments and growing operating companies.
INFRASTRUCTURE TECHNOLOGY
Software and hardware embedded within energy, water, transportation and environmental infrastructure.
PROJECT TECHNOLOGY
Technologies incorporated directly into individual environmental projects.
SOFTWARE & DATA
Platforms providing monitoring, analytics, environmental data or market infrastructure.
This is a fundamentally different investment universe from owning farmland, forests or solar facilities.
Technology may offer higher potential growth.
But it can also introduce higher failure risk.

Technology Risk Is Different From Asset Risk
Consider two investments.
One is an operating solar facility using established photovoltaic technology.
The other is an early-stage company developing a new solar material.
Both relate to solar energy.
But their risks are dramatically different.
The operating facility may primarily face:
Power-price risk
Counterparty risk
Equipment risk
Financing risk

Operating risk
The technology company may face:
Product-development risk
Commercialization risk
Intellectual-property risk
Manufacturing risk
Competition
Capital requirements
Technology obsolescence
Potential complete loss of invested capital
This reinforces one of the central themes of the entire Ecolence Outlook:
Environmental exposure does not define investment risk. Structure, maturity and business model do.

AI Also Creates an Environmental Infrastructure Challenge
Technology's relationship with the environment is not entirely positive.
Artificial intelligence itself requires physical infrastructure.
Data centers consume electricity.
They require grid connections.
They require cooling.
They use land and equipment.
In some locations they can also require substantial water resources.
The IEA estimated data centers consumed approximately **415 TWh of electricity in 2024**, roughly 1.5% of global electricity consumption. Its 2025 analysis projected consumption of around **945 TWh by 2030** in its base case. IEA
More recent IEA analysis reports data-center electricity consumption reached about **485 TWh in 2025** and maintains a central projection of approximately **950 TWh in 2030**, with AI-focused data-center electricity use growing substantially faster than the overall category. IEA
That creates a paradox.
AI can help optimize energy systems.
But AI also increases electricity demand.
Technology can simultaneously become part of the environmental solution and part of the infrastructure challenge.
Investors should recognize both sides.

Technology and Energy Are Becoming Interdependent
This interaction could become increasingly important.
The IEA estimates that roughly half of the increase in electricity required by data centers through 2035 in its base case is met by renewable generation, while natural gas and nuclear also contribute materially. IEA
Data-center growth therefore creates demand not simply for servers.
It can create demand for:
Electricity generation
Transmission
Grid infrastructure
Battery storage
Cooling
Water infrastructure
Backup power

Energy management
The technology economy and environmental infrastructure economy are becoming interconnected. That may produce investment opportunities on both sides of the relationship.

Not Every Environmental Technology Will Succeed
Technology investing also requires particular discipline because innovation markets frequently produce winners and losers.
A technology can be environmentally useful and still fail commercially.
Potential problems include:
High production costs
Difficulty scaling
Insufficient customer demand
Long sales cycles
Competition
Capital intensity
Regulatory barriers
Supply-chain constraints
Dependence on subsidies
Technology obsolescence
Inability to achieve expected performance
Investors should therefore separate three questions:
Does the technology work?
Does the technology solve an important problem?
Can the company build a profitable business around it?
All three matter.
What Investors Should Examine
Environmental-technology due diligence can include:

What problem does the technology solve?
Is the problem economically important to the customer?
Does the technology already work at commercial scale?
Is it software, hardware or both?
How capital-intensive is deployment?
Who owns the intellectual property?
How defensible is the technology?
What competing solutions exist?
Who is the customer?
How long is the sales cycle?
Does adoption require regulation or subsidies?
What gross margins are achievable?
How much additional capital will the company require?
Can the technology integrate with existing infrastructure?
What cybersecurity risks exist?
How is environmental impact measured?
Does greater adoption create unintended environmental costs?
And perhaps most importantly:
Is the technology creating measurable economic value for the customer—or merely an environmental benefit that customers may be unwilling to pay for?

“That distinction can determine commercial viability.”

The 2027 Environmental-Technology Question

Entering 2027, environmental technology appears increasingly likely to function as an enabling layer across the broader environmental investment economy.
Renewable generation requires smarter grids.
Agriculture increasingly uses precision technologies.
Water systems require better monitoring.
Natural-capital markets require credible measurement.
Carbon markets require stronger verification.
Circular systems require better material identification.
Infrastructure requires predictive maintenance.
The common requirement is information.
Measure the asset.
Understand the asset.
Optimize the asset.
Verify the outcome.
Technology increasingly performs those functions.
At the same time, rapid expansion of AI and data infrastructure creates new electricity and infrastructure requirements of its own. The IEA's projection of roughly **950 TWh of data-center electricity consumption by 2030** illustrates how quickly the relationship between digital technology and physical infrastructure is evolving. IEA
The 2027 investment question is therefore not simply:
“Which environmental technology will grow?”
It is:
“Which technologies will become indispensable to operating the physical environmental economy more efficiently?”

ECOLENCE RESEARCH PERSPECTIVE
Technology may ultimately be the layer that connects every major sector in this report.
Energy becomes smarter.
Agriculture becomes more precise.
Water becomes more measurable.
Forests become more observable.
Environmental markets become more verifiable.
Waste becomes more identifiable.
Infrastructure becomes more predictable.

This does not mean technology replaces physical assets.
Quite the opposite.
Technology derives much of its environmental value from improving the productivity and intelligence of the physical economy.
That creates a powerful investment intersection:

REAL ASSETS + INFRASTRUCTURE + DATA + TECHNOLOGY

The strongest environmental technologies may not necessarily be those with the most ambitious environmental claims.

They may be the technologies that solve costly, measurable problems for the owners and operators of real-world assets.
A farmer who can use less water.
A utility that can detect a leak.
A grid operator that can better balance electricity.
A recycling facility that can recover more valuable material.
A forest manager who can monitor thousands of acres.
An infrastructure owner who can prevent equipment failure.
In each case, the environmental benefit is reinforced by an economic benefit.
And that may be where environmental technology becomes most investable.
The technology layer of the environmental economy will matter not because it makes physical assets less important—but because it can make those assets smarter, more productive, more efficient and more valuable.

10. How Investors Are Accessing the Environmental Economy



From Real Assets to Private Markets
The environmental economy is not a single asset class.
An investor seeking exposure to clean energy might own shares of a publicly traded utility, invest in a private infrastructure fund, finance an individual solar project or provide credit to an energy developer.
An investor interested in sustainable agriculture might own farmland, invest in an agricultural operating company, provide farm credit or back an agricultural-technology business.

Forestry, water, recycling, environmental technology and natural capital present similarly diverse possibilities.
This distinction is fundamental to understanding environmental investing:
The environmental sector determines what an investor is exposed to. The investment structure determines how the investor participates—and much of the risk, return, liquidity and control that follows.
As environmental investment expands beyond public equities, investors are increasingly encountering private funds, infrastructure, real assets, private equity, private credit, venture capital and individual projects.
Understanding those structures is therefore as important as understanding the environmental sectors themselves.
One Economy, Multiple Ways to Invest
Consider a single environmental theme: **clean energy**.
Capital can enter that sector through:
PUBLIC EQUITY
Shares of publicly traded renewable-energy companies, utilities, equipment manufacturers or other businesses.
PRIVATE EQUITY
Ownership interests in privately held energy businesses.
INFRASTRUCTURE FUNDS
Investment vehicles owning or developing power-generation, transmission, storage or related assets.
PRIVATE CREDIT
Loans to developers, projects or operating companies.
PROJECT FINANCE
Capital tied directly to the economics of a specific facility or portfolio of facilities.
VENTURE CAPITAL
Investment in emerging energy technologies.
DIRECT REAL ASSETS
Ownership of physical infrastructure.
The environmental exposure may be similar.
The investment experience may be completely different.

Public Markets Remain an Important Entry Point
Public markets provide the most familiar route into environmental investment.
Investors can purchase shares in companies involved in areas such as:
Renewable energy
Utilities
Water
Waste management
Agricultural technology
Environmental services
Industrial efficiency
Battery technology
Electric infrastructure
Public securities can provide several advantages.
They are generally more liquid than private investments.
Pricing is visible.
Financial reporting is standardized.
Investors can diversify relatively easily.

But public equities also introduce broader stock-market exposure.
A company's share price can move because of interest rates, earnings expectations, market sentiment, capital structure or general equity-market conditions even when the underlying environmental market remains attractive.
Environmental exposure therefore does not isolate an investor from traditional market risk.

Private Markets Are Expanding the Investment Universe
Many environmental assets never become publicly traded securities.
A solar facility may be owned by a private infrastructure fund.
A farm may be held by a private real-asset partnership.
A recycling facility may be privately financed.
A water-technology company may be backed by venture capital.
A reforestation project may be financed through a private fund.
A battery-storage project may rely upon project finance and private credit.
This is one reason private markets are particularly relevant to environmental investment.
They allow capital to reach the **asset, business or project level**.
The broader private-infrastructure market demonstrates the scale of this shift. McKinsey reports that global infrastructure fundraising reached a record of nearly **$200 billion in 2025**, almost 60% higher than in 2024. In its survey of roughly 300 global limited partners, **51% said they planned to increase infrastructure allocations over the following three years**. McKinsey & Company
Environmental investment increasingly sits inside this larger expansion of private infrastructure.

Real Assets Connect Capital With the Physical Economy
Real assets represent perhaps the clearest expression of the thesis running throughout this report.
Instead of owning a company that participates in the environmental economy, an investor may own an interest in the **physical asset itself**.
Examples include:
Farmland
Forests
Solar facilities
Wind facilities
Battery-storage assets
Water infrastructure
Recycling facilities
Environmental infrastructure
Real assets may generate returns through combinations of:
Operating income
Lease income
Contracted payments
Commodity production
Land appreciation
Asset appreciation
Environmental attributes
Eventual sale proceeds
The investment is therefore connected to the economics of a tangible asset.
But tangible does not mean low risk.
Real assets can face operational failures, weather events, commodity-price changes, regulatory changes, financing risk, environmental liabilities and illiquidity.

Infrastructure Has Become a Major Private-Market Strategy
Environmental investment and infrastructure are increasingly overlapping.
The reason is straightforward.
Much of the environmental economy must actually be **built**.
Power generation.
Electric grids.
Battery storage.
Water treatment.
Recycling facilities.
Waste infrastructure.
Agricultural infrastructure.
Charging networks.
McKinsey estimates approximately **$106 trillion of cumulative infrastructure investment may be required globally through 2040**, including roughly $23 trillion in energy and power, $6 trillion in waste and water and $5 trillion in agriculture. Energy and power represented nearly half of infrastructure deal value in 2025. McKinsey & Company
This creates a large potential role for private capital.
But infrastructure strategies can vary considerably.

Core, Core-Plus and Value-Added Infrastructure
Not every infrastructure investment carries the same risk.
CORE
Typically established operating assets with relatively predictable cash flows and lower operational complexity.
CORE-PLUS
Assets that may have stable characteristics but also require improvements, expansion or additional operational management.
VALUE-ADDED
Assets or platforms requiring more significant development, construction, repositioning or operational improvement.
GREENFIELD
Projects that have not yet been constructed.
This spectrum matters because investors can move from owning a mature operating asset to effectively financing development.
The return expectations may increase as an investor moves up that spectrum.
So can the risk.
McKinsey reports that infrastructure investors have increasingly moved toward core-plus and value-added strategies, with much of recent fundraising concentrated in those categories rather than traditional core infrastructure. McKinsey & Company
Environmental infrastructure can exist across the entire spectrum.

Private Equity Invests in the Businesses Behind the Assets
Private equity provides another route.
Instead of buying a solar farm, an investor might own part of the company that develops solar farms.
Instead of owning recycling equipment, the investor might own the recycling company.
Instead of purchasing farmland, the investor might invest in an agricultural operating business.
Potential targets include:
Renewable-energy developers
Water companies

Waste and recycling businesses
Environmental-services companies
Agricultural businesses
Infrastructure-service providers
Environmental-data companies
Energy-management businesses
Private equity can potentially create value through:
Revenue growth
Operational improvements
Acquisitions
Technology
Cost efficiencies
Expansion into new markets
Eventually selling the company
This differs substantially from owning the underlying environmental asset.
The investor is underwriting a **business**, its management team and its ability to execute.

Private Credit Finances the Environmental Economy
Not every investor needs to own equity.
Private credit has become an increasingly important part of private markets, and environmental assets can require substantial debt capital.
Loans may finance:
Renewable-energy projects
Battery storage
Agricultural operations
Infrastructure
Equipment
Environmental businesses
Construction
Project development
Acquisitions
The IEA reports that debt financing for energy investment expanded approximately **10% in 2025**, with much of the increase flowing toward clean power, electricity grids and battery-storage projects. It also reports that three-quarters of energy investment in 2025 was financed from commercial sources, primarily banks. IEA
For investors, private credit changes the economic relationship.
The lender generally does not receive unlimited participation in an asset's appreciation.
Instead, the investment thesis typically revolves around:
Interest income
Principal repayment
Collateral
Covenants
Priority in the capital structure
That can produce a very different risk-return profile from equity ownership.

Capital Structure Matters
Consider a hypothetical $100 million environmental infrastructure project financed with:
$60 million debt
and

$40 million equity
Both investors are financing the same environmental asset.
But they are not taking the same risk.
The lender may receive contractual interest and principal payments and may hold security over project assets.
The equity investor receives what remains after operating expenses and debt obligations.
If the project performs extremely well, equity may capture greater upside.
If performance deteriorates, equity typically absorbs losses before senior debt.
This produces a basic hierarchy:
PROJECT CASH FLOW
↓
OPERATING EXPENSES
↓
SENIOR DEBT
↓
SUBORDINATED CAPITAL
↓
EQUITY
The underlying environmental project may be identical.
The investor's position within its capital structure can fundamentally change the investment.

Project Finance Brings Investors Closer to the Asset
Project finance goes one step further.
Rather than underwriting an entire company, investors finance a specific project or group of projects.
The project may have:
Construction contracts
Operating agreements
Power-purchase agreements
Offtake contracts
Lease agreements
Insurance
Debt facilities
Equity investors
Cash flows generated by the project are expected to support the investment.
This structure has long been used for infrastructure and energy assets.
For environmental investors, project finance can provide relatively direct exposure to real-world outcomes.
But direct exposure also means direct project risk.
If construction is delayed, costs increase or contracted revenues fail to materialize, the investment can be affected.

Contracted Revenue Can Change the Risk Profile
One of the most important characteristics of infrastructure investing is the nature of the project's revenue.
A solar project selling electricity under a long-term contract has a different risk profile from a merchant facility selling power at prevailing market prices.
A recycling facility with contracted feedstock and long-term purchase agreements differs from one relying entirely upon spot-market commodity prices.
A farmland property with long-term leases differs from a directly operated farming strategy.

Investors should therefore ask:
Who pays the asset?
Why do they pay?
For how long?
At what price?
Can the contract be terminated?
How creditworthy is the counterparty?
Contract structure can sometimes matter more to investment risk than the environmental technology itself.

Venture Capital Finances What Does Not Yet Exist at Scale
At the opposite end of the spectrum lies venture capital.
Venture investors may finance emerging companies developing:
New battery technologies
Carbon removal
Advanced materials
Water technologies
Agricultural technology
Environmental software
Artificial intelligence
Recycling technologies
Measurement systems
Carbon and biodiversity platforms
Unlike operating infrastructure, many venture-backed companies have limited revenue and may not yet have proven their technology commercially.
The potential upside can be substantial.
So can the probability of failure.
Venture capital therefore represents one of the highest-risk ways of accessing the environmental economy.
It should not be confused with investing in established environmental infrastructure simply because both investments share an environmental theme.

Private Funds Pool Capital
Many investors will not purchase projects or companies directly.
Instead, they participate through private funds.
A private fund generally pools capital from multiple investors and places investment decisions under the responsibility of a professional manager.
A fund may specialize in:
Infrastructure
Farmland
Forestry
Private equity
Private credit
Venture capital
Natural capital
Renewable energy
Environmental technology
Multiple environmental sectors
This provides diversification and professional management.

But it introduces another layer of analysis.
The investor must evaluate not only the assets.
The investor must evaluate the **manager**.

The Manager Becomes Part of the Investment
Private-market investing places substantial responsibility in the hands of the sponsor or fund manager.
Important considerations can include:
Experience
Track record
Investment discipline
Sector expertise
Deal sourcing
Valuation practices
Use of leverage
Conflicts of interest
Fees
Governance
Reporting
Risk management
Exit experience
Alignment of interests
Two funds investing in the same environmental sector can produce very different outcomes because of manager decisions.
For this reason:
In private markets, investors are frequently underwriting both the asset and the people responsible for managing it.

Fees Matter
Private-market investments can contain several layers of fees.
Depending upon the structure, these may include:
Management fees
Performance allocations or carried interest
Acquisition fees
Origination fees
Development fees
Asset-management fees
Financing fees
Administrative expenses
Fund expenses
Fees are not inherently problematic.
Professional management requires resources.
But investors should understand exactly **who receives each fee, when it is charged and whether it is calculated on committed capital, invested capital, assets or performance**.
Small differences can materially affect long-term net returns.

Liquidity Is One of the Largest Differences
Public securities can often be sold relatively quickly.
Private environmental investments may require capital to remain invested for years.

McKinsey notes that infrastructure holding periods have been lengthening and that liquidity has become an increasingly important consideration for institutional investors. McKinsey & Company
Private funds may impose:
Multi-year terms
Lockups
Limited redemption rights
Notice periods
Redemption gates
Transfer restrictions
Manager approval requirements
An investor should therefore distinguish between:
Value
and
Liquidity.
An asset may have economic value without there being an immediate buyer willing or permitted to purchase the investor's interest.
Illiquidity is not merely an inconvenience. It is an investment characteristic that should be evaluated before capital is committed.

Regulation Determines Who Can Participate
Access to private investments also depends upon securities regulation and jurisdiction.
In the United States, private environmental offerings can use several structures and exemptions, including offerings under **Regulation D** and other exemptions from SEC registration.
Some offerings may be limited to accredited investors; others may use structures permitting broader participation subject to applicable requirements.
Because the regulatory structure can affect eligibility, disclosure, marketing and resale restrictions, investors should review the actual offering documents rather than assume that two private investments operate under the same rules.
The regulatory wrapper is not merely paperwork.
It helps define **who can invest and under what conditions**.

Direct Investment Versus Fund Investment
Investors may also need to decide how directly they want to participate.
DIRECT INVESTMENT
An investor selects a particular asset, company or project.
Potential advantages include greater transparency into the specific investment and more control for sufficiently large investors.
But concentration and due-diligence requirements can be greater.
FUND INVESTMENT
The manager selects multiple investments.
This can provide diversification and professional management.
But investors relinquish much of the asset-selection decision to the manager.
CO-INVESTMENT
Some institutional investors invest alongside a fund in particular transactions.
This can provide more direct exposure while retaining a relationship with an experienced sponsor.
None is universally superior.
They simply distribute responsibility and concentration differently.

Environmental Impact and Financial Structure Are Separate Questions

One of the most important principles for investors is that environmental impact does not determine investment quality.

A project can produce significant environmental benefits and still be a poor financial investment.

Conversely, an economically successful environmental business may produce more modest measurable environmental outcomes than its marketing suggests.

Investors should therefore evaluate two questions independently:

ENVIRONMENTAL QUESTION

What environmental outcome is the investment expected to produce?

FINANCIAL QUESTION

How is the investor expected to earn a return?

Only after answering each separately should they be considered together.

This prevents environmental narratives from replacing financial analysis.

Risk Exists on a Spectrum

The environmental private-market universe can be visualized approximately as a progression:

OPERATING REAL ASSET

↓

CORE INFRASTRUCTURE

↓

CORE-PLUS

↓

VALUE-ADDED

↓

GREENFIELD DEVELOPMENT

↓

PRIVATE EQUITY

↓

GROWTH EQUITY

↓

VENTURE CAPITAL

This is not a universal ranking of risk. Individual investments can differ substantially.

But it illustrates an important principle.

A mature operating asset with contracted revenues generally presents a fundamentally different investment proposition from an early-stage technology company attempting to create a new market.

Environmental investing spans both.

The Same Sector Can Contain Completely Different Investments

Consider sustainable agriculture.

An investor could:

Own farmland and collect rent.

Operate a farm.

Provide a farmer with private credit.

Invest in an agricultural private-equity fund.

Finance irrigation infrastructure.

Invest in agricultural technology.

Purchase environmental credits generated by agricultural practices.

Each investment participates in agriculture.

But each produces a different combination of:

Cash flow
Risk
Liquidity
Duration
Leverage
Operational exposure
Potential return
Environmental impact
That is why sector labels alone provide insufficient information.

Capital Is Already Moving Toward the Physical Economy
The broader investment data reinforce this trend.
The IEA expects worldwide energy investment to reach approximately **$3.4 trillion in 2026**, including roughly **$2.2 trillion directed toward renewables, nuclear, electricity grids, storage, low-emissions fuels, efficiency and electrification**. IEA
Meanwhile, private infrastructure fundraising reached nearly **$200 billion in 2025**, and McKinsey estimates **$106 trillion** of infrastructure investment will be required globally through 2040. McKinsey & Company
The significance is broader than the numbers themselves.
Environmental investment is increasingly being financed through the same capital structures used throughout the physical economy:
EQUITY
DEBT
PRIVATE FUNDS
PROJECT FINANCE
INFRASTRUCTURE CAPITAL
REAL ASSETS
This is one reason environmental investing is evolving beyond the traditional concept of purchasing environmentally themed public stocks.

What Investors Should Examine
When evaluating how to access an environmental opportunity, investors should ask:
What exactly do I own?
Am I investing in an asset, company, fund or project?
Where am I in the capital structure?
What produces the cash flow?
Is revenue contracted or market-dependent?
How much leverage is being used?
Who controls investment decisions?
What experience does the manager have?
What fees are charged?
How are assets valued?
How frequently will I receive reporting?
How long is my capital committed?
Can I redeem or sell my interest?
What happens if I need liquidity early?
What is the expected exit?
What environmental outcome is being claimed?
How is that outcome measured?

And ultimately:
Am I being compensated appropriately for the specific financial risks I am taking—not simply attracted to the environmental sector in which the investment operates?

The 2027 Access Question
The environmental investment universe is expanding in two directions simultaneously.
The range of environmental sectors is becoming broader.
And the number of financial structures through which investors can access those sectors is increasing.
That combination creates opportunity.
It also creates complexity.
A prospective investor may now encounter farmland funds, renewable infrastructure funds, environmental private-credit vehicles, natural-capital strategies, carbon projects, climate-technology venture funds and individual private offerings.
These investments cannot be evaluated using a single framework.
The key question entering 2027 is therefore:
Which combination of environmental exposure, investment structure, risk, liquidity and return fits the investor's objective?
Understanding the environmental sector is only the beginning.
Understanding the financial structure is what turns a theme into an investment.

ECOLENCE RESEARCH PERSPECTIVE
The evolution of environmental investing may ultimately be less about creating a new asset class than about applying established financial structures to a rapidly expanding environmental economy.
Farmland can be a real asset.
Solar can be infrastructure.
Environmental businesses can be private equity.
Projects can be financed with private credit.
New technologies can be venture capital.
Forests can combine real assets with environmental markets.
Water systems can combine infrastructure, technology and project finance.
The environmental economy therefore sits across the investment landscape rather than inside a single category.
That is precisely why transparency becomes so important.
Investors need to understand:
WHAT they are investing in.
HOW the investment is structured.
WHERE they sit in the capital structure.
HOW returns are expected to be generated.
WHEN liquidity may become available.
WHO is managing the capital.
WHAT environmental outcome is actually being produced.
This leads to one of the central conclusions of the Ecolence 2027 Outlook:
Environmental investing is not an asset class. It is an investment universe.
The opportunity extends from land to infrastructure, from debt to equity, from established real assets to emerging technology.
And as more private capital enters that universe, the ability to **discover, understand and compare those opportunities using a consistent framework** becomes increasingly important.
That is where the environmental investment market can begin to mature—from a collection of individual themes and projects into a more accessible investment ecosystem.

11. Risk, Return & Due Diligence



Evaluating Environmental Investments Beyond the Story

Environmental investments can tell compelling stories.

A solar facility produces electricity without burning fuel. A farm can improve soil and water management. A forest can store carbon and support biodiversity. A recycling facility can recover materials that otherwise become waste. A new technology may promise to make infrastructure more efficient.

Those outcomes may be meaningful.

But they do not, by themselves, make an investment financially attractive.

Every environmental investment ultimately has to answer the same questions as any other investment:

Where does the revenue come from?

What can go wrong?

How much capital is at risk?

How and when does the investor get paid?

And is the potential return sufficient to compensate for those risks?

This distinction becomes especially important as environmental investing moves deeper into private markets, where investments may be illiquid, valuations less transparent and information more dependent upon the sponsor.

A compelling environmental story can explain why an opportunity matters. Due diligence determines whether it makes sense as an investment.

Environmental Need Is Not the Same as Investment Opportunity

One of the central themes of this Outlook has been the enormous amount of capital required across the environmental economy.
Global energy investment alone is expected to reach approximately **$3.4 trillion in 2026**, with about $2.2 trillion directed toward renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification. IEA
Infrastructure requirements extend across energy, water, agriculture, waste and transportation.
But a large financing requirement does not guarantee attractive investment returns.
A market can desperately need infrastructure while individual projects remain economically unattractive.
A technology can solve an important environmental problem while the company developing it fails.
A forest can provide enormous ecological value while producing insufficient cash flow.
A recycling facility can recover valuable materials while operating costs exceed the value recovered.
Investors should therefore separate two propositions:
THE WORLD NEEDS THIS.
from
THIS PARTICULAR INVESTMENT HAS ATTRACTIVE ECONOMICS.
Both can be true.
But one does not prove the other.

Return Begins With Cash Flow
Investment returns ultimately have to come from somewhere.
For an environmental investment, potential sources can include:
Operating income
Lease payments
Interest
Dividends
Contracted revenues
Commodity sales
Land appreciation
Business growth
Asset appreciation
Environmental credits
Government incentives
Sale or refinancing proceeds
Understanding which source actually drives the projected return is one of the first steps in due diligence.
Consider two investments both advertising a targeted 12% return.
The first may derive most of its return from contractual cash flows generated by an operating infrastructure asset.
The second may depend upon selling an undeveloped project five years later at a significantly higher valuation.
The headline target is identical.
The underlying risk is not.
Investors should examine the engine producing the return, not simply the return being advertised.

Target Returns Are Not Actual Returns
Private offerings frequently present terms such as:
Target Return
Target IRR
Preferred Return
Target Yield

Projected Distribution
Target Multiple
These terms can mean very different things.
A target return is generally an objective or projection.
It is not the same as a contractual guarantee.
A preferred return may describe how distributions are allocated between investors and a sponsor, but it does not necessarily mean sufficient cash will exist to pay it.
A projected distribution may depend upon operating assumptions that do not occur.
Investors should therefore ask:
Is this return contractual or targeted?
Is it gross or net of fees?
Does it include asset appreciation?
Does it assume a future sale?
Does it depend upon leverage?
Does it depend upon environmental-credit revenue?
What assumptions must occur for the target to be achieved?
A percentage without understanding those assumptions provides very little information.

Risk Should Be Decomposed
The word **risk** is often presented as though it were one variable.
Environmental investments can contain many separate risks.
A useful framework is to break them apart.
MARKET RISK
Prices for electricity, agricultural commodities, timber, recycled materials, environmental credits or other outputs may change.
OPERATING RISK
Equipment can fail. Agricultural yields can disappoint. Projects can underperform.
DEVELOPMENT RISK
Permits can be delayed. Construction costs can rise. Projects may never reach operation.
TECHNOLOGY RISK
A technology may fail to perform at expected levels or may be displaced by a better alternative.
FINANCING RISK
Interest rates, leverage, refinancing availability and capital-market conditions can materially affect returns.
COUNTERPARTY RISK
A purchaser, tenant, borrower, developer or other contractual party may fail to perform.
REGULATORY RISK
Subsidies, environmental regulations, permitting requirements, tax incentives or market rules may change.
ENVIRONMENTAL RISK
Drought, wildfire, storms, flooding, disease and other environmental conditions can damage physical assets.
VALUATION RISK
A private asset may be worth less than the value shown in periodic reports.
LIQUIDITY RISK
An investor may be unable to exit when desired.
MANAGER RISK
The sponsor may make poor decisions, experience operational problems or encounter conflicts of interest.

Breaking risk into categories makes it considerably easier to understand what an investor is actually accepting.

Illiquidity Changes the Investment
Liquidity is particularly important in private environmental investments.
Public securities often provide observable market prices and relatively easy access to buyers.
A private farmland fund, infrastructure vehicle, carbon project or environmental private-equity investment may not.
Private-market investors can face multi-year holding periods, limited redemption rights and uncertain exit timing. McKinsey's 2026 private-markets research specifically highlights **longer and more complex holding periods** and increasing liquidity pressures across private capital. McKinsey & Company
That creates a risk investors sometimes underestimate.
An investment may be performing reasonably well while still being impossible to sell at an acceptable price.
This means investors should ask two separate questions:
What is my investment worth?
and
Can I actually convert it into cash?
Those are not the same question.

Private-Market Valuations Require Scrutiny
Private investments generally do not trade continuously on an exchange.
That means valuation often depends upon estimates.
A manager might use:
Comparable transactions
Discounted cash flow
Appraisals
Comparable public companies
Broker indications
Independent valuation providers
Asset-specific methodologies
Valuation involves judgment.
And the price shown on a quarterly statement may not necessarily equal the price obtainable if the asset had to be sold immediately.
The SEC has long identified valuation methodology, disclosure, fees and conflicts as important issues in private funds. SEC
For investors, the practical questions include:
Who values the asset?
How frequently?
What methodology is used?
Is an independent valuation obtained?
Has the methodology changed?
How are unrealized gains reflected in reported performance?
What happened when previous investments were actually sold?
The final question can be particularly revealing.

Leverage Can Amplify Both Outcomes
Debt can increase investment returns when an asset performs well.
It can also magnify losses.

Consider a simplified example.
An investor purchases a $100 million asset using:
$60 million debt
$40 million equity
If the asset eventually rises substantially in value, equity investors can benefit disproportionately because the debt balance does not rise alongside the asset.
But if the asset's value falls to $70 million, the lender may still be owed approximately $60 million before considering repayments or other changes.
Only $10 million of asset value remains above the debt balance.
A 30% decline in asset value has therefore produced a much larger reduction in equity value.
This is financial leverage.
Investors should understand:
Loan-to-value
Interest rate
Fixed versus floating debt
Maturity
Covenants
Collateral
Refinancing requirements
Default provisions
Recourse
Leverage is not inherently inappropriate.
But investors should understand how much of a projected return results from the asset itself and how much results from borrowed money.

Interest Rates Matter
Environmental infrastructure can be capital intensive.
That makes financing costs particularly important.
Solar projects, water facilities, farmland, recycling plants, battery storage and other physical assets can require significant upfront investment.
The IEA reports that debt financing for energy investments increased approximately **10% in 2025**, flowing largely toward clean power, electricity grids and battery-storage projects. It also notes that financing conditions vary substantially across regions, with higher financing costs remaining a barrier in many emerging and developing economies. IEA
When borrowing costs rise, project economics can change.
A project that works at one interest rate may produce very different returns at another.
Due diligence should therefore test:
Higher interest rates
Lower refinancing availability
Longer construction periods
Higher capital costs
The question is not merely whether financing is available today.
It is whether the investment remains viable if financing conditions become less favorable.

Environmental Revenue Deserves Separate Analysis
Some investments include revenue from:
Carbon credits
Biodiversity credits
Renewable-energy certificates

Conservation programs
Government incentives
Tax credits
Other environmental attributes
These revenues can improve economics.
But they should be underwritten separately.
Investors should ask:
Does the project work without this revenue?
How established is the market?
Is the revenue contracted?
What price is assumed?
Who purchases the environmental asset?
What verification is required?
What happens if regulation changes?
What happens if credit prices fall?
A useful analysis can divide the investment into:
CORE OPERATING ECONOMICS
plus
ENVIRONMENTAL REVENUE
plus
POTENTIAL UPSIDE
That makes it easier to see whether environmental value strengthens the investment—or whether the investment depends entirely upon optimistic environmental assumptions.

Technology Requires Commercial Due Diligence
Environmental technology presents a different set of questions.
A new technology may work scientifically but fail commercially.
Investors should distinguish:
Technical viability
from
Commercial viability
A battery technology may function in a laboratory but prove too expensive to manufacture.
A water technology may work but require customers to replace existing infrastructure.
A recycling process may recover valuable material but consume too much energy.
An agricultural technology may increase yields but cost farmers more than the additional value it produces.
Due diligence should therefore ask:
Does it work?
Can it scale?
What does it cost?
Who will buy it?
Why will they switch?
How long is the sales cycle?
Can competitors replicate it?
How much additional capital is required?
Environmental usefulness does not guarantee commercial adoption.

Physical Assets Require Physical Due Diligence
Real environmental assets require another layer of investigation.

For farmland:
Soil quality
Water availability
Crop history
Lease terms
Infrastructure
Environmental liabilities
For forestry:
Species
Age classes
Timber inventory
Access
Fire exposure
Harvest assumptions
Land title
For renewable infrastructure:
Equipment
Generation history
Interconnection
Offtake agreements
Maintenance
Resource assumptions
For water or recycling infrastructure:
Plant condition
Capacity
Permits
Feedstock
Customers
Operating costs
Maintenance requirements
A spreadsheet cannot replace inspection of the physical asset.

Sponsor Due Diligence Can Be as Important as Asset Due Diligence
Private investments place substantial authority in the hands of managers.
Investors should therefore investigate the sponsor itself.
Important questions include:
Who owns the manager?
How long has the team worked together?
What investments have they previously managed?
Which investments succeeded?
Which failed?
How were losses handled?
How much of the sponsor's own capital is invested?
What other businesses does the sponsor control?
Are related-party transactions possible?
Who values the investments?
Who holds investor assets?
Who performs accounting?
Who audits the fund?

What happens if a key executive leaves?
Conflicts deserve particular attention. SEC materials have repeatedly highlighted issues involving private-fund fees, expense allocation, valuation practices, related parties and preferential arrangements. SEC
The sponsor's reputation should never substitute for verification.

Fees Should Be Followed Through the Entire Structure
An investor may see a management fee and assume that represents the full cost.
It may not.
Depending upon the investment, other costs can include:
Performance allocation
Carried interest
Acquisition fees
Development fees
Origination fees
Financing fees
Asset-management fees
Administrative expenses
Legal expenses
Audit expenses
Property-management fees
Disposition fees
Related-party charges
The important number is ultimately:
What return remains for the investor after every layer of fees and expenses?
This is why net return generally matters more to investors than gross asset performance.

Incentives Should Be Understood
Investors should understand how the sponsor gets paid.
Suppose a manager earns substantial fees simply by raising and deploying capital.
Its economic incentive may differ from a manager whose compensation depends primarily upon successful investment performance.
Neither arrangement automatically indicates good or bad management.
But incentives influence behavior.
Investors should examine whether the structure encourages the manager to:
Raise more capital
Deploy capital quickly
Use leverage
Hold assets longer
Sell assets
Generate transactions
Increase valuations
Produce long-term investor returns
The goal is alignment.
The strongest structures attempt to make the sponsor economically successful when investors are economically successful.

Offering Documents Matter
Marketing materials explain an opportunity.

Offering documents define it.
For private investments, investors should carefully review applicable materials such as:
Private Placement Memorandum
Limited Partnership Agreement
Operating Agreement
Subscription Agreement
Financial Statements
Valuation Policy
Audited Reports
Risk Disclosures
Side-Letter Provisions where relevant
Material Contracts
Important economic terms should agree across documents.
If marketing material describes an 8% return, investors should understand exactly what the governing documents say that 8% represents.
If liquidity is described as available after a particular period, the redemption provisions should be reviewed.
If environmental credits are central to projected returns, the contractual rights to those credits should be understood.
The investment should ultimately be evaluated from the documents that legally govern it—not from the presentation used to market it.

Stress Testing Reveals What the Story Does Not
Financial projections normally describe what management expects to happen.
Due diligence should also examine what happens when expectations are wrong.
Consider testing:
Revenue 20% lower
Operating costs 20% higher
Construction delayed one year
Interest rates higher
Commodity prices lower
Carbon prices lower
Agricultural yields lower
Technology adoption slower
Exit valuation lower
Holding period longer
No environmental-credit revenue
The purpose is not to predict disaster.
It is to identify which assumptions matter most.
If a modest change in one assumption eliminates the investment return, the investment may contain more risk than the headline projection suggests.

Scenario Analysis Is More Useful Than a Single Forecast
Instead of relying upon one projected outcome, investors can consider several.
DOWNSIDE CASE
What happens if major assumptions disappoint?
BASE CASE
What happens under reasonable operating assumptions?
UPSIDE CASE

What happens if execution and market conditions exceed expectations?
The range between these outcomes can be more informative than the midpoint.
For environmental investments, scenario analysis can be particularly important because many projects combine:
Long holding periods
Physical assets
Commodity exposure
Regulatory exposure
Technology
Environmental conditions
Private-market illiquidity
The future is rarely represented accurately by a single number.

Return Should Be Considered Relative to Risk
A higher projected return is not automatically a better investment.
Suppose Investment A targets 8%.
Investment B targets 15%.
Investment C targets 25%.
Without additional information, those percentages tell investors almost nothing about relative attractiveness.
Investment A might involve an operating asset with contracted revenues.
Investment B might involve development risk.
Investment C might be an early-stage technology company with substantial probability of losing the entire investment.
The appropriate question is therefore not:
“Which investment offers the highest return?”
It is:
“What risks must I accept to pursue that return?”
That is the foundation of risk-adjusted investing.

Due Diligence Is a Process, Not a Document
A sophisticated due-diligence process can be organized into several layers:
1. INVESTMENT
What exactly is being purchased?
2. MARKET
What drives demand and pricing?
3. ECONOMICS
How does the investment make money?
4. ASSET
What is actually owned?
5. SPONSOR
Who manages the capital?
6. STRUCTURE
Where does the investor sit legally and financially?
7. RISK
What can cause permanent loss?
8. VALUATION
How is the investment priced?
9. LIQUIDITY

How and when can capital be returned?

10. IMPACT

What environmental outcome is being claimed and how is it measured?

11. DOCUMENTATION

Do the legal documents support the marketing representations?

12. EXIT

How does the investment ultimately end?

The goal is not to eliminate uncertainty.

That is impossible.

The goal is to **understand uncertainty before capital is committed.**

Warning Signs Deserve Attention

No single warning sign automatically proves an investment is problematic.

But certain patterns justify additional investigation.

Examples can include:

Guaranteed-sounding returns without clear support
Pressure to invest quickly
Returns substantially above comparable investments without explanation
Unclear use of proceeds
Complex related-party transactions
Sponsor-controlled valuations without sufficient transparency
Environmental claims unsupported by measurable evidence
Projected revenue from markets that do not yet exist at meaningful scale
Heavy dependence on future refinancing
Large fees that are difficult to identify
Missing financial statements
Unclear ownership of assets
Unclear exit strategy
Inconsistent information across documents
Resistance to reasonable investor questions

A sophisticated investment does not have to be simple.

But its economics should ultimately be explainable.

Due Diligence Does Not End at Closing

Private-market investing can require ongoing monitoring.

Investors should continue examining:

Financial performance
Distributions
Asset valuations
Debt levels
Covenants
Project milestones
Operating performance
Environmental outcomes
Material contracts
Management changes
Regulatory developments
Exit progress

The investment thesis should periodically be compared with actual results.

If the original thesis was:
Acquire → Improve → Generate Cash Flow → Sell
investors should be able to determine whether each step is actually occurring.

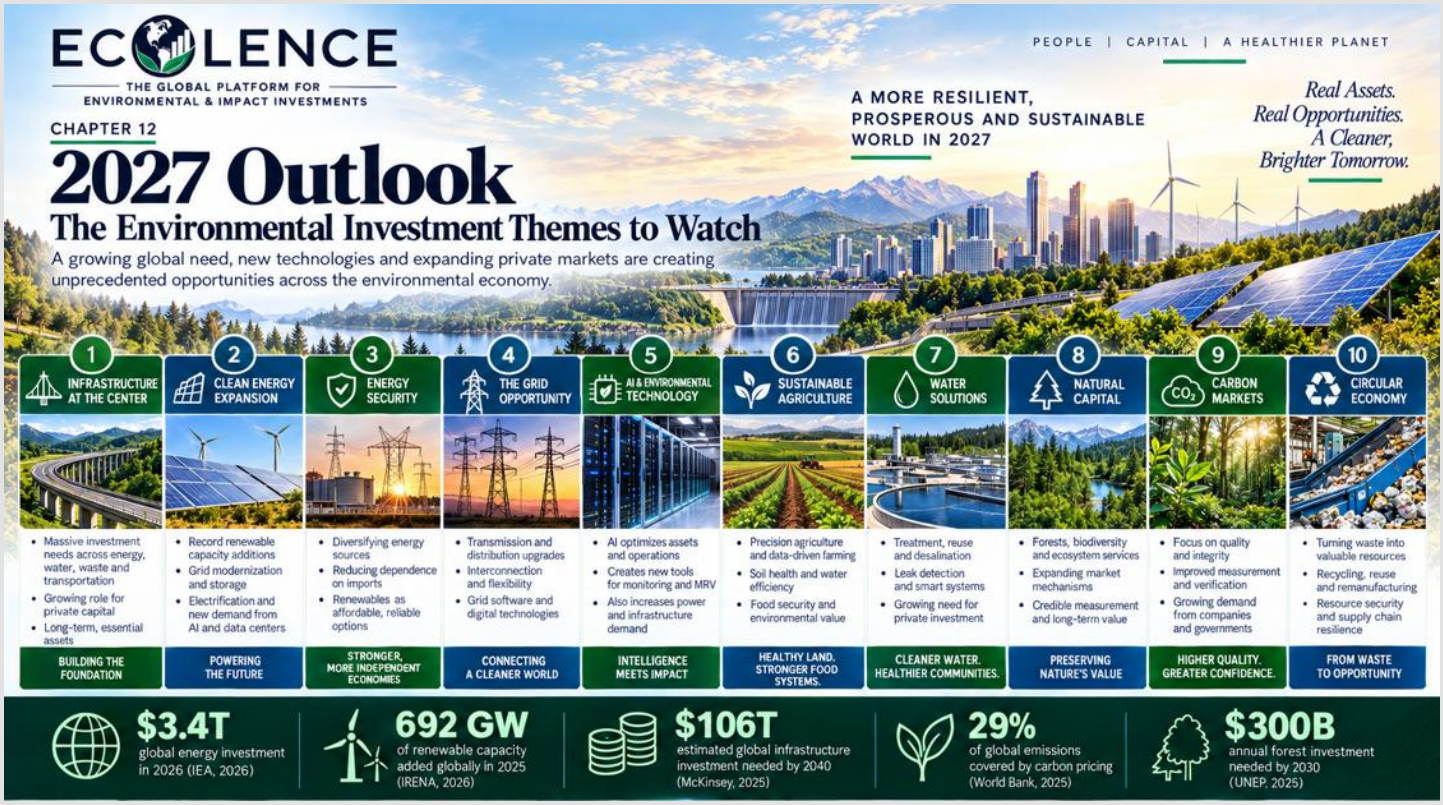
Transparency Is Part of Risk Management
Private markets inherently provide less continuous price discovery than public exchanges.
That makes reporting particularly important.
Investors should understand:
How frequently reporting occurs
What information is provided
Whether financial statements are audited
How valuations are determined
Whether material events are disclosed promptly
How performance is calculated
Whether environmental metrics are independently verified
Transparency does not eliminate investment risk.
But it makes risk easier to observe.
That distinction is important.
Investors cannot manage risks they cannot see.

The 2027 Due-Diligence Question
Private capital is becoming increasingly important to environmental investment.
The IEA reports that three-quarters of global energy investment in 2025 was financed from commercial sources, primarily banks, while McKinsey describes a private-markets environment in which execution, capital structure, liquidity and risk management are becoming increasingly important as holding periods lengthen. IEA
As environmental private markets expand, investors will encounter increasingly diverse opportunities.
Some will be mature operating assets.
Some will be development projects.
Some will depend upon environmental markets.
Some will involve new technologies.
Some will be highly leveraged.
Some will be relatively simple.
Others will combine several layers of risk.
The central question entering 2027 is therefore not merely:
“Is this a good environmental investment?”
It is:
“Do the economics, structure, management, valuation, liquidity and potential return justify the risks being taken?”
That question applies regardless of how compelling the environmental objective may be.

ECOLENCE RESEARCH PERSPECTIVE
The environmental investment market has an unusual characteristic.
Its strongest opportunities can combine two powerful narratives:
The potential to generate financial returns.
and
The potential to contribute to meaningful environmental outcomes.
That combination can attract capital.
It can also make disciplined analysis more important.

Investors should be able to admire the environmental objective while independently evaluating the investment.
A solar facility still requires sound economics.
A forest still requires credible ownership and management.
A farm still requires productive land and water.
A carbon project still requires measurable environmental outcomes.
A recycling facility still requires feedstock and customers.
A technology company still requires a viable business model.
A private fund still requires a capable manager.
And every investment still requires a credible path for returning capital to investors.
This leads to perhaps the most important due-diligence principle in the Ecolence 2027 Outlook:
Never allow the importance of the environmental mission to replace analysis of the investment itself.
The most durable environmental investments may ultimately be those where the two reinforce one another:
The environmental outcome creates economic value.
The economic value supports the investment.
The investment provides capital for the environmental outcome.
When that cycle works, environmental investing can move beyond narrative and become part of a functioning capital market.
And when investors can clearly see the assets, economics, risks, managers, structures and environmental outcomes behind an opportunity, they are better positioned to make their own informed investment decisions.

12. 2027 Outlook



The Environmental Investment Themes to Watch

The environmental investment landscape entering 2027 looks different from the one that existed only a few years ago.

The conversation is broadening beyond ESG screens and publicly traded clean-energy companies. Increasingly, capital is encountering the environmental economy through **infrastructure, real assets, private credit, private equity, technology, natural resources and individual projects**.

Energy security is reinforcing investment in electricity systems. Artificial intelligence is increasing demand for power and infrastructure while simultaneously creating new tools for optimization. Agriculture and water are becoming increasingly technology-enabled. Natural capital is developing new financing mechanisms. Carbon markets are confronting questions of integrity and quality. Circular-economy businesses are attempting to transform waste into economically valuable resources.

The common thread is increasingly clear:

Environmental investing is becoming less about investing in an environmental label and more about financing the physical systems, resources and technologies that the global economy depends upon.

The following themes are among those Ecolence Research believes warrant particular attention entering 2027.

1. Environmental Investing Becomes an Infrastructure Story

Perhaps the most important theme of this Outlook is the convergence between environmental investment and infrastructure.

Energy generation must be built.
Electric grids must be expanded.
Water infrastructure must be modernized.
Battery storage must be installed.
Recycling facilities must be constructed.
Agricultural infrastructure must be improved.
Environmental data systems must be deployed.

The scale is substantial. The IEA expects global energy investment alone to reach approximately **$3.4 trillion in 2026**, with roughly **$2.2 trillion** flowing to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification. IEA

That changes the investment conversation.

Environmental investment increasingly overlaps with:

INFRASTRUCTURE
REAL ASSETS
PROJECT FINANCE
PRIVATE CREDIT
PRIVATE EQUITY

The 2027 question is no longer simply which environmental sectors will grow.

It is:

Which physical systems require capital—and which investment structures can finance them economically?

2. Electricity Becomes the Backbone of the Environmental Economy

Renewable generation continues to expand rapidly.

IRENA reports that **692 GW of renewable power capacity was added globally during 2025**, bringing total renewable capacity to approximately **5,149 GW**. Renewables accounted for **85.6% of total power-capacity additions** during the year. IRENA

But generation is only one part of the electricity system.
More renewable generation creates greater requirements for:
Transmission
Distribution
Battery storage
Grid modernization
Interconnection
Demand management
Energy software
Flexible generation
Digital control systems
At the same time, electrification, manufacturing and data centers are creating additional electricity demand.
This leads to one of the defining themes for 2027:
The investment opportunity may increasingly move from renewable generation alone toward the infrastructure required to make an increasingly electrified economy function.

3. Energy Security Reinforces the Investment Case
Environmental investment is increasingly intersecting with another economic priority:
Energy security.
Recent geopolitical disruptions have pushed countries to reconsider where their energy comes from, how electricity is generated and how resilient their energy infrastructure is.
The IEA's 2026 investment outlook specifically identifies energy security as an important force shaping global capital flows, including efforts to diversify energy sources, strengthen electricity systems and expand domestically available generation. IEA
IRENA likewise reports that renewable deployment is reducing dependence on imported fossil fuels in a number of countries and notes that more than 85% of newly commissioned renewable capacity is now cheaper than fossil-fuel alternatives. IRENA
That broadens the rationale for investment.
Renewables, storage and grids can simultaneously intersect with:
Economics
Reliability
Domestic infrastructure
Energy independence
Environmental objectives
In 2027, these motivations may increasingly reinforce one another.
4. The Grid Becomes an Investment Theme of Its Own
For years, much of the environmental-investment conversation focused on building renewable generation.
Increasingly, attention is turning toward what connects that generation to the economy.
The grid.
Electricity infrastructure must accommodate renewable generation, storage, electric vehicles, industrial electrification and new large loads such as data centers.
This can create opportunities across:
Transmission
Substations
Distribution equipment
Transformers
Grid software

Power electronics
Interconnection infrastructure
Energy storage
Demand management
The important shift is conceptual:
Electricity generation can only grow as effectively as the infrastructure capable of transporting, balancing and managing that electricity.
For investors, the bottleneck itself can become an investment theme.

5. AI Creates Both an Opportunity and an Infrastructure Challenge
Artificial intelligence may become one of the most unusual environmental-investment themes of 2027.
AI can potentially improve:
Grid management
Renewable forecasting
Precision agriculture
Water management
Recycling
Environmental monitoring
Infrastructure maintenance
Carbon measurement
Satellite analysis
But AI also requires enormous physical infrastructure.
Data centers require electricity, grid connections, cooling equipment, backup power and, in some cases, significant water infrastructure.
This creates a circular relationship:
AI can help optimize infrastructure.
while
AI itself creates demand for more infrastructure.
For environmental investors, the opportunity may therefore extend beyond AI companies themselves.
It can include the **energy, water, grid, storage and efficiency infrastructure supporting the digital economy.**

6. Farmland Evolves Beyond a Land Investment
Farmland is likely to remain an important real-asset category.
But the investment thesis is broadening.
Future agricultural value may increasingly depend upon the combination of:
LAND
WATER
SOIL
INFRASTRUCTURE
TECHNOLOGY
OPERATIONS
ENVIRONMENTAL ATTRIBUTES
Satellite intelligence, precision irrigation, soil analytics, automation and artificial intelligence are making agriculture increasingly data-driven.
At the same time, water availability and soil productivity remain fundamental physical constraints.
The emerging opportunity is therefore not simply owning acreage.
It is improving the **productive system surrounding the land**.

For investors entering 2027, farmland may increasingly sit at the intersection of real assets, food security, water, technology and natural capital.

7. Water Moves Closer to the Investment Conversation
Water has historically been dominated by governments, municipalities and utilities.
That is unlikely to disappear.
But the enormous need for water infrastructure and technology is creating increasing interest in private-sector participation.
Investment opportunities can develop around:
Water treatment
Wastewater
Distribution
Leak detection
Reuse
Desalination
Agricultural irrigation
Industrial water
Monitoring technology
Water-efficiency systems
The challenge remains translating societal need into investable cash flows.
That distinction will remain important throughout 2027.
Water scarcity can create an enormous economic problem without automatically creating an attractive investment.
The opportunities most likely to attract private capital will generally need identifiable customers, revenues and business models.

8. Natural Capital Attempts to Become Investable Capital
Forests, wetlands, soils and biodiversity provide enormous environmental and economic benefits.
But private investment remains relatively limited.
UNEP estimates annual forest investment would need to rise from approximately **$84 billion in 2023 to $300 billion by 2030**, while private forest finance amounted to only around **$7.5 billion in 2023**. UNEP - UN Environment Programme
That gap creates opportunity—but also illustrates the challenge.
Nature can have enormous economic value without producing a direct investor cash flow.
Entering 2027, attention will likely remain focused on mechanisms capable of connecting the two:
Sustainable forestry
Carbon markets
Conservation finance
Biodiversity markets
Ecosystem-service payments
Blended finance
Restoration
Sustainable agriculture
The key development to watch is not simply whether natural capital attracts more attention.
It is whether projects can establish **credible and durable revenue models**.

9. Carbon Markets Move From Quantity Toward Quality
Carbon markets are entering a more demanding stage of development.

Direct carbon pricing now covers just over **29% of global greenhouse-gas emissions across 87 implemented policies**, and carbon-pricing mechanisms generated more than **$107 billion for public budgets during 2025**. World Bank
But voluntary carbon markets continue to face concerns around additionality, permanence, baselines, measurement and verification.
The World Bank reports that carbon-credit issuance increased **8% from 2024 to 2025**, while prices declined slightly overall. However, certain categories—including highly rated forest-conservation and reforestation credits—continued to command premiums. World Bank
That suggests an important transition.
The next phase may not reward every environmental credit equally.
It may increasingly reward:
Credibility
Transparency
Verification
Permanence
Additionality
High-quality measurement
The 2027 carbon-market story may therefore become:
Not simply more credits—but better credits.

10. Environmental Measurement Becomes Infrastructure
As environmental markets mature, the ability to measure environmental outcomes becomes increasingly valuable.
Carbon projects need measurement.
Biodiversity projects need monitoring.
Forests need observation.
Agriculture needs soil data.
Water systems need sensors.
Infrastructure needs performance monitoring.
This creates a potentially important technology category:
MEASUREMENT + REPORTING + VERIFICATION
Satellite imagery, remote sensing, sensors, artificial intelligence, drones and environmental-data platforms can help transform physical environmental outcomes into observable information.
That matters financially.
An environmental attribute that cannot be reliably measured can be difficult to value.
Better measurement can make environmental assets more transparent—and transparency can make markets more investable.

11. Circular Economy Becomes a Resource-Security Strategy
The circular economy may also move beyond its traditional association with recycling.
Waste streams contain:
Metals
Battery materials
Plastics
Construction materials
Electronics
Organic material
Industrial by-products

Recovering those resources can potentially reduce waste while providing alternative sources of economically valuable materials.
That creates a broader investment thesis:
WASTE MANAGEMENT
becomes
RESOURCE RECOVERY
which can become
RESOURCE SECURITY
This could become particularly important where supply chains depend upon critical materials or imported resources.
The investment question will remain economic:
Can recovered material compete with virgin material at sufficient quality, cost and scale?
Where the answer is yes, waste can become feedstock.

12. Environmental Technology Moves From Theme to Operating Layer
Environmental technology is unlikely to remain a standalone sector.
Increasingly, it will be embedded throughout the environmental economy.
Technology can improve:
A solar facility
A farm
A water network
A forest
A recycling plant
An electricity grid
A carbon project
A building
This changes how investors might think about environmental technology.
Rather than asking:
“Which environmental technology companies will grow?”
the more important question may become:
“Which technologies become essential to the operation of real-world environmental assets?”
The technologies that improve productivity, reduce costs, increase reliability or provide better information may ultimately have stronger economic foundations than technologies supported primarily by environmental narratives.

13. Private Credit Expands Alongside Environmental Infrastructure
Much of the environmental economy requires capital before it produces revenue.
That creates opportunities not only for equity investors but for lenders.
Private credit can potentially finance:
Equipment
Construction
Renewable projects
Agricultural operations
Infrastructure
Recycling facilities
Environmental businesses
Acquisitions
Expansion

This may become particularly relevant as banks, private lenders and institutional investors compete to finance infrastructure.
For investors, private credit provides a different relationship to the environmental economy.
Instead of relying primarily on asset appreciation, the investment can focus on:
Interest income
Principal protection
Collateral
Covenants
Priority in the capital structure
That does not eliminate risk.
But it expands the range of risk-return profiles available within environmental investment.

14. Environmental Investing Moves Deeper Into Private Markets
Perhaps the broadest structural theme for 2027 is the continuing expansion of environmental investment beyond public securities.
Many of the assets discussed throughout this report are naturally private.
Farmland.
Forests.
Solar projects.
Battery facilities.
Water infrastructure.
Recycling plants.
Private environmental companies.
Early-stage technologies.
Natural-capital projects.
Investors therefore increasingly encounter the environmental economy through:
PRIVATE FUNDS
PRIVATE EQUITY
PRIVATE CREDIT
INFRASTRUCTURE
REAL ASSETS
VENTURE CAPITAL
PROJECT FINANCE
This creates access to investments unavailable through traditional stock markets.
It also introduces illiquidity, manager risk, valuation uncertainty and greater due-diligence requirements.
The growth of environmental private markets will therefore need to be accompanied by better **discovery, transparency and standardized information**.

15. Investors Become More Selective
Perhaps the most important theme is not environmental at all.
It is financial discipline.
As the market matures, investors are likely to ask increasingly difficult questions.
Not simply:
Is this sustainable?
But:
What produces the revenue?
What is the asset worth?
What risks am I taking?
Who manages the investment?

How much leverage is being used?
What fees am I paying?
When can I exit?
What environmental outcome is actually being produced?
How is that outcome verified?
That evolution would be healthy for the market.
Environmental investing does not become stronger when investors lower their financial standards.
It becomes stronger when environmental opportunities can withstand the **same rigorous analysis applied to other investments.**

What Could Disrupt the 2027 Outlook?
The environmental investment opportunity is substantial.
But the trajectory will not necessarily be smooth.
Investors should watch several potential headwinds:
Interest rates
Higher financing costs can weaken capital-intensive project economics.
Commodity prices
Energy, agriculture, timber, recycled materials and environmental commodities remain price sensitive.
Policy changes
Tax incentives, subsidies, permitting rules and environmental regulations can materially alter investment economics.
Supply-chain constraints
Transformers, grid equipment, batteries and other infrastructure components can experience shortages or delays.
Permitting and interconnection
Projects can have capital available but remain unable to begin construction.
Technology failures
Emerging technologies may not achieve expected performance.
Environmental events
Wildfire, drought, storms, flooding and other physical events can affect assets.
Geopolitical instability
Trade restrictions, energy disruptions and conflict can alter supply chains and capital flows.
Valuation
Private-market assets may not always achieve expected exit valuations.
Liquidity
Long holding periods can create pressure even when underlying assets remain viable.
These risks do not negate the environmental investment thesis.
They determine how individual investments should be evaluated.

The Bigger Investment Shift
Looking across the sectors examined in this Outlook, an important pattern emerges.
Environmental investment is moving:
FROM THEMES → TO ASSETS
FROM LABELS → TO ECONOMICS
FROM PUBLIC MARKETS → TOWARD A BROADER PUBLIC-AND-PRIVATE UNIVERSE
FROM ENVIRONMENTAL CLAIMS → TOWARD MEASUREMENT
FROM GENERATION → TO COMPLETE INFRASTRUCTURE SYSTEMS
FROM WASTE → TO RESOURCES
FROM LAND → TO PRODUCTIVE LAND SYSTEMS

FROM NATURE → TOWARD NATURAL CAPITAL
FROM TECHNOLOGY → TO TECHNOLOGY EMBEDDED IN PHYSICAL ASSETS
This does not mean traditional environmental investing disappears.
It means the investment universe becomes considerably larger.

The 2027 Environmental Investment Question
The environmental economy will require enormous amounts of capital.
But capital alone does not determine successful outcomes.
Projects need viable economics.
Infrastructure needs customers.
Businesses need competitive advantages.
Technology needs commercial adoption.
Natural capital needs credible revenue mechanisms.
Environmental markets need integrity.
Private funds need capable managers.
And investors need sufficient information to understand what they are buying.
The defining investment question for 2027 may therefore be:
Where do environmental necessity and economic opportunity genuinely intersect?
That intersection—not environmental need by itself—is where durable investment opportunities are most likely to develop.

ECOLENCE RESEARCH PERSPECTIVE
The environmental investment market appears to be entering a more mature phase.
The first phase was largely about awareness.
The next phase is increasingly about **capital deployment**.
Building power systems.
Modernizing water infrastructure.
Improving farmland.
Financing forests.
Recovering resources.
Developing technology.
Measuring environmental outcomes.
Financing businesses and projects capable of operating within those systems.
This is why Ecolence views environmental investing not as a narrow category but as an expanding **investment universe**.
It includes:
REAL ASSETS
INFRASTRUCTURE
PRIVATE EQUITY
PRIVATE CREDIT
VENTURE CAPITAL
PROJECT FINANCE
ENVIRONMENTAL MARKETS
PUBLIC SECURITIES
And increasingly, these categories overlap.
The opportunity entering 2027 is therefore not simply to invest in something because it is described as environmental.

It is to identify the places where capital can finance **productive assets, essential infrastructure, valuable resources and commercially viable technologies** while contributing to measurable environmental outcomes.
That leads to the central conclusion of the **Ecolence 2027 Environmental Investment Outlook**:
The environmental economy is becoming part of the real economy—and the investment opportunities increasingly reflect that reality.
The next generation of environmental investing may be defined less by labels and more by assets.
Less by promises and more by measurement.
Less by environmental narratives alone and more by the combination of **economic value, disciplined investment structures and real-world outcomes**.
For investors, that creates a much larger universe to explore.
And for the environmental economy, it creates something equally important:
A broader pathway for private capital to participate in building what comes next.

Methodology, Sources & Disclosures



How to Read the Ecolence 2027 Environmental Investment Outlook

The **Ecolence 2027 Environmental Investment Outlook** is designed to provide investors, sponsors, industry participants and other readers with a broad research perspective on the environmental investment economy.

The report examines the intersection of **capital, infrastructure, natural resources, technology and environmental markets**, with particular attention to the ways private capital can participate in those sectors.
The report is intended to identify important developments, explain emerging investment structures and provide context for understanding environmental investment opportunities and risks.
It is **not intended to predict precisely what will occur in 2027**.
Instead, the Outlook asks a broader question:
Which economic, technological and capital-market developments appear most relevant to the environmental investment landscape entering 2027?

Research Methodology

Ecolence Research uses a **thematic research approach**.
Rather than attempting to forecast individual securities, funds or projects, the Outlook examines major sectors of the environmental economy and the forces influencing investment within them.
The research process focuses on five areas:

1. MARKET SCALE
The current size, growth and capital requirements of environmental sectors.

2. CAPITAL FORMATION
How governments, companies, banks, institutional investors and private capital are financing those sectors.

3. INVESTMENT STRUCTURES
The vehicles through which investors may obtain exposure, including real assets, infrastructure, private equity, private credit, venture capital, project finance, private funds and public securities.

4. TECHNOLOGY & MARKET DEVELOPMENT
Technologies, infrastructure requirements and emerging business models that may change the economics of environmental assets.

5. RISK & INVESTABILITY
Whether environmental need is being translated into identifiable revenues, cash flows, ownership rights and investment structures.

This final distinction is central to the methodology used throughout the report:
Environmental importance does not automatically equal investment opportunity.

Source Selection

The Outlook prioritizes information from institutions that publish primary data, sector research or recognized market analysis.
Major sources used throughout the report include:

International Energy Agency (IEA)
Energy investment, electricity infrastructure, grids, artificial intelligence and energy-system analysis.

International Renewable Energy Agency (IRENA)
Renewable-energy capacity, deployment and power-system research.

World Bank Group
Carbon pricing, water infrastructure, development finance and environmental-market research.

United Nations Environment Programme (UNEP)
Natural capital, forestry, resource efficiency, waste and environmental finance.

Food and Agriculture Organization of the United Nations (FAO)
Agriculture, water, forests, land and natural-resource data.

United States Department of Agriculture (USDA)
U.S. farmland values, farm-sector assets and agricultural economics.
U.S. Environmental Protection Agency (EPA)
U.S. drinking-water infrastructure requirements and environmental infrastructure data.
McKinsey & Company
Private markets, infrastructure investment and institutional-capital research.
Ecosystem Marketplace
Voluntary carbon-market transaction and market data.
Integrity Council for the Voluntary Carbon Market (ICVCM)
Carbon-market integrity frameworks and Core Carbon Principles.
Berkeley Carbon Trading Project
Carbon-credit registry and offset-market data.
Ellen MacArthur Foundation
Circular-economy frameworks, business models and resource-efficiency research.
Other governmental, academic, industry and market sources may be used where relevant.

Use of Current and Historical Data

Unless otherwise indicated, the report uses the most recently available information considered relevant at the time of preparation.
Readers should note that publication years and underlying data years may differ.
For example, a report published in 2026 may contain final data for 2025, preliminary estimates for 2026 or projections extending into later years.
Where practical, the Outlook distinguishes among:
Historical Data — measured results from completed periods.
Estimates — current-period values that may not yet be final.
Forecasts — forward-looking expectations produced by third parties.
Ecolence Research Analysis — interpretation of available information and identification of themes considered relevant to the environmental investment market.
This distinction is particularly important when interpreting large capital requirements.
For example, the IEA estimates global energy investment will reach approximately **$3.4 trillion in 2026**, including about $2.2 trillion directed toward renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification. These are estimates rather than completed-year results. IEA
Similarly, UNEP's estimate that annual forest investment needs to increase from approximately **$84 billion in 2023 to $300 billion by 2030** represents an assessment of financing requirements—not a forecast that $300 billion will actually be invested. UNEP - UN Environment Programme

Treatment of Forward-Looking Information

The **2027 Outlook** necessarily contains forward-looking discussion.
Statements concerning future investment, market development, technology adoption, capital requirements, regulation, asset values or other future conditions should be understood as **analysis, scenarios or third-party forecasts**, rather than statements of fact about future outcomes.
Terms such as:
may
could
expected
projected

estimated
potential
outlook
theme to watch
are intentionally used to reflect uncertainty.
Actual outcomes may differ materially because of economic conditions, interest rates, commodity prices, regulation, technological development, geopolitical events, environmental events, capital availability and numerous other factors.

Investment Need Versus Investable Opportunity

A particularly important methodological distinction applies throughout this report.
Large investment requirements do not necessarily represent available private investment opportunities.
For example:
A government may finance infrastructure directly.
A utility may finance projects internally.
A bank may provide traditional lending.
A project may lack commercially viable revenue.
An environmental benefit may not be monetizable.
An investment opportunity may exist but provide an unattractive risk-adjusted return.
Accordingly, references to trillions of dollars of required infrastructure or environmental investment should **not** be interpreted as equivalent to the size of an addressable private investment market.
The Outlook uses those figures to demonstrate the scale of underlying economic requirements.

Environmental Impact Versus Financial Performance

The report also intentionally separates **environmental outcomes from investment returns**.
An investment can produce meaningful environmental benefits while generating poor financial results.
Likewise, a financially successful investment may produce environmental benefits that are difficult to measure or smaller than initially anticipated.
Ecolence Research therefore approaches an environmental investment through two separate questions:
ENVIRONMENTAL
What environmental outcome is expected, and how can it be measured?
FINANCIAL
How is the investment expected to generate economic value for the investor?
Neither answer substitutes for the other.

Carbon and Environmental Markets

Carbon and other environmental markets require particular caution because methodologies, standards, regulation and market practices continue to evolve.
Carbon pricing itself is now economically significant: the World Bank reports **87 implemented direct carbon-pricing policies covering just over 29% of global greenhouse-gas emissions**, with more than **$107 billion raised for public budgets in 2025**. World Bank
However, individual carbon credits can differ substantially in methodology, additionality, permanence, verification, registry, project type and permitted use.

References in this report to carbon credits, biodiversity credits or other environmental commodities therefore should not be interpreted as suggesting that individual credits are interchangeable or equivalent in quality.

Geographic Scope

The Outlook takes a **global perspective**, while using the United States and other major markets for certain examples where reliable information is available.
Environmental investment conditions vary substantially by geography.
Differences may include:
Regulation
Securities laws
Taxation
Interest rates
Currency
Energy markets
Land ownership
Water rights
Environmental-credit rules
Infrastructure
Political risk
Investor eligibility
Readers should not assume that an investment structure or market condition described in one jurisdiction applies in another.

Currency and Units

Unless otherwise indicated:
$ or USD refers to United States dollars.
GW refers to gigawatts.
TWh refers to terawatt-hours.
CO_2e refers to carbon-dioxide equivalent.
Hectares are used where consistent with the underlying international source.
Figures may be rounded for readability.
Because source organizations may use different currencies, measurement periods, inflation assumptions and methodologies, figures from separate studies should not automatically be treated as directly comparable.

Data Limitations

Environmental markets remain less standardized than many mature financial markets.
Data limitations can be particularly significant in:
Private markets
Natural capital
Biodiversity
Carbon markets
Emerging environmental technologies
Private infrastructure

Developing economies
Individual environmental projects
Information may be incomplete, privately held, based on surveys or derived from estimates.
Methodologies can also differ among organizations.
Accordingly, statistics in this report should be interpreted in the context of their original sources rather than as perfectly comparable measurements.
IRENA, for example, reports that **692 GW of renewable capacity was added during 2025**, bringing global renewable capacity to 5,149 GW. Those figures measure installed generating capacity—not investment dollars or electricity actually generated. IRENA
Understanding what a statistic actually measures is as important as the number itself.

Ecolence Research Independence

The Outlook is intended as an **educational and research publication**.
The inclusion of a sector, investment structure, technology, market or environmental strategy does not constitute an endorsement by Ecolence.
Likewise, discussion of risks should not be interpreted as a recommendation against investing in a particular sector.
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Nothing in this report constitutes an offer to sell, a solicitation of an offer to buy, or a recommendation concerning any security, investment fund, project, financial instrument or investment strategy.
Ecolence does not make any representation that an investment, strategy or environmental sector discussed in this report is appropriate for any particular investor.
Investors should conduct their own independent investigation and consult appropriate financial, legal, tax and other professional advisers before making an investment decision.

Private Investment Risk

Private investments can involve substantial risk.
Depending upon the investment, risks may include:
Loss of some or all invested capital
Illiquidity
Long holding periods
Limited operating history
Lack of market pricing
Valuation uncertainty
Leverage
Development and construction risk

Commodity-price exposure
Regulatory risk
Technology risk
Environmental risk
Manager and sponsor risk
Limited diversification
Restrictions on transfer or redemption
Private securities may not be registered under applicable securities laws and may be available only to investors satisfying particular eligibility requirements.
Investors should review the applicable offering documents before investing.

No Guarantee of Returns

Any references to historical performance, targeted returns, projected yields, expected distributions, investment multiples, asset appreciation or other financial outcomes are provided for informational purposes.
Past performance does not guarantee future results.
Targeted or projected returns are not guaranteed.
Actual results may differ materially from projections.
Investors may lose some or all of their investment.

Environmental Claims

Environmental terminology can vary among organizations, markets and jurisdictions.
Terms including:
Sustainable
Environmental
Impact
Natural Capital
Green
Regenerative
Climate Technology
may not have a single universally applicable definition.
The inclusion of an investment or activity within one of these categories does not independently establish its environmental performance.
Environmental claims should be evaluated based upon the underlying methodology, evidence and measurement practices.

Source Attribution

Statistics and third-party research used in the Outlook remain attributable to their respective publishers.
The inclusion of third-party research does not imply endorsement of Ecolence by those organizations.
Readers seeking additional detail should review the original publications, particularly where an investment decision could depend upon the information.
Key primary research underpinning the Outlook includes the IEA's **World Energy Investment 2026**, IRENA's **Renewable Capacity Statistics 2026**, UNEP's **State of Finance for Forests 2025**, and the World Bank's **State and Trends of Carbon Pricing 2026**. IEA

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Information reflects sources and analysis available through the report's research cutoff date. Markets, regulation, economic conditions and data can change after publication. Ecolence does not undertake an obligation to update every statistic, forecast or conclusion following publication unless otherwise stated.

FINAL RESEARCH PRINCIPLE

Throughout this report, Ecolence Research has attempted to maintain one distinction above all others:
Environmental importance should never be confused with investment certainty.
The environmental economy presents substantial capital requirements and potentially significant investment opportunities.
But every investment must ultimately stand on its own economics, structure, management, risks and potential return.
The purpose of Ecolence Research is therefore not to tell investors **what to invest in**.
It is to provide information and context that can help investors better understand **what they are looking at**.
That principle fits directly with the larger purpose of Ecolence:
Bring greater discovery, organization, transparency and understanding to the environmental investment universe.

ECOLENCE
THE GLOBAL PLATFORM FOR
ENVIRONMENTAL & IMPACT INVESTMENTS