

DiversiTerra

March 31, 2023



Green Alpha[®]

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Investment Philosophy

The greatest growth drivers of today's economy are high-functioning, inventive companies creating and accelerating solutions to system-level risks—the climate crisis, resource degradation, widening inequality, and human disease burdens. Those companies are our best investment opportunity to preserve and grow clients' capital.

Green Alpha's philosophy is simple: seek enterprises creating scalable and rapidly evolving, economically-competitive solutions, rigorously evaluate their fundamentals, and acquire them at reasonable valuations.

Our investments seek to de-risk the global economy (which in turn reduces clients' long-term investment risks) while striving to grow faster than underlying GDP.



Why Invest in DiversiTerra?

- Active research, stock selection, and portfolio management
- Invests at the intersection of the most diverse companies in the Next Economy™ universe that are foremost on Green Alpha's conviction list
- 45-65 global, market-leading, solutions-oriented companies led by diverse executive teams and boards

Inception: March 31, 2018

Vehicle: Separately Managed Accounts

Research

Across our portfolios, we seek companies:

- with products and/or services lowering the global economy's risk profile by creating solutions to our most pressing economic and environmental risks
- committing more capital to R&D and owning more intellectual property than their peers
- run by effective, diverse executive teams and boards of directors with track records of increasing revenues and expanding margins, leading to earnings growth
- exhibiting sound financial fundamentals
- trading at compelling valuations relative to proven and anticipated growth, within acceptable levels of risk

Portfolio Construction

Diverse teams outperform homogeneous ones on a variety of critical metrics; thus, this portfolio seeks to invest in companies run by the most diverse executive teams *and* boards. DiversiTerra is a high-conviction subset of Green Alpha's Social Index portfolio.

DiversiTerra is an actively managed gender-lens portfolio. Our gender lens is focused on the reality that women suffer the greatest effects of the climate crisis, resource degradation, inequality, and disease; therefore, they disproportionately benefit from investments in solutions.

Largest Positions

How the DiversiTerra portfolio is driving progress toward the Next Economy

Brookfield Renewable (Sector: Utilities, Industry: Electric Utilities)

- Brookfield Renewable is a leading renewable power company that owns and operates a portfolio of solar, wind, and hydroelectric power generation and storage facilities in North America, South America, Europe, and Asia.
- Brookfield is one of the largest renewable power companies in the world, with a portfolio of over 24,000 megawatts of generating capacity. The company's mission is to provide sustainable energy solutions that help people and businesses thrive. They are committed to developing and operating renewable energy projects that are environmentally responsible, socially beneficial, and economically viable.
- Brookfield is conservatively managed, continually looking for acquisitions at favorable prices and organic development to grow generation capacity, and has revenues largely backed by long-term power purchase agreements (PPAs). Brookfield is inflation resilient and may benefit from an inflationary environment, because their generating costs are fixed but their PPAs are indexed to inflation.
- Women comprise 30% of board directors (including the Audit Committee Chair), 25% of overall workforce, and 26% of the exec team. The exec team has a robustly above-average age spread of 48 years, as does the board at 38 years.

Vestas Wind Systems (Sector: Energy, Industry: Renewable Energy)

- A front runner in the global energy transition, Vestas is the world's most advanced wind turbine manufacturer, and the global leader in onshore, offshore, and grid-connected installations. Vestas is also a leading service contract provider, furnishing the company with meaningful higher-margin recurring revenue.
- Vestas' order backlog is over 50 billion Euros and service order backlog is over 5 billion Euros. New order intake has accelerated into 2023, with 3.022 GW in new orders in Q1 alone, and the service segment continues to gain momentum.
- They have 141+ GW under service contracts, with 125+ GW located offshore. The average service contract duration is 10 years, providing a long runway of revenue transparency.
- Vestas is targeting carbon neutral operations—without use of carbon offsets—by 2030 and zero-waste wind turbines by 2040.
- Vestas' board is comprised of five women (42%). Of the 12 members, eight were elected by shareholders and four were elected by Denmark-based employees. Women serve on all committees and comprise half of the Nomination & Compensation Committee.

IBM (Sector: Technology, Industry: Software & Tech Services)

- IBM is a world leader in driving innovation to mitigate global risks. Having divested from its legacy managed-infrastructure business, IBM has re-emerged as a Next Economy™ powerhouse. Their primary initiatives include blockchain code and technology, cloud computing, AI and machine learning, and quantum computing. IBM has said these innovations “can exponentially alter the speed and scale at which we can uncover solutions to complex problems. We've come to call this accelerated discovery.”

IBM, Taiwan Semiconductor Manufacturing, and Moderna's Next Economy attributes are continued on the following page.

Company Name	Ticker	Weight
Brookfield Renewable	BEPC	5.27%
Vestas Wind Systems	VWDRY	4.19%
IBM	IBM	3.89%
Taiwan Semiconductor Manufacturing Co.	TSM	3.34%
Moderna	MRNA	3.00%
Lam Research Corp.	LRCX	2.67%
First Solar	FSLR	2.61%
CRISPR Therapeutics	CRSP	2.60%
Maxon Solar Tech.	MAXN	2.43%
Equinix	EQIX	2.27%
% of Portfolio		32.27%

Largest Positions *continued*

IBM *continued*

- After filing the most U.S. patents annually for 29 straight years, in 2022 IBM pivoted to create more open-source code and platforms, and so was awarded the 2nd largest number of U.S. patents after Samsung. We view this as positive to IBM's ability to scale as the data economy evolves. They remain among the largest IP holders across many domains: cloud and cognitive software; quantum computing; enabling distributed ledger; pioneering AI; developing security methods atop lattice cryptography; and advancing nanotechnology.
- Women comprise 33%+ of IBM's workforce. Women with significant authority include the COO, General Counsel, and CHRO. IBM is a longstanding leader on pay equity for both women and minority populations.

Taiwan Semiconductor (*Sector: Technology, Industry: Semiconductors*)

- Taiwan Semiconductor Manufacturing Company Limited (TSMC) is a Taiwanese multinational semiconductor contract manufacturing and design company. It is the world's most valuable semiconductor company, the world's largest dedicated independent (pure-play) semiconductor foundry.
- TSMC is a contract manufacturer, which means that it does not design or sell its own chips. Instead, it manufactures chips for other companies, including Apple, Qualcomm, and NVIDIA. TSMC's customers include some of the world's largest technology companies, and the company's chips are used in a wide range of products, including smartphones, computers, and cars.
- TSMC is by far the largest semiconductor foundry in the world with 54% market share overall and 92%+ market share of the world's most advanced chips. It is one of two companies capable of producing advanced 3-nanometer tech, and ahead on the next generation as it prepares to produce 2-nanometer chips in 2023.
- The company relies solely on internally generated funds to finance organic growth, capacity expansion, and R&D; it only invests in practical growth, never engaging in share buybacks.
- The company features strong fundamentals, including a fortress-like balance sheet and outstandingly high credit ratings.
- Their new Arizona plant will make advanced 3-and-5-nanometer transistors. The factory is expected to be operational by 2024, and it will be TSMC's first fab in the United States.
- TSMC's executive team includes several women in positions of high authority, including the President of TSMC Europe.

Moderna (*Sector: Health Care, Industry: Biotech & Pharma*)

- Moderna is a biotechnology company specializing in developing messenger RNA (mRNA) therapeutics and vaccines.
- Their mRNA technology platform is designed to enable the development of personalized cancer vaccines, as well as vaccines against infectious diseases such as COVID-19, influenza, HIV, CMV, and Zika. Unlike traditional vaccines, which use weakened or inactivated forms of viruses to stimulate an immune response, mRNA vaccines work by instructing cells to produce a specific protein that triggers an immune response against the targeted virus.
- Moderna is not just pioneering new medicines, but *new categories* of medicines, potentially transforming the field of medicine overall.
- The Q4 2022 announcement of a partnership with Merck to develop personalized cancer vaccines is a positive indication of a potential forward revenue driver. In addition, Moderna is running 31 development programs, including 26 in the clinic, showing both broad and deep product potential.
- Moderna's executive team exhibits good diversity, with four female Chief-level officers making up 39% of the group. In addition, the board includes three women, two of whom chair the Audit and Product Development Committees.

Please see the final page of this document for important disclosures about portfolio, benchmark, and characteristic information.

Macroeconomic Commentary



In the first quarter of 2023, the global economy continued to be characterized by the key challenges of 2022, including the ongoing COVID-19 pandemic, the war in Ukraine, rising inflation, and interest rate hikes. These challenges have had a significant impact on economic growth, trade, and investment, which has led to continued high market volatility.

For Green Alpha strategies, January 2023 provided double-digit performance gains as some of the above-listed concerns seemed to be easing, and then tougher markets in February and March as some issues seemed to reassert themselves, capped off by a positive rally at quarter-end as markets reverted to a more January-like dynamic. And yet, in context, inflation, interest rate concerns, and even geopolitical conflicts have historically been short-to-medium term sources of market volatility. As always, we endeavor to think about the longer term, and position our portfolios to preserve and grow our clients' purchasing power over multi-cycle periods.

And yes, the global economy is also facing long-term challenges, such as the climate crisis, inequality, and technological change. These challenges will require governments, businesses, and individuals to work together to find solutions, and, in overcoming them, the world will make significant—*it is not an exaggeration to say unprecedented*—investments in the best of these solutions. The patient, forward-looking investor therefore stands to benefit. To illustrate, let's look at a couple of sectors that saw big changes in Q1.

Carefully Navigating Tech's Rapidly Evolving Landscape

The way we understand the tech economy is changing dramatically. Large language models (LLM) are exponentially improving, seemingly by the week, and traditional search and ad serving businesses are looking less like the indefinite cash cows that they did just last year. The codes for these models are improving so fast, in part, because the models themselves are becoming partially self-recursive in that they produce content not only in natural language but in code itself, meaning software engineers now have very capable "co-pilots" to help them develop the next LLM iteration faster than the last (this is part of why we don't buy the general argument that productivity gains have flatlined). Ultimately, these models will be capable of generating ever-improving versions of themselves without direct human intervention and will be limited only by the capabilities of their underlying hardware.

Speaking of which, we can't let this subject pass without acknowledging a key vulnerability to the global economy: utter dependence on the Taiwan Semiconductor Manufacturing Company (TSMC). According to [recent reporting in Wired](#), TSMC is home to "the world's biggest logic chip manufacturing capacity and produces, by one analysis, a staggering 92 percent of the world's most avant-garde chips...Perhaps more to the point, TSMC makes a third of all the world's silicon chips, notably the ones in iPhones and Macs. Every six months, just one of TSMC's 13 foundries—the redoubtable Fab 18 in Tainan—carves and etches a quintillion transistors for Apple. In the form of these miniature masterpieces, which sit atop microchips, the semiconductor industry churns out more objects in a year than have ever been produced in all the other factories in all the other industries in the history of the world." Unfortunately, this stunning and so far, singular capability resides on one island whose government believes it is a sovereign nation, but that is also claimed as territory by China.

Let's face facts: the wonders we see from the LLMs don't occur in isolation. OpenAI, Microsoft, Google, Nvidia, Apple, and many more tech titans are utterly dependent on this one island with its N-of-One capabilities. The complex code that gives us ChatGPT and its kin have been made possible by the technological achievements at TSMC that brings forth the hardware capable of running these monster programs.

Continued on the following page

Macroeconomic Commentary *continued*

To run ChatGPT and others, [Microsoft Azure says](#) they leverage up to “thousands of NVIDIA H100 GPUs interconnected by NVIDIA Quantum-2 InfiniBand networking,” all made at TSMC. We’re not big on fossil fuel analogies here at Green Alpha but imagine a world where Saudi Arabia has 92% of the world’s oil reserves and is at the same time struggling to maintain its independence from a determined world superpower. This overwhelming dependency on TSMC means the world’s economy is far more vulnerable to disruption than is generally assumed, and of course also means that TSMC is a significant holding in many Green Alpha investment strategies. Challenge and opportunity, hand-in-hand, as always.

Volatility is Unlocking Opportunities: Investing in REITs

Tech isn’t the only place where the challenge/opportunity dynamic exists. We can also see it in the more prosaic field of real estate. Real Estate Investment Trusts (REITs) have had a tough time in 2022 and Q1 2023 in the face of unprecedented Federal Reserve rate hikes and the ongoing phenomenon of work-from-home catalyzed by COVID-19. This pair of headwinds has caused even some of the highest quality REITs to be down more than 70% in the trailing year at the end of Q1 ’23, and, clearly with some justification. Looking more closely, though, we can see that not all REITs are, by any means, equal. While many mid-tier and lower quality office REITs are reporting occupancy levels not much better than 50%, the highest quality office REITs, with AAA space, great sustainability profiles, and in desirable markets, are more than 90% occupied with relatively strong lease pricing power.

Moreover, specialty REITs like those providing lab space for biotechnology are actively growing. The predilection of traders and algorithms to bid down the entire sector is basically a scorched earth approach that has resulted in some amazing value opportunities among the gems in the space. Benefitting from these low entry points requires patience, but is not, in our opinion, particularly risky for the long-term investor. It’s all about waiting for markets to appreciate that not all REITs are created equal, and the quality names have been oversold. Meanwhile, REITs compensate us for this patience with returns in the form of a dividend while we wait. This approach isn’t new in investing, it is a straightforward example of time-arbitrage; while we can’t be sure if it is or is not too soon to enter the highest-quality REIT space, we know for sure it is not too late. At some point, it will be.

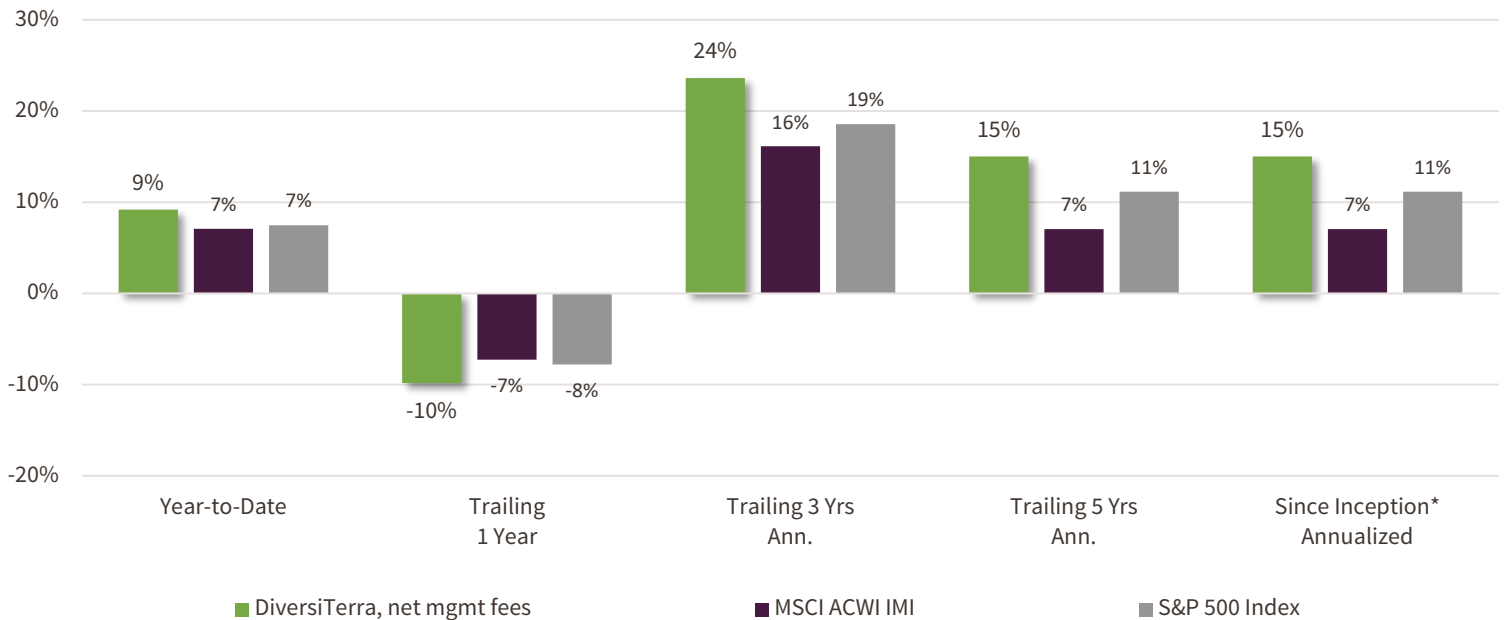
Remain Focused

Tech and REIT stocks are not often particularly correlated. As we’ve seen, they have very different dynamics, dependencies, and fundamentals; holding both is generally considered wise diversification. And yet, we have seen the global leaders in both industries lose share price value recently, even sometimes when their business results were good and improving.

The best thing an investor can do in volatile environments like these is maintain thesis conviction and convert the nearer term challenges into long-term opportunities via a carefully curated basket of securities. Near-term challenges create volatility, long-term challenges show us where to look for growth.

If you are a Green Alpha client, contact betsy@greenalphaadvisors.com to inquire whether your account(s) holds any of the securities listed in this macroeconomic commentary. At the time this commentary was written, Green Alpha held shares in Taiwan Semiconductor Manufacturing Co (TSM), NVIDIA (NVDA), and Apple (AAPL) in some client accounts. No Green Alpha client accounts held shares in Microsoft (MSFT) or Google (GOOG) at the time of authorship. Please see the final page of this document for additional related disclosures.

Portfolio Performance & Commentary



For Q1 2023, Green Alpha's DiversiTerra strategy returned 9.22% net of management fees, versus its benchmark, the MSCI All Country World Investable Market Index (MSCI ACWI IMI), which returned 7.09%.

The strategy's top performing sectors were Technology and Energy.

- In the Technology sector, the semiconductor value chain contributed the most to returns, including gains from foundry manufacturing, front-end capital equipment makers, and chip designers. Catalysts for semiconductors in the quarter included early implementation of the CHIPS Act, growing recognition of the importance of semis to the global economy, and multiple announcements related to expansion of global production capacity. Within the technology hardware industry, communications equipment and data networking contributed to gains. Contributions were also provided by exposure to security and engineering software.
- In Energy, returns were derived from renewable energy equipment, with solar equipment representing the lion's share of upside contribution. Specifically, the world's leading thin-film solar PV maker had an outstanding quarter, as it announced benefits from the Inflation Reduction Act ("IRA") and capacity expansion plans. Other renewable contributions were from traditional C-Si PV makers. In addition, gains were provided by a leading solar panel tracker maker and a niche provider of solar carports. Gains in energy were partially offset by losses from a leading solar inverter manufacturer and America's largest residential solar installer.

The sectors detracting the most from the strategy's returns in the quarter were Real Estate and Consumer Discretionary.

- Within the Real Estate sector, losses in office Real Estate Investment Trusts ("REITs") were partially offset by gains in data center and logistics REITs. Office REITs were under pressure given the interest rate environment and the narrative around work-from-home. However, we believe the highest-quality office REITs have been oversold vs. industry peers and currently present attractive long-term buying opportunities.
- In Consumer Discretionary, which detracted a mere 0.13%, a recycled flooring maker and electric vehicles led declines, but these losses were partially offset by a sustainable office furnishings provider. In EVs, the companies with less production capacity and operating leverage were down, although EV sales overall set a record high in the quarter.

**Portfolio Inception: March 31, 2018. All returns presented above that are greater than 1 year in length have been annualized. Performance data quoted represents past performance. Past performance does not guarantee future results and current performance may be lower or higher than the data quoted. Please see the final page of this document for additional important disclosures.*

DiversiTerra

How our portfolios compare to their benchmark, the MSCI All Country World Investible Market Index

Characteristics

- **Gender-lens criteria:** diverse teams demonstrably outperform homogenous teams—namely increased innovation levels, reduced governance controversies, greater customer orientation, and lower employee turnover
- **Fundamentals-driven:** the underlying quality of companies and the price paid for their shares are key drivers of LT returns
 - ✓ **High growth:** indicated by Sales Growth, and a decrease from Current P/E to Forward P/E as revenue and earnings grow
 - ✓ **Compelling valuation:** demonstrated by Price/Sales and Price/Book metrics relative to growth expectations
 - ✓ **Strong balance sheet and management execution:** conveyed by capital stewardship, LT Debt/Equity, and Current Ratio
- **Fossil fuel free since inception:** we have never invested in companies that prospect, extract, refine, or transport fossil fuels, nor in fossil-fired utilities or internal combustion engine manufacturers
- **Diversified – we seek solutions wherever we can find them:** across the globe, in companies of all sizes, and every industry
- **Public equities, long-only:** most investors' largest asset class; largest opportunity for impact

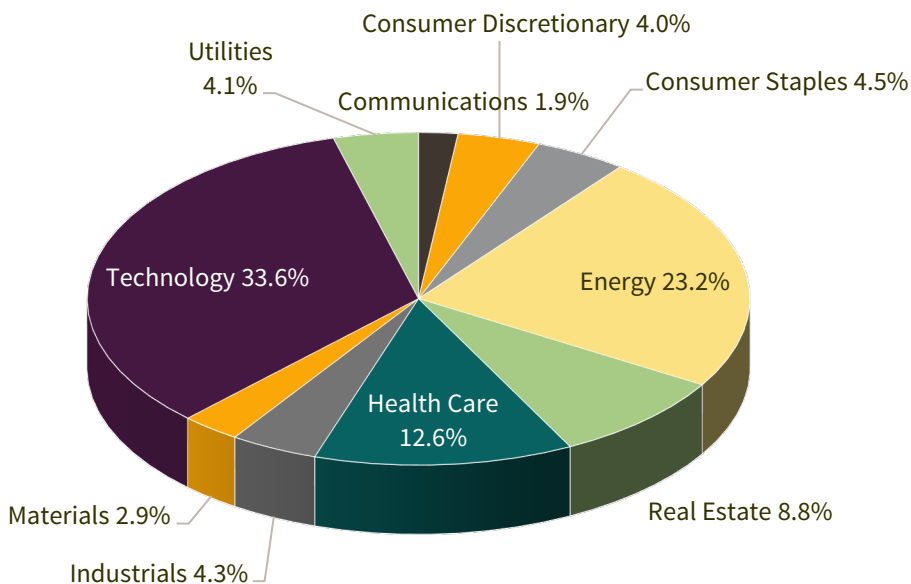
Characteristics	DiversiTerra	Benchmark: MSCI ACWI IMI (SPGM)	Next Economy Index	Social Index	Next Economy Select	Growth & Income	Sierra Club Green Alpha
# of Securities	57	2,488	142	99	63	35	47
Active Share	95%	-	93%	94%	96%	97%	96%
Sales Growth, Trailing 3-Yr	53%	14%	47%	57%	42%	23%	45%
P/E, Current	19.9	16.1	19.8	21.0	16.0	15.9	18.7
P/E, 1-Year Forward	21.7	15.4	20.3	22.1	17.0	16.0	19.8
Price/Sales	1.9	1.6	2.1	2.0	1.6	1.6	1.2
Price/Book	2.6	2.4	3.0	2.8	2.1	1.7	2.4
LT Debt/Equity	97%	138%	105%	92%	93%	63%	95%
Current Ratio	3.2	2.0	3.2	3.8	4.0	2.7	2.7
Dividend Yield	1.46%	2.29%	1.19%	1.10%	1.96%	4.42%	1.46%
Market Cap., Wtd Avg (\$B)	\$109.88	\$326.62	\$88.08	\$86.65	\$103.96	\$84.35	\$104.71
Market Cap., Median (\$B)	\$7.41	\$2.53	\$8.06	\$7.76	\$3.79	\$29.04	\$12.65
Turnover, Trailing 2-Yr Avg	32%	Not Available	12%	43%	12%	18%	21%
Beta, Trailing 2-Yrs	1.26	1.00	1.26	1.30	1.26	1.20	1.28
U.S.-Domiciled Companies	80%	57%	76%	84%	65%	66%	68%
% Revenue Derived in U.S.	58%	43%	48%	53%	43%	45%	45%

All characteristics are sourced from FactSet, are based on a representative account and include cash. Please see the final page of this document for additional important disclosures.

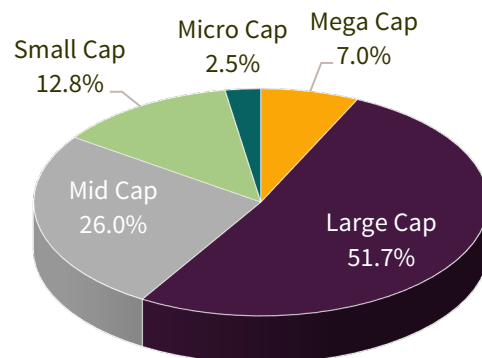
Portfolio Allocations

Our search for Next Economy companies is unconstrained. For the DiversiTerra portfolio, we seek solutions to systemic risks wherever they exist – across sectors, market caps, and geographies.

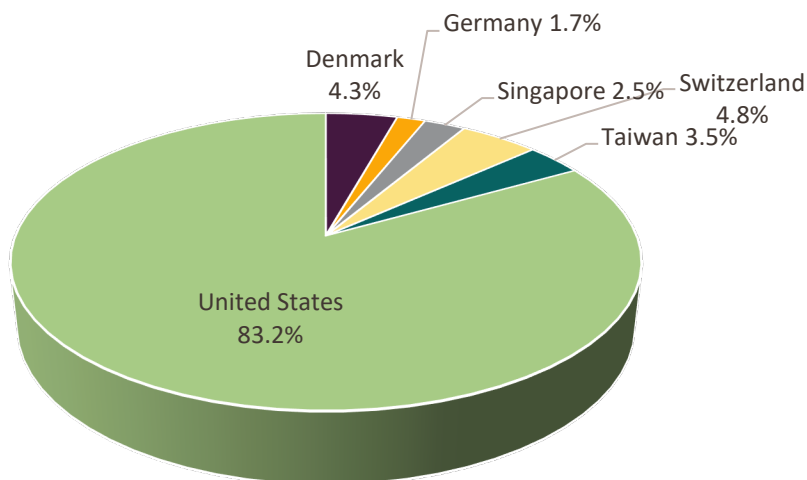
Economic Sectors



Market Capitalizations



Companies' Main Headquarters



Allocation data is sourced from FactSet and is based on a representative account. The exception is the sector chart, which utilizes the Bloomberg Industry Classification Standard from Bloomberg, and is based on a model portfolio. All charts on this page are shown as percent of equity. Please see the final page of this document for additional important disclosures.

Important Disclosures

- Green Alpha Advisors, LLC is a registered investment advisor. Registration as an investment advisor does not imply any certain level of skill or training.
- Green Alpha Investments is a trade name of Green Alpha Advisors, LLC. Green Alpha is a registered trademark of Green Alpha Advisors, LLC. Green Alpha Advisors also owns the trademarks to “Next Economy,” “Next Economics,” “Next Economy Portfolio Theory,” “Investing in the Next Economy,” and “Investing for the Next Economy.”
- Performance quoted throughout this document represent past performance. Past performance does not guarantee future results, and current performance may be lower or higher than the data quoted. Investment returns and principal will fluctuate with market and economic conditions, and investors may have a gain or loss when shares are sold.
- Beginning June 30, 2022, the DiversiTerra performance results are a composite of discretionary client accounts invested in the DiversiTerra strategy on specific custodial platforms. Green Alpha’s discretionary client accounts that are not included in the composite are those custodied at Folio Institutional due to operational limitations of Folio’s data feeds to Green Alpha’s portfolio accounting system Advent APX. The DiversiTerra composite performance results reflect actual performance for a composite of discretionary client accounts. Net-of-fee returns reflect the deduction of actual management fees and transaction costs. Some assets managed in the DiversiTerra strategy within the composite receive a reduced fee from the standard management fee schedule. Actual client returns experienced will vary from the returns presented based on a variety of factors, and we encourage you to ask about specific factors. Accounts are included in the composite for full-month periods under management with Green Alpha Investments. DiversiTerra composite performance results do not reflect the reinvestment of dividends and interest.
- Prior to June 30, 2022, the performance results represent a single account managed to the strategy. The performance results shown are not materially higher than if all related accounts were included prior to July 2022. Please contact Green Alpha for information about the representative account selection process.
- Actual advisory fees may vary among clients with the same investment strategy. Green Alpha’s standard fee schedules are available within Form ADV Part 2. For those details and additional legal information, please see information and files here: <http://greenalphaadvisors.com/about-us/legal-disclaimers/>.
- The DiversiTerra strategy contains equity stocks that are managed with a view towards capital appreciation. Extreme periods of underperformance or outperformance are due to the concentrated nature of the strategy and the impact of specific security selection. Such results may not be repeatable.
- Green Alpha portfolios may invest in companies with small and medium market capitalizations, which may have more limited product lines, markets, and financial resources than larger companies. In addition, their securities may trade less frequently and in more limited volume than those of larger companies. Small or mid-cap stocks may be more volatile than those of larger companies and, where trading volume is thin, the ability to dispose of such securities may be more limited. Green Alpha portfolios may also invest in foreign domiciled companies. Investing in foreign securities may involve additional risks, including exchange-rate fluctuations, limited liquidity, high levels of volatility, social and political instability, and reduced regulation. Emerging markets are often more volatile than developed markets and investing in emerging markets involves greater risks. International investing may not be suitable for everyone. An investment in Green Alpha portfolios should be considered a long-term investment.
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- The MSCI All Country World Investable Market Index (ACWI IMI) captures large, mid, and small cap representation across 23 developed markets and 27 emerging markets countries. With more than 8,750 constituents, the index is comprehensive, covering approximately 99% of the global equity investment opportunity set. Investors cannot invest directly in this index.
- The SPDR MSCI Global Stock Market ETF (ticker: SPGM) seeks to provide investment results that, before expenses, correspond generally to the price and yield performance of the MSCI ACWI IMI. Investors can invest directly in SPGM.
- The S&P 500 Index is an unmanaged index of 500 common stocks chosen for market size, liquidity, and industry group representation. It is market-value weighted. The S&P 500 Index figures do not reflect any fees, expenses, or taxes. Investors cannot invest directly in this index.
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