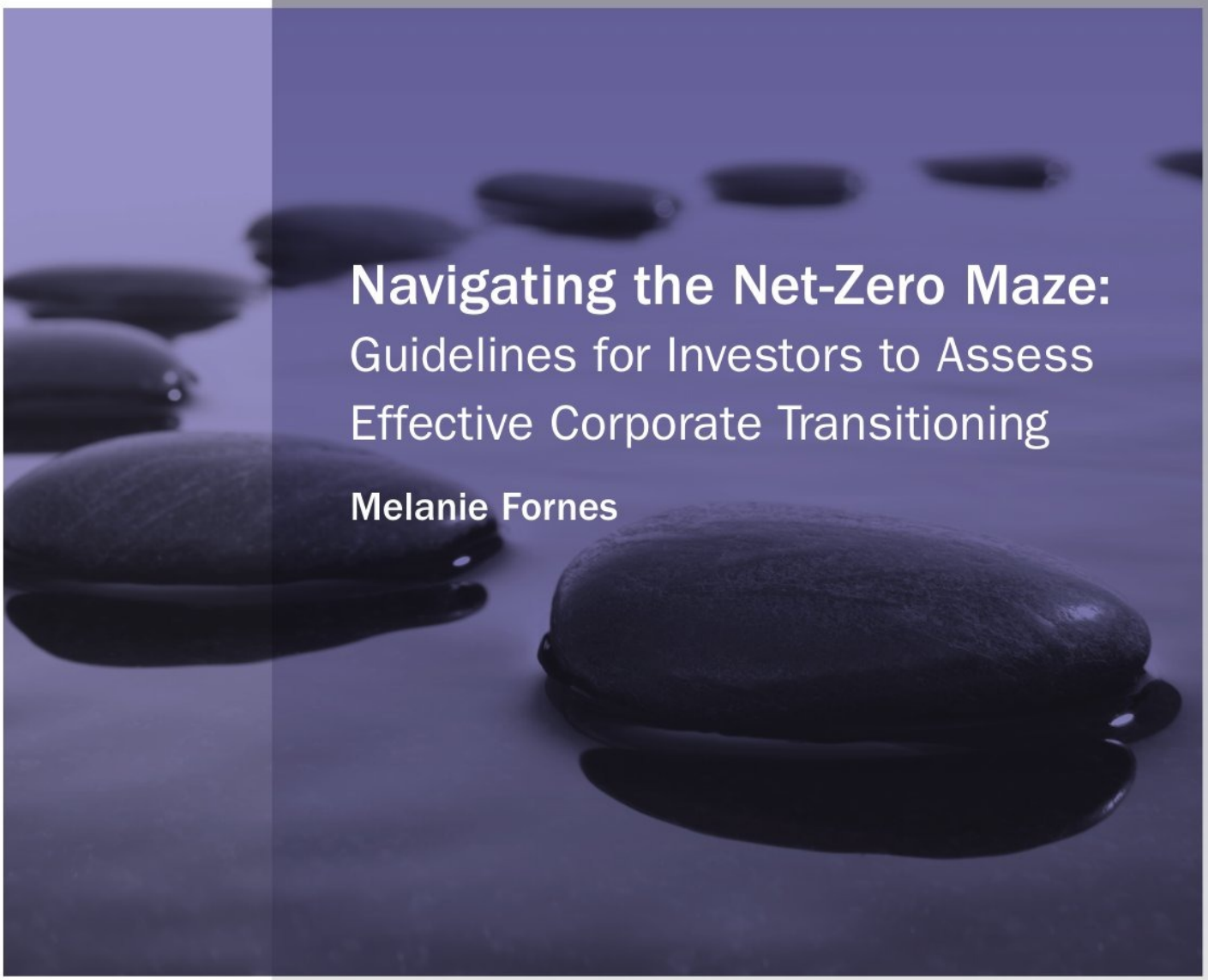
PORTFOLIO MANAGEMENT RESEARCH
with. Intelligence

VOLUME 27 | NUMBER 2

The Journal of Wealth Management



Navigating the Net-Zero Maze: Guidelines for Investors to Assess Effective Corporate Transitioning

Melanie Fornes

pm-research.com

FALL 2024

GLENMEDE

GLENMEDE

An independent and privately held investment and wealth management firm, The Glenmede Trust Company (GTC) was founded in 1956 to serve in perpetuity as trustee and administrator of The Pew Memorial Trust, the initial funding source for the nonprofit now known as The Pew Charitable Trusts. Today, GTC and its affiliates (Glenmede) provide highly customized investment, fiduciary and advisory services to high-net-worth individuals, families, family offices, nonprofits, foundations and institutional entities. Understanding the benefits of being optimally sized, we are a boutique wealth manager with the scale to provide comprehensive solutions, while maintaining our client focus to deliver tailored services and solutions, which include wealth planning and advice, investment management, trust and estate planning, philanthropy and wealth education, outsourced chief investment officer and sustainable & impact investing capabilities. Glenmede's values of accountability, agility and integrity form the basis of how our multidisciplinary teams of experts deliver personalized service and solutions that adapt to and grow with our clients' objectives.

Melanie Fornes

Climate Change Investment Specialist, Sustainable & Impact Investing, Officer

Melanie Fornes is a Climate Change Investment Specialist on the Sustainable & Impact investing team. She is responsible for supporting the development of thematic investment solutions within Glenmede's sustainable and impact investing platform.

Prior to her current role, Melanie was a ESG Product Analyst for Income Research + Management, where she was responsible for designing new thematic fixed income strategies, managing client inquiries, and publishing ESG-related thought leadership and market commentary. Before that, she was an Associate at Arabesque Asset Management and a Climate Policy Fellow for CivicWell.

Ms. Fornes earned a Master of Science degree in Environmental Economics & Climate Change from the London School of Economics and Political Science. She also earned Bachelor of Arts degrees in Economics as well as in Environmental Studies from the University of California.

Melanie serves is a member for 100 Women in Finance and is an AmeriCorps alumnus.

Navigating the Net-Zero Maze: Guidelines for Investors to Assess Effective Corporate Transitioning

Melanie Fornes

Melanie Fornes
is a Climate Change Investment Specialist at Glenmede Trust Company in New York, NY.
melanie.fornes@glenmede.com

KEY FINDINGS

- The climate investment space has rapidly grown due to market demand, and to the evolving climate transition and its effects on economic and financial systems.
- Climate investors are faced with an influx of market initiatives, frameworks, and guidance related to net-zero planning and corporate transitioning. However, this heterogenous landscape, alongside inadequate in-house expertise, has led to unsuccessful analysis and integration within current investment processes.
- A practitioner-designed set of guidelines—informed by the wide landscape of market, industry, and academic research—provides investors with a lens through which to analyze and discern effective corporate climate action.

ABSTRACT

Public market investors are incorporating climate change considerations broadly in two ways: (1) allocating capital toward "pure play" companies that are inherently positioned for the climate transition (e.g., renewable-energy power producers); and (2) identifying companies that are effectively transitioning toward this future today (e.g., traditional automakers shifting toward making electric vehicles). The latter approach has sparked a movement of corporate "net zero" pledges—companies promising to decrease their emissions to net zero by using a variety of decarbonization and offsetting methods. Though net zero is now mainstream as a concept, operationalizing this key facet of climate investing is still in its nascent stages. The heterogeneous landscape of market initiatives, decarbonization frameworks and verification services has created a maze that investors are left to navigate. Under this current regime, investors risk failing to capture material climate risks that vary across industries. At worst, investors run the risk of encountering persisting greenwashing in the investment industry. This article seeks to build a framework that maps the myriad net-zero methodologies to a set of Corporate Climate Transition Guidelines for investors to consider when building climate-themed portfolios. The Corporate Climate Transition Guidelines create an actionable framework that distills the vast research on the climate-related risks that are most relevant to investors. Such a robust lens may help investors better navigate material risks and opportunities that the climate transition poses in portfolios today.

Climate change is posing an increasing risk to companies' assets across sectors and industries. Physical climate risks, such as increased frequency and severity of weather disasters, are estimated to cost the United States $177

billion in 2022 alone (NCEI 2024). Transition risks amplify these costs (e.g., reputational losses or stranded assets) when policies, sentiments, and technologies shift as the economy moves toward a lower-carbon future. Yet investors are lacking the tools and frameworks to adequately price in these evolving climate-related physical and transition risks. The financial industry has made significant innovations in the past century that serve as an example: from the formation of formalized accounting standards (e.g., the Generally Accepted Accounting Principles and the International Financial Reporting Standards), to the advancement of financial structuring and product innovations, such as securitization and derivatives. Incorporating new information into the investment process has been the backbone of the financial industry, and integrating climate change considerations is no less a part of this DNA. The increasing focus on theme-specific portfolio capabilities caters to investors' preferences while also forging new product categories. Climate change—one of the largest macroeconomic challenges of our time—is one such critical theme that investors are tackling now at large.

The climate investment space spans asset classes and industries. Public market investors are incorporating climate change into portfolios broadly in two ways: (1) allocating capital toward "pure play" companies that are inherently poised for the climate transition; and (2) identifying companies that are effectively transitioning toward this future today. The latter approach has sparked companies to consider how to mitigate emerging climate risks, while also positioning themselves to capitalize on the new opportunities that the climate transition presents. The corporate community has coalesced around net-zero pledges as the catch-all term encapsulating this critical and nuanced transition. Although net zero is now a mainstream concept, operationalizing this key facet of climate investing is still in its nascent stages, riddled with a new maze of acronyms, taxonomies, and expertise for investors to navigate.

This article aims to clarify the role of corporate transitions through an investment lens. In doing so, it explores the origins of net zero, maps the myriad net-zero efforts, and seeks to provide a set of Corporate Climate Transition Guidelines for investors to consider when building climate thematic portfolios. Such a robust lens may help investors better navigate the financially material risks and opportunities that the climate transition poses in portfolios today.

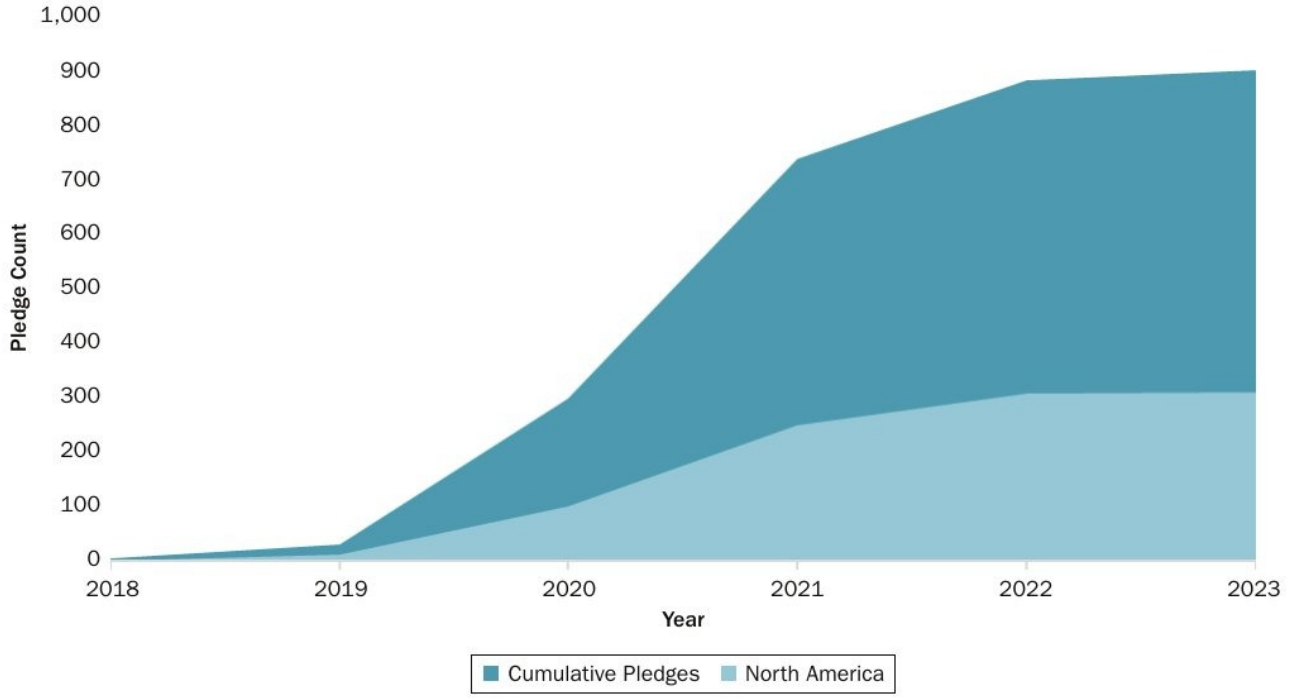
ORIGINS OF NET ZERO AND CHALLENGES AHEAD

Net zero—once only known in the scientific community—refers to the atmospheric state in which the amount of greenhouse gas (GHG) emissions going into the atmo sphere is no more than the amount coming out. The concept derives from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, and was included in the famed Paris Agreement of 2015, in which nations agreed to reach peak emissions as soon as possible to achieve an overall global warming goal of no more than 2°C, and ideally 1.5°C. While it is a political goal, the 2°C threshold is based on scientific knowledge of the probable consequences of global warming for humans and the environment. Nations have since led the wave of net-zero pledges to achieve the Paris Agreement's goals, and corporates are now building substantial momentum in net-zero pledges too. Between December 2020 and Q1 2023 alone, the number of publicly listed corporations with net-zero targets has more than doubled to over 900 globally, raising enthusiasm for net zero more than ever before (See Exhibit 1).

While the momentum of net-zero pledges mirrors the recent growth of sustainable investing, the implications of net zero and the climate transition for companies greatly

EXHIBIT 1

Cumulative Net-Zero Pledges by Year and Region



SOURCE: Net Zero Tracker. 2023. "Net Zero Stocktake 2023." NewClimate Institute, Oxford Net Zero, Energy and Climate Intelligence Unit, and Data-Driven EnviroLab. Accessed [June 21, 2023] from: https://zerotracker.net/analysis/net-zero-stocktake-2023.

differ from those related to integrating environmental, social, and governance considerations. The net-zero pledge transposes the concept of global warming temperatures into several wide-ranging ways in which corporates across sectors and industries can decrease and offset emissions. This inherently involves companies setting GHG reduction targets through a phased approach that should reflect material changes to companies' operations and capital expenditures in the short, medium, and long term. Around the time of the Paris Agreement, the Science-Based Targets initiative (SBTi) was created, coining the term "science-based target" in a corporate context, and offering companies guidance on GHG reduction targets that are aligned with the Paris temperature goal (SBTi 2023). The basic process for creating a science-based target can be seen in Exhibit 2.

Underpinning the SBTi's process of creating science-based targets is the broader concept of a GHG Mitigation Hierarchy. The GHG Mitigation Hierarchy informs a basic view of what corporate climate transitioning entails, distinguishing what actions are to be prioritized and considered more urgent than others (see Exhibit 3).

"Avoid" denotes that companies should seek to avoid any new emissions-intensive projects immediately. Particularly relevant to the most emissions-intensive sectors, such as energy, this implies that companies should not use today's capital expenditures for activities that may have volatile valuations in the future. "Reduce" encompasses the GHG mitigation efforts for companies to reduce emissions within today's technological availability. This might encompass so-called low-hanging fruit, such as energy efficiency or cost-effective renewable energy sources. "Replace" entails medium-to long-term capital expenditure planning for new technologies that will enable companies to pursue deeper decarbonization pathways. And, finally, "Offset"

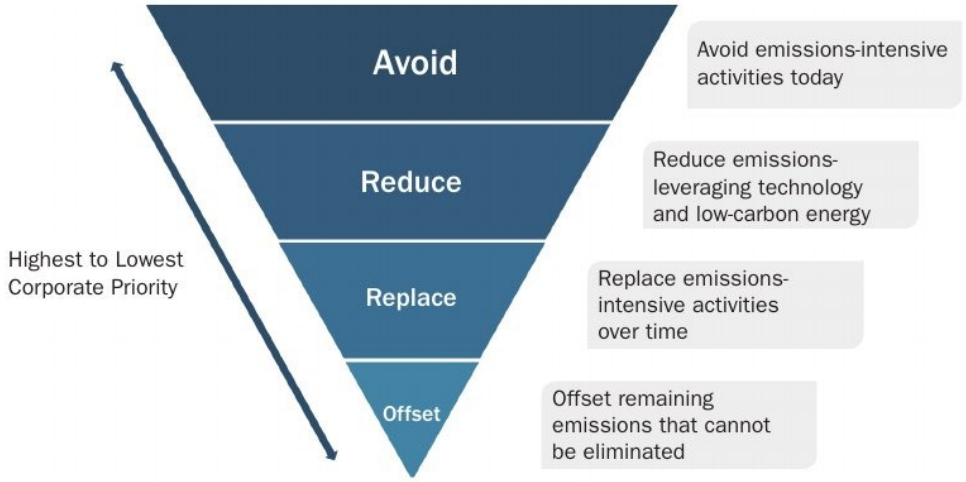
EXHIBIT 2

SBTi: Creating a Science-Based Target

SOURCE: Science-Based Targets initiative (SBTi) 2023.

EXHIBIT 3

The GHG Mitigation Hierarchy



SOURCE: Arnold and Mardirossian 2023.

recognizes that some base level of emissions cannot be eliminated and should be offset by carbon sequestration and capture projects.

Alongside the SBTi and its leading methodology, there has been an expansive landscape of coalitions, standards, initiatives, and organizations that stem, in some form, from the GHG Mitigation Hierarchy. All aim to help guide the corporate community toward integrating climate change considerations and decarbonization toward net zero. However, it has also amassed into what might be perceived as today's net-zero maze and investor confusion. The following sections will outline the mosaic of approaches to corporate transitioning, before setting out the article's own guidelines to help investors apply these complex principles tangibly within fundamental analysis.

THE NET-ZERO MAZE: LANDSCAPE ANALYSIS

A diverse landscape of actors has emerged from the wave of net-zero pledges and decarbonization efforts among corporations. We summarize this landscape schematically as a net-zero maze, echoing the "conveyor belt" in Hale (2022).

EXHIBIT 4

The Net-Zero Maze

Orchestrated Campaigns	United Nations Race to Zero
Standards	International Organization for Standardization (ISO) International Sustainability Standards Board (ISSB)
Investor Coalitions	Net Zero Asset Owner Alliance Net Zero Asset Managers initiative Climate Action 100+ The Investor Agenda
Research and Service Providers	Science Based Targets initiative (SBTi) Transition Pathway Initiative (TPI) Net Zero Tracker Carbon Tracker CDP

SOURCE: Created by the author.

The net-zero landscape is still in its nascent stages, primarily led by voluntary efforts, and accordingly shaped by how corporates choose to respond in the absence of any consensus on standards (Exhibit 4).

Orchestrated Campaigns

Since the signing of the Paris Agreement in 2015, a proliferation of coalitions and efforts have sprung up to help fill the gap between the corporate community and the actions needed to limit global warming by 2°C. As the SBTi, Climate Action 100+, and other organizations sprang up, the United Nations began the Race to Zero campaign in 2020 to formalize the net-zero pledges made across states, regions, companies, and institutions. Race to Zero is the leading campaign to rally leadership across these areas to bridge the Paris Agreement and real economy actors. It continues to be the universal yardstick to what can be deemed net zero, regularly facilitating research and discussion on the evolving space. For example, the latest report, "Integrity Matters" (also known as the McKenna Report), published in 2022, offers 10 recommendations for creating credible net-zero targets in a space where integrity is increasingly lacking. The report tackles emerging issues, including the use of offsets, regular interim targets, and committing to end fossil-fuel use (United Nations 2022).

Standards

The International Organization for Standardization (ISO) has developed standards in areas ranging from occupational health and safety to cybersecurity and food safety. Commissioned by the UN's Race to Zero, in 2022 the ISO developed Net-Zero Guidelines to provide a common reference point for defining and planning net zero for actors at state, regional, city and organizational levels.[1] The guidelines, which are lengthy and best suited for practitioners, provide an overview of net-zero principles, covering areas such as urgency, ambition, credibility, equity, and justice. They clearly define GHG emissions-reduction targets, measurement, monitoring, offsetting, and governance best practices.

[1] https://www.iso.org/netzero.

For a more focused view for corporates and investors alike, the International Sustainability Standards Board (ISSB) was formally established in 2021, overseen by the International Financial Reporting Standards Foundation. The ISSB builds on the work of market-led, investor-focused reporting initiatives, including the Climate Disclosure Standards Board, the Task Force for Climate-Related Financial Disclosures (TCFD), the Value Reporting Foundation's Integrated Reporting Framework, and the industry-based Sustainability Accounting Standards Board Standards. The ISSB aims and continues to refine climate-related disclosures that are cohesive across corporations and the investor community.

Investor Coalitions

Market-led, investor-focused coalitions have helped bridge the broader climate action movement toward the potential catalytical powers of financial markets. Shortly after the landmark United Nations Climate Change Conference of Parties in 2015, Climate Action 100+, the UN Net-Zero Asset Owner Alliance, and the Net-Zero Asset Managers Initiative sprang up.

Climate Action 100+ was formed by investors in 2017 to establish a shared agenda for shareholder engagement with the highest-emitting companies. The agenda focused on companies establishing clear commitments to cut emissions, improving governance, and strengthening both climate-related financial disclosures and transition plans in order to create long-term shareholder value.[2] On the other hand, the Net-Zero Asset Owner Alliance and Asset Managers Initiative both create internal goals for asset owners' and managers' investment portfolios to align with net-zero goals by 2050. These coalitions have been driven by broader investor networks—namely, the Asia Investor Group on Climate Change, the Investor Group on Climate Change, the Institutional Investor Group on Climate Change, Ceres, and the Principles for Responsible Investment. Together, these initiatives form an overarching Investor Agenda that covers both corporate engagement and portfolio investments, as well as investor disclosure and policy advocacy.[3]

Research and Service Providers

Research and service providers help funnel the momentum and coalition building toward actionable best practices. The SBTi is the leading net-zero service provider, offering companies guidance on Paris-aligned GHG reduction targets and acting as a target certifier. The SBTi has broadly created two approaches in developing corporate transition plans: a cross-sector pathway and a sector-specific pathway, overlaying both near and long-term targets in both approaches. A cross-sector pathway is applicable to all sectors except power generation, maritime transportation, and land-intensive sectors. It recognizes that these sectors are emissions-intensive and require sector-specific transition plans, given their outsized effect on global warming. For example, the SBTi is currently developing sector-specific guidance for oil and gas companies, as it is not yet able to accept commitments or validate targets for companies in fossil-fuel sectors (SBTi 2023).

Accordingly, research has coalesced around either generalist corporate transitions scores or sector-specific analysis. Organizations such as CDP, Transition Pathway Initiative, and Net Zero Tracker regularly publish data and research on the state and quality of corporate transitions across sectors. Other organizations such as Carbon Tracker specialize in sector- and industry-specific research, offering

[2] https://www.climateaction100.org/about/.
[3] https://theinvestoragenda.org/about-the-agenda/.

detailed reports into emissions-intensive companies' transition efforts and their efficacy.

This landscape of campaigns, investor coalitions, research, and service providers continues to expand as net-zero pledges remain voluntary and in the nascent stages. In the meantime, an effort to simplify this maze into tangible guidance for investors to integrate when building climate portfolios is critical.

CORPORATE CLIMATE TRANSITION GUIDELINES

We sought to create a practitioner-designed set of guidelines, informed by the wide landscape of market, industry, and academic research, to provide investors with a lens through which to analyze and discern effective corporate climate action. In the absence of regulation to help standardize and formalize this landscape, companies are not legally obligated to report and verify net-zero targets and progress regularly. So, while a company's commitment to net zero may reflect value at one point in time, there is currently no efficient way of tracking and reflecting these efforts onto company valuations. Like many nascent spaces, growth and legitimacy rely heavily on how markets price these efforts, exposing companies and markets to further volatility. This presents a pivotal role for investors and the financial industry at large.

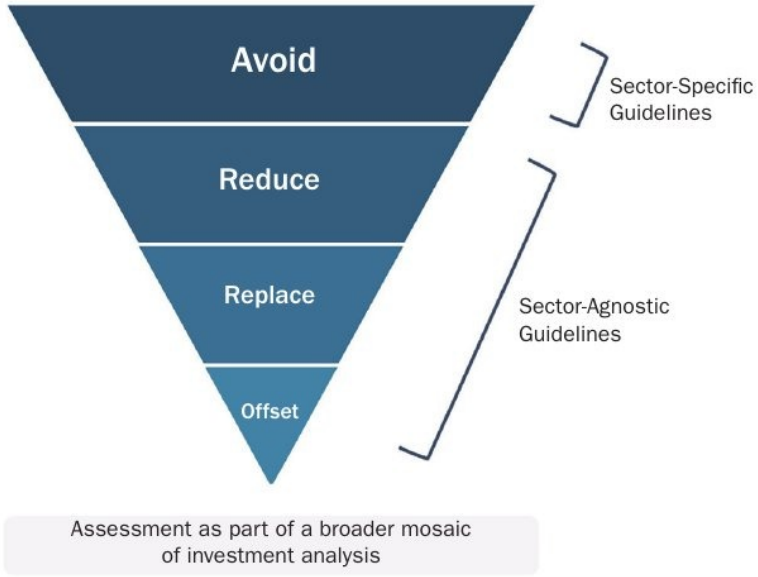
This article proposes a two-part set of guidelines to assess a company's climate transition performance. First, we propose sector-specific guidelines that aim to address the most pressing GHG sources in capital markets. Specifically, the energy sector encompasses companies that are highly impacted by climate-related physical and transition risks, and thus require a separate, sector-specific evaluation. The sector-specific guidelines also include the materials sector, which contributes to today's operational coal reserves—one of the most carbon-intensive fuel sources. The "Avoid" section therefore reviews how these specific sectors might avoid further emissions-intensive activities that are accountable for most global warming today. A second set of sector-agnostic guidelines helps to evaluate general corporate transitioning that is applicable across sectors: how companies are reducing emissions, replacing emission-intensive activities, and offsetting emissions that cannot be eliminated. This two-part set of guidelines therefore overlays with the foundational GHG Hierarchy for ease of use (Exhibit 5).

Translating the net-zero maze, and evolving best practices into a set of practical guidelines to be integrated into thematic investment analysis, is an opportunity to contribute to this growing landscape. This article aims to distill the technical and evolving net-zero maze into guidelines that promote ease of use, flexibility, and scalability. While research abounds in this area, primary concerns still exist, such as data availability, accounting for real emissions reduction, limited Scope 3 disclosures, and insufficient clarity over carbon offsets (Shugar, Myers, and Fugere 2022). These concerns particularly ring true depending on company capitalization and sector. For example, large capitalization companies with historically large emissions profiles are more likely to face regulatory pressure and have the resources to report annual emissions. Data availability and coverage then often vary based on market capitalization, geographic region, and industry. The guidelines therefore best serve large capitalization companies where there is data availability.

Using the GHG Hierarchy serves as a helpful backbone by clearly prioritizing corporate climate action whereby companies first reduce and replace emissions before offsetting, while giving specific attention to the most emissions-intensive sectors and activities. The guidelines should be positioned alongside the mosaic of other factors that investors consider in order to better inform relative valuations of companies.

EXHIBIT 5

Two-Part Set of Corporate Climate Transition Guidelines



SOURCE: GHG Hierarchy modified by the author.

They are not intended to be used solely to exclude specific companies within an investment universe, but to be leveraged in constructing a climate-themed portfolio aimed at investing in companies positioned for the climate transition.

The following "Avoid" section reflects the sector-specific guidelines to evaluate how such companies avoid high-risk, emissions-intensive operations.

Avoid

At the base of the GHG Hierarchy, "Avoid" encompasses the sector-specific guidelines for assessing companies' ability to avoid capital expenditure today on future emissions-intensive projects. The energy sector is the largest contributor to GHG emissions from global markets, and thus encompasses the companies that are most imminently under threat from climate-related transition risks. The materials sector, specifically metals and mining companies with large shares of coal reserves and operations, also is exposed to risks such as stranded assets. Stranded assets may pose one of the largest transition risks—with the rapid rate of technological and regulatory changes required for the transition, the expected volatile future profits of fossil-fuel assets are rapidly being perceived as a risk too. Such price volatility and valuation corrections could lead to losses for the ultimate asset owner and reverberate through financial markets. Researchers have estimated global stranded assets (the present value of future lost profits) in the upstream oil and gas sector to exceed $1 trillion from expected climate-policy changes alone (Semieniuk et al. 2022).

Accordingly, some regulators have stepped in and created advanced disclosure requirements for such emissions-intensive industries (such as requiring GHG emissions disclosure) to inform investors of such risks. Given their near-term, high exposure to climate risks, regulatory developments, and heightened disclosure, a sector-specific framework is warranted to focus in on the most GHG-intensive activities. In addition to these financially material risks, scientists also point to the need for change within these high emissions-intensive sectors. For example, to keep within

the Paris Agreement's temperature goal of 1.5°C, the IPCC projects that the use of fossil fuels without carbon capture and storage needs to be reduced by 95% for coal, 60% for oil, and 70% for gas by 2050 (IPCC 2022).

With both financial and climate risks pointing toward targeted change within the energy and materials sectors, the guidelines focus on new fossil-fuel development and coal-fired generation. Coal as an energy source has been on the decline in the United States, falling by more than half since its peak in 2005 (EIA 2023). The decline has been largely led by the electric power industry's weakening consumption, followed by declines in overall coal stocks held by producers and distributors in the materials sector. While coal makes up a smaller portion of today's fossil-fuel consumption relative to petroleum and natural gas, it has been responsible for the majority of historical emissions and holds one of the highest emissions-intensity factors of any fossil fuel. For these reasons, the UN Experts Group Report, the International Energy Agency, and other experts recommend no new coal production, in addition to exploration of new oil and gas reserves, and a phase-out of coal-fired generation by 2040 (Net Zero Tracker 2023).

With ambitious targets needing to be met by the energy and materials sectors, it is no surprise that researchers have not found any fossil-fuel companies making the necessary commitments to fully transition away from fossil-fuel extraction or production. Yet, paradoxically, fossil-fuel and power-generation companies are still among the highest percentages of industries with net-zero targets (Net Zero Tracker 2023). Emissions-intensive companies, such as those in the energy and materials sectors, face complex challenges ahead. Many are torn between maintaining free cash flow to return to shareholders and committing capital-expenditure dollars to fulfill net-zero commitments. Particularly with the uncertainty about the timing and market effects of the transition, many companies in targeted sectors try to balance this fine line only to find increasing investor and regulatory scrutiny around greenwashing. Accordingly, the main value driver of "Avoid" is to focus on the most emissions-intensive and riskiest capital-expenditure and operational activities. The sector-specific guidelines can also be leveraged as a tool for engagement, to bridge the sector's pledges toward tangible action. Echoing the work of Climate Action 100+ and other investor coalitions, the sector-specific "Avoid" section can help guide investors on the most pertinent issues to engage with energy and materials companies (Exhibit 6).

We may operationalize the sector-specific guidelines by focusing on an illustrative example of a US-based materials-sector company in the Construction Materials GICS industry group. The company's footprint in terms of revenue and operations is wide—including construction business lines across aggregates (crushed stone, sand, and gravel); a strategic cement and magnesia business; and downstream businesses for readily mixed concrete, and asphalt and pavement services. The varying services and business lines reflect the reality of diversified materials companies, as well as the continuing challenge of reporting emissions and operational impacts.

The company has made sustainability reporting publicly available for several years, recently integrating net-zero planning and TCFD alignment in their latest edition. In terms of governance, the company board's performance on sustainability goals is considered in determining compensation. Further signaling a commitment to its net-zero targets, and as a key part of this framework, the firm has not acquired new coal reserves, and has reduced the use of coal in kiln fuel mixes from 70% to 15% of total fuel usage in the past seven years. The firm continues to invest in additional fuel sources as part of its 2030 emissions-reduction targets and 2050 net-zero goals. Overall, the firm has shown some critical signs of balancing its net-zero commitments alongside its business operations—an interesting basis for comparison with peers within the industry group.

EXHIBIT 6

Sector-Specific Guidelines

Sector	Avoid	Timing	Data Metrics	Governance
Energy Sector	• Exploration of new oil and gas reserve expansions	• 2023	• Decreasing "brown" capital expenditure	• Integration within sustainability reporting and/or net-zero reports
	• Coal-fired generation	• 2040	• Decreasing fossil fuel power generation share	• Board-level support
Materials Sector	• New coal mines and/or extensions	• 2023	• Coal reserves (estimated or reported)	

SOURCE: Created by the author.

The sector-agnostic guidelines in the next section cover "Reduce," "Replace," and "Offset" in relation to GHG emissions, outlining the required timing, data metrics, and governance factors to consider for each (Exhibit 7).

Reduce

"Reduce" aims to set the focus on how companies can reduce current GHG emissions through operational efficiencies that are feasible today. For example, a manufacturing company can reduce emissions via more efficient operations and fuel switching. For immediate reduction of emissions within a company's current operations, analysts closely examine Scope 1 and 2 emissions specifically. Scope 1 emissions encompass direct emissions that are owned or controlled by a company. Scope 2 emissions are associated with a company's energy use, specifically the indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.

According to the SBTi's cross-sector pathway, companies should set near-term targets that reduce Scope 1 + 2 CO_2e (carbon dioxide equivalent) at a linear minimum annual rate of 4.2%, depending on the baseline emissions year (SBTi 2023). For sector-specific pathways, most notably the energy sector, CO_2e intensity is the preferred metric to analyze, given the sector's inherent emissions limitations in the near term. CO_2e intensity, in the context of companies, can be measured as metric tons of carbon dioxide or equivalent, per million dollars of sales. Using CO_2e intensity allows analysts to compare all emissions under one metric across companies, while also capturing the relationship between company revenues and emissions.

Reducing emissions through environmental management and governance practices is not just for the sole benefit of climate action either. There is preliminary evidence of company stock prices benefiting from enhanced governance practices. For example, research has found that downgrades in governance-related factors lead to economically meaningful reduced stock returns for a period of up to two years following a rating change (Berg, Heeb, and Kölbel 2022). This reflects how markets today particularly value negative reputational risks associated with poor governance-related factors. The effects of wider environmental, social, and governance corporate practices can also be reflected more broadly in market performance. For example, Morningstar's US Sustainability Leaders Index is designed to provide exposure to Morningstar US Market large-cap stocks that have the lowest sustainability risk in their parent universe (Solberg 2023). For a trailing five-year period, the Morningstar US Sustainability Leaders Index gained 80.8%, outperforming the broader equity market by 25% as measured by the Morningstar US Market Index (Exhibit 8) (Morningstar 2023). Time and further evolution of climate investing will tell what additional material

EXHIBIT 7

Sector-Agnostic Guidelines

	Timing	Data Metrics	Governance
Reduce			
Scope 1 + 2 CO_2e emissions	Near-term 2030 targets and long-term 2050 targets	• ≥4% reduction annually	• Executive compensation incentives for achieving net-zero targets • Consistent communications on transition plans and progress • Appointing new expertise and leadership for delivering net-zero plans
Replace			
Scope 1 + 2 CO_2e emissions	Near-term 2030 targets and long-term 2050 targets	• Increasing "green" capital expenditure and patents • Reductions in financed emissions	
Offset			
≤10% of Scope 1 + 2 + 3 CO_2e emissions	Long-term 2050 targets	• Third-party verification of offsets • Transparent quality and sourcing reporting	

SOURCE: Created by the author.

effects the management of climate-related risks specifically might have on company stock performance and climate-themed portfolios (Bouchey 2024).

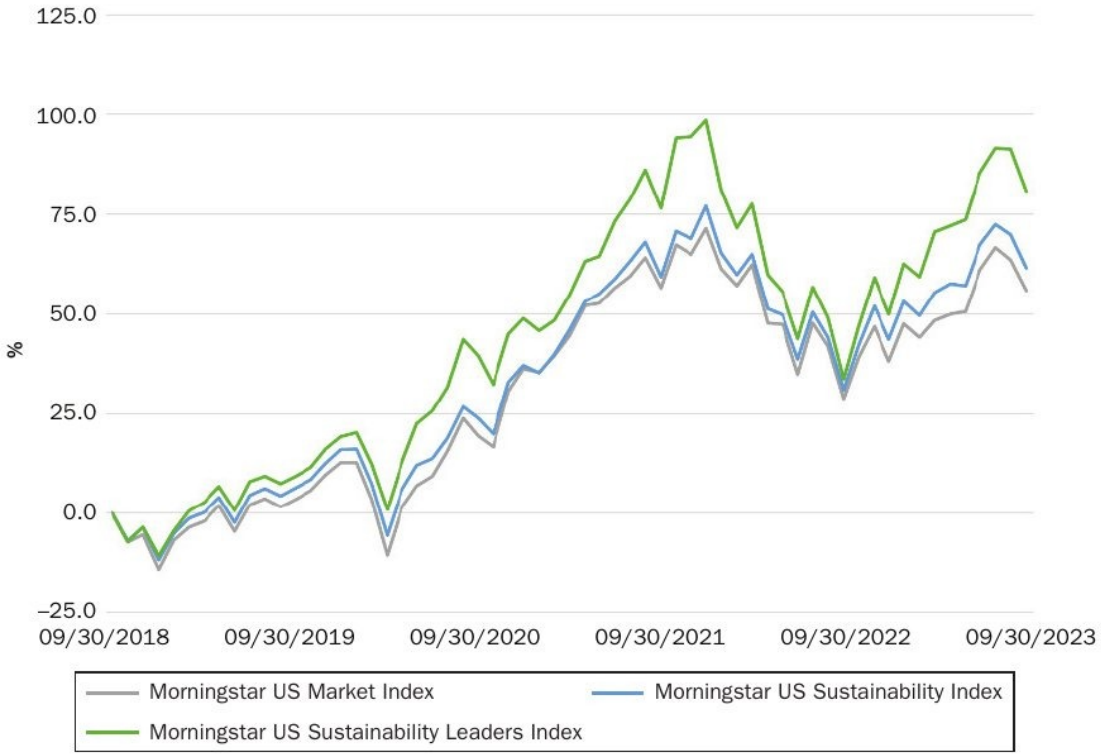
We can apply the sector-agnostic guidelines to our illustrative example as well. In the most recent, publicly available 2022 sustainability report, the company sets out net-zero-by-2050 targets for Scope 1 and 2 emissions, alongside pre-existing 2030 Scope 1 emissions-reduction targets. In 2022, total GHG emissions amounted to 4.6 million metric tons of CO_2e, and 0.63 million metric tons of CO_2e, which is relatively flat from previous years: 4.5 million metric tons of Scope 1 CO_2e, and 0.56 million metric tons of Scope 2 CO_2e, in 2021; and 4.5 million metric tons of Scope 1 CO_2e and 0.67 million metric tons of Scope 2 CO_2e in 2020. The "Reduce" section of the guidelines is an opportunity for engagement with management to better understand key drivers of the static nature of emissions year over year, and to discuss key challenges facing the company. It may be an indication to monitor, year over year, if the company is able to generate the operational efficiencies needed to further drive and meet its net-zero commitment.

Replace

Moving away from shorter-term low-hanging fruit, "Replace" takes a more forward-looking view to longer-term changes to company operations. Replacing current emissions-intensive processes requires both near- and longer-term planning, and a renewed attention to Scope 3 emissions. Scope 3 covers a wide range of indirect upstream and downstream emissions not covered by Scope 1 and 2—from upstream emissions in energy production, to the use of products sold, and emissions associated with investments, company travel, and employee commuting. The GHG Protocol has identified 15 categories of Scope 3 emissions, which have formed the basis of emerging guidance on the disclosure and management of Scope 3 emissions. Still, Scope 3 is not broadly disclosed, precisely because it covers so many categories and is greatly reliant on a company's supply-chain partners. Only a fraction of companies report Scope 3 emissions and, of those disclosures, only a small portion of the 15 categories is measured, usually representing an insignificant and therefore misleading disclosure (Net Zero Tracker 2023).

EXHIBIT 8

Five-Year Performance of Morningstar US Sustainability Leaders Index



SOURCE: Morningstar Direct, Morningstar Indexes. Data as of September 30, 2023.

The SBTi advises that when Scope 3 emissions make up 40% or more of a company's total emissions (Scope 1, 2, and 3 combined), the company must set targets covering the majority of its Scope 3 emissions (SBTi 2023). Sectors that are estimated to fall in this category include energy, consumer discretionary and financials. A practical method for estimating companies' longer-term transition efforts is tracking disclosures and metrics that serve as a proxy for investments in longer-term operational replacements and substitutions. For example, to replace emissions-intensive activities for a net-zero transition, investors may track metrics such as "green" capital expenditure or patents filed, emissions financed, and human capital investments in the space. Targeting such metrics may give investors a more heightened perspective on companies' net-zero performance, as opposed to Scope 3 measurements and reporting that is still largely unregulated and patchy across sectors and industries. To this end, mandated disclosure of all emissions should be encouraged by the broader financial industry, to ensure standardization and transparency across markets.

Applying the "Replace" section to our illustrative example, the company has spent more than $1 billion in recent years on upgrading equipment, improving energy efficiency, and increasing the use of lower-carbon fuels. The company is also actively investing in a new concrete recycling business—a model benefiting both from its net-zero goals and the projected increase in US demand for cement recycling. More transparency around the timeline and rollout of these projects, alongside projected future capital expenditure designated for net-zero targets and sustainability goals, would be an improvement for the firm and, again, an area for engagement.

Offset

Emissions offsets provide a mechanism by which a company can invest in carbon reduction or sequestration projects outside of its own value chain to counteract the impact of its own emissions. Some projects currently in the market include reforestation, sustainable agriculture, or direct carbon capture. Being yet another unregulated market, scientists have determined key attributes to quality offsets, such as: measurable, real, verifiable, enforceable, permeance, and additionality (Net Zero Tracker 2023). Permeance specifically speaks to the like-to-like nature of carbon offsets—for example, how a company's methane emissions correspond with its offsetting in terms of warming potential, durability, and impact.

Following our illustrative example, the company does not measure and report Scope 3 emissions, making it difficult to determine the total Scope 1 + 2 + 3 emissions footprint. Likely sources of value-chain emissions may be from transportation of materials, and operations by gas and diesel fuel trucks, for example. However, the company cites an absence of Scope 3 emissions measurement and management due to a lack of regulatory guidance, and therefore remains outside of its net-zero targets. While there continue to be challenges in standardized Scope 3 measurements, having a complete picture of the emissions profile of a company's operations is pivotal to addressing decarbonization goals more broadly.

Carbon as a new asset class is experiencing rapid growth, particularly as new companies attempt to source and secure a pipeline of carbon-offset projects. As it relates to nature-based offset projects that are likely to be located in developing nations, such a boom may further bolster perverse incentives for offset malpractice. Best practices therefore suggest that offsets should be used only for residual emissions where reductions are not feasible due to technology limitations, which should generally represent 10% or less of total reductions (Shugar, Myers, and Fugere 2022). Carbon offsets, while easily offering perverse invectives and garnering major media attention, force us to come to terms with the inevitable: that our economy may never reach zero emissions. The true "net" of net zero aims for decarbonization—decreasing carbon emissions to a more efficiently priced and functioning economy, in a new balance whereby environmental and social externalities are more accurately valued.

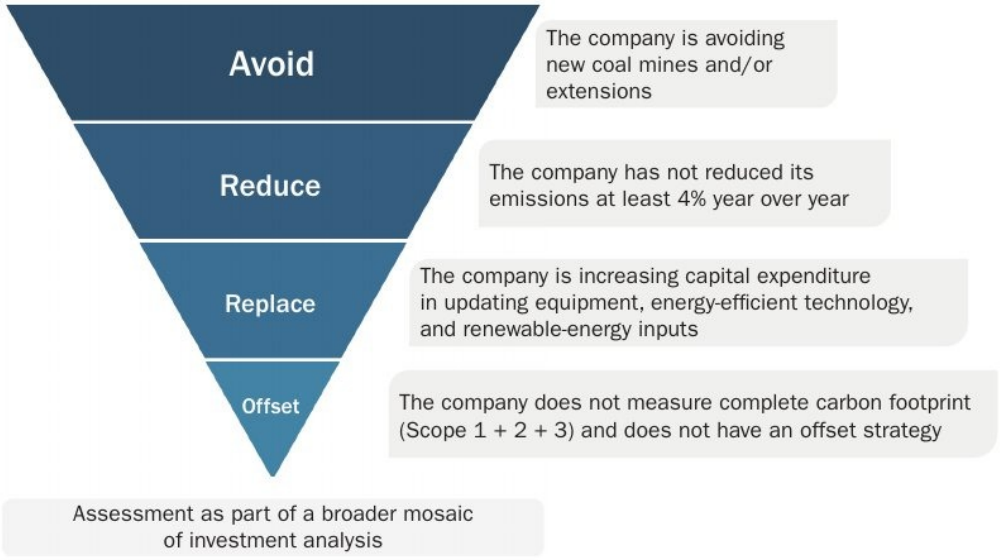
LOOKING AHEAD

Regulation is also helping to drive corporate behavior and investment dollars. At the time of this article, corporate disclosure of climate-related risks is already mandatory in China and the United Kingdom, and is expected to spread to other countries such as Canada, New Zealand, and South Korea. Laws such as the Corporate Sustainability Due Diligence Directive and the Net Zero Industry Act in the European Union also help drive transparent climate disclosures and investor action. In many ways, pre-existing voluntary efforts such as the TCFD act as a precursor to regulation elsewhere, such as with the recently finalized US ruling on climate-related disclosures from the Securities and Exchange Commission.

Outlining our illustrative example through both the sector-specific and sector-agnostic guidelines reveals how the varied facets of net zero may be distilled into an assessment that can be integrated within a broader mosaic of investment analysis (see Exhibit 9). The US-based materials company is adequately avoiding the most GHG-intensive activities that pose the greatest financially material climate-transition risk today. However, the company is not reducing emissions enough across its various business lines to achieve a smooth decarbonization path toward 2050. While its capital expenditure to address updated equipment and energy efficiency is perhaps comparable to industry

EXHIBIT 9

Illustrative Example: US Materials Company



peers, the lack of Scope 3 measurement may also hinder the achievement of net zero in the long run. There are persistent challenges in measuring and reporting, as well as in how regulation (in this case, US regulation versus. its European counterparts) provides differing backdrops against which companies must operate. The process of applying the Corporate Climate Transition Guidelines underscores the extent to which decarbonization is evolving across sectors, and the delicate balance to be struck among stakeholder interests—from investors and corporate leaders to society at large.

Our future hinges on our understanding of complex planetary processes and their interactions with our society, economy, and financial systems. There is no silver bullet or single pathway to decarbonization, due to the sheer complexities of these interactions and the inherent uncertainty that comes with climate modelling. The rush to net zero is still in its nascent stages, and yet is urgently needed today, through 2050, and beyond. Operationalizing net zero will not be a straightforward path, but an evolving and dynamic process riddled with challenges, both in the near and long term. Distilling this complex body of work into a set of guidelines for investors is one helpful step toward integrating material climate considerations within portfolios.

REFERENCES

Arnold, J., and N. Mardirossian. 2023. *Commentary: Nature-Based Insetting: A Harmful Distraction from Corporate Decarbonization*. Social Science Research Network. Accessed June 21, 2023, from: https://doi.org/10.2139/ssrn.4438523.

Berg, F., F. Heeb, and J. Kölbel. 2022. "The Economic Impact of ESG Ratings." Working Paper. Accessed September 1, 2023, from: https://ssrn.com/abstract=4088545.

Bouchey, P. 2024. "Reducing the Carbon Footprint of an Index: How Low Can You Go?" (January 12). Accessed from: https://ssrn.com/abstract=4692326.

Hale, T. 2022. "The Net-Zero Governance Conveyor Belt." Philadelphia, PA: Kleinman Center for Energy Policy.

Intergovernmental Panel on Climate Change (IPCC). 2022. "Summary for Policymakers" P. R. Shukla, J. Skea, A. Reisinger, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, P. Vyas, (eds.). In: *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* P. R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, eds. Cambridge, UK and New York, NY: Cambridge University Press. DOI: 10.1017/9781009157926.001.

Morningstar, 2023. Accessed October 6, 2023, from: https://indexes.morningstar.com/indexes/details/morningstar-us-sustainability-leaders-FS0000DX00?currency=USD&variant=TR&tab=overview.

NOAA National Centers for Environmental Information (NCEI). 2024. "US Billion-Dollar Weather and Climate Disasters." Accessed August 16, 2023, from: https://www.ncei.noaa.gov/access/billions/.

Net Zero Tracker. 2023. "Net Zero Stocktake 2023." NewClimate Institute, Oxford Net Zero, Energy and Climate Intelligence Unit, and Data-Driven EnviroLab. Accessed June 21, 2023, from: https://zerotracker.net/analysis/net-zero-stocktake-2023.

Solberg, L. 2023. "How Sustainable Indexes Beat the Market in Q1 2023." Morningstar, Inc., Accessed October 6, 2023, from: www.morningstar.com/sustainable-investing/sustainable-investing-stock-strategies-beat-market-q1-2023.

Science-Based Targets initiative (SBTi). 2023. "SBTi Corporate Net Zero Standard." April 2023 Edition accessed on June 21, 2023, from: https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf.

Semieniuk, G., P. B. Holden, J-F. Mercure, P. Salas, H. Pollitt, K. Jobson, P. Vercoulen, U. Chewpreecha, N. R. Edwards, and J. E. Viñuales. 2022. "Stranded Fossil-Fuel Assets Translate to Major Losses for Investors in Advanced Economies." *Nature Climate Change* 12: 532–538.

Shugar, D., D. Myers, and D. Fugere. 2022. "Road to Zero Emissions: 55 Companies Ranked on Net Zero Progress." *As You Sow*. Working Paper. Accessed June 26, 2023, from: https://www.asyousow.org/reports/2022/road-to-zero-emissions.

United Nations. 2022. "Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities, and Regions: Report from the United Nations' High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities."

US Energy Information Administration (EIA). 2023. "Nonfossil Fuel Energy Sources Accounted for 21% of US Energy Consumption in 2022." Accessed September 1, 2023, from: https://www.eia.gov/todayinenergy/detail.php?id=56980.