2022 TCFD Report

DECEMBER 31, 2022

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BRIDGEWATER

Climate change will be a defining issue of the 21st century, affecting societies, economies, and markets. At Bridgewater, our starting point for addressing climate change is who we are—investors with a fundamental, systematic, and diversified approach to understanding the world and translating that understanding into insights and portfolio solutions to help our clients achieve their financial and sustainability goals. This makes climate a crucial ingredient for Bridgewater's central mission. Our CEO and Executive Committee have made sustainable investing, with climate a central component, a strategic priority across the company, and climate-related considerations are integrated across our business: in our portfolio solutions for clients with sustainability goals, in how we seek to beat markets in our alpha portfolios, in our portfolio risk controls process, in our approach to stewardship, in our suite of tools for partnering with clients and analyzing their portfolios, and in our reporting.

Regarding Bridgewater's own operations, we are committed to minimizing our environmental impact. We have already significantly reduced our Scope 1 and Scope 2 emissions and developed plans to reduce our carbon footprint across Scope 1 and Scope 2 by more than 90% by 2025 (compared to our 2019 baseline). In addition to our reduction efforts, we achieved our goal of carbon neutrality across Scope 1 and Scope 2 emissions in 2022 through the purchase of renewable energy credits and high-quality carbon offsets.

In December 2015, the Financial Stability Board (FSB) established the industry-led Task Force on Climate-related Financial Disclosures (TCFD) to develop climate-related disclosures to help "promote more informed investment, credit, and insurance underwriting decisions and, in turn, enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks." Bridgewater publicly supports the TCFD, and in line with this, we provide reporting organized around the four key TCFD reporting areas:

- **Governance:** The organization's governance around climate-related risks and opportunities.
- **Strategy:** The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.
- **Risk Management:** The processes used by the organization to identify, assess, and manage climate-related risks.
- **Metrics and Targets:** The metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Below we include our Governance and Strategy disclosures, as the Risk Management and Metrics and Targets disclosures in our full TCFD report includes details on our strategies that we share only with our clients.

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Governance

Disclose the organization's governance around climate-related risks and opportunities.

Sustainable investing is a strategic priority for Bridgewater at all levels of senior management, flowing down from our Chief Executive Officer and Executive Committee, who are responsible for Bridgewater's overall strategic direction. Accordingly, we have prioritized climate-related investment initiatives, overseen by Bridgewater's highest-level executives and investors, as well as climate-related initiatives in our operations.

Given its status as a strategic priority for the firm, we have deployed some of our most senior investors and the full power of Bridgewater's fundamental and systematic approach to the challenge of understanding sustainability considerations broadly, with a particular focus on climate-related opportunities. Topics related to climate and sustainable investing, and to ESG more broadly, are fully integrated into our systematic macro research and portfolio construction processes, as described in the next two sections of this report.

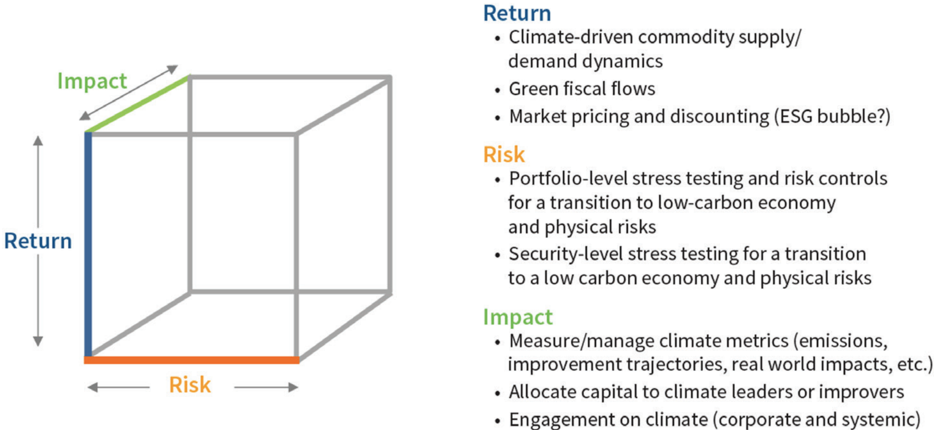
Regarding investment portfolios, co-CIO Karen Karniol-Tambour and co-CIO for Sustainability Carsten Stendevad chair our Sustainable Investing Committee and are responsible for embedding sustainability considerations across Bridgewater's investment processes and for designing and overseeing those portfolios that pursue both financial and impact goals, including climate-related goals. The Sustainable Investing Committee is responsible for developing and governing Bridgewater's investment research, portfolio construction, stewardship, standards, and processes as they relate to ESG and sustainable investing and are supported by a full-time, dedicated research staff.

Regarding climate-related considerations in our operations, Bridgewater's Operating Committee—composed of department heads and other business leaders across the company—is responsible for overseeing the day-to-day operations of the firm and execution against the plan.

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

Sustainable Investing, including climate-related considerations, is a strategic priority not only for Bridgewater but for many of our clients around the world as well. This has offered us the opportunity to partner with our clients, both in the form of research conversations and portfolio solutions, across what we think of as the three dimensions of climate-related investment considerations: return, risk, and impact.



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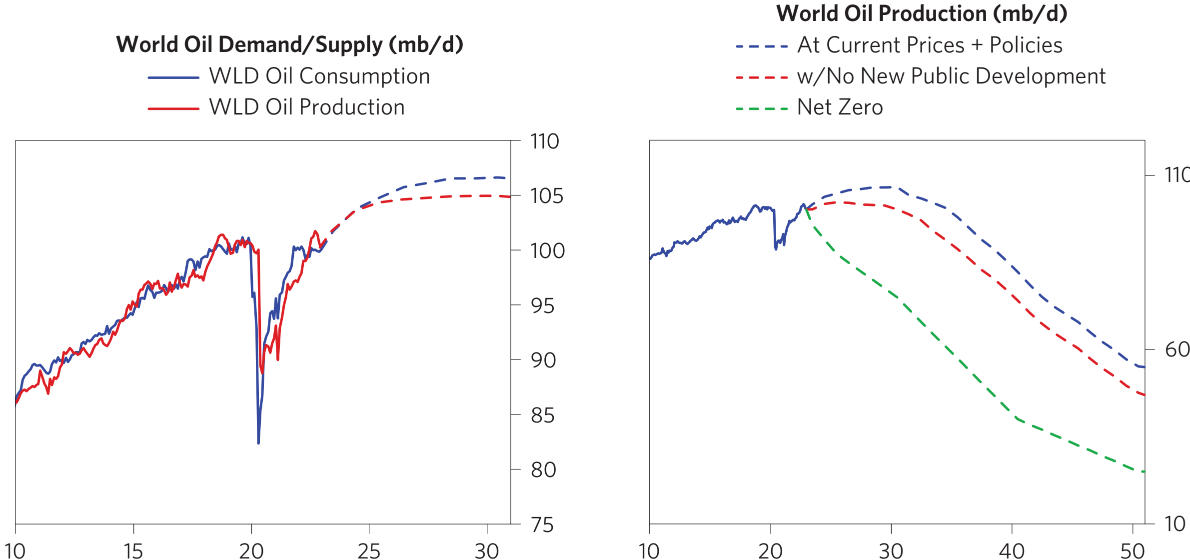
Focusing first on the risk-return dimension of climate, climate can create both short- and long-term opportunities for our alpha trading across asset classes. We have developed capabilities to measure some of the impacts of the climate transition in our alpha process, which we expect to exert pressures on markets that our systems will capture over the coming years.

We incorporate climate transition policies in our supply and demand estimates for commodities. As part of our existing process for trading commodities (and all assets), we map out the buyers and sellers, seek to deeply understand their behaviors, and assess what the likely price moves are as a result. For example, our holistic measures of oil supply and demand take into account current climate policies countries have implemented, and we have also mapped out what future production would have to look like to achieve net zero emissions in order to understand and prepare for the range of potential outcomes. We've done a similar exercise with copper and nickel demand, incorporating both a base case estimate into our process and projections that reflect an aggressive shift to electric vehicles, as shown below.



Oil estimates are based on Bridgewater analysis. Data through December 2022.

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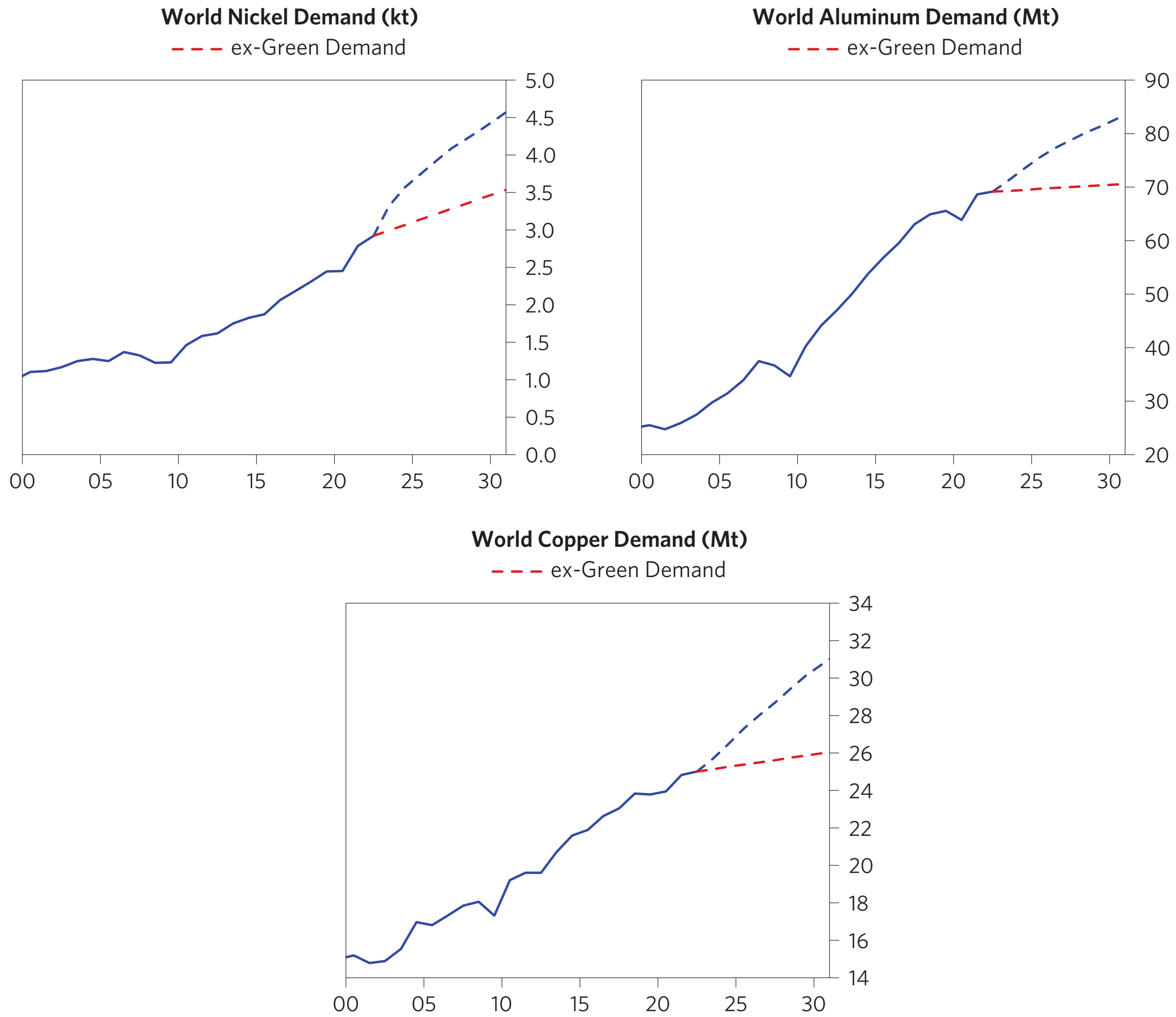

Aluminum, copper, and nickel estimates are based on Bridgewater analysis and consensus. Data through December 2022. Aluminum, nickel, and copper data source: Wood Mackenzie.

We study climate-related fiscal policy as part of our broader efforts to understand government impact on growth, which is an important input into views across our portfolios. We've invested in building out the capability to assess the impact of fiscal policy program by program. Fiscal policy can take many forms and can have radically different impacts depending on the nature of the program (e.g., whether a loan, transfer, or direct investment; who is receiving the stimulus and what they are likely to do with it; etc.). As a result, the headline (announced) size of a stimulus can be quite misleading as to its actual impact. We've systemized how different forms of fiscal policy will impact growth based on our proprietary logic and, as with all of our systems, are constantly comparing our lived experience with our predictions and refining our process as we learn. An important component of this research has been studying the impact of fiscal policy with climate-related objectives, such as clean-energy tax credits, green infrastructure investments, and carbon pricing schemes. For example, we analyzed the US's 2022 Inflation Reduction Act, estimating that, on aggregate, it would have a roughly neutral impact on growth and inflation (as shown below). Its meaningful climate investments are offset by tax increases and healthcare-related savings, amounting to an overall small spending package. Similarly, as shown below on the right, we have also looked at the potential impacts on growth of China's Emissions Trading System under various scenarios for how it could evolve (higher coverage, higher carbon prices), and we will continue to track this going forward.

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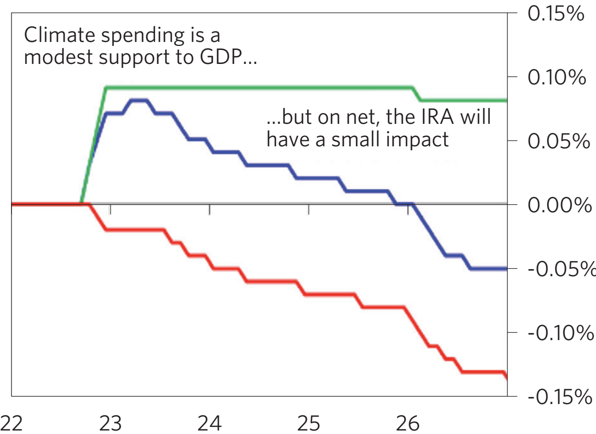
IRA Impact on USA GDP Level (%GDP)

Total — of which Climate — of which Rest of IRA



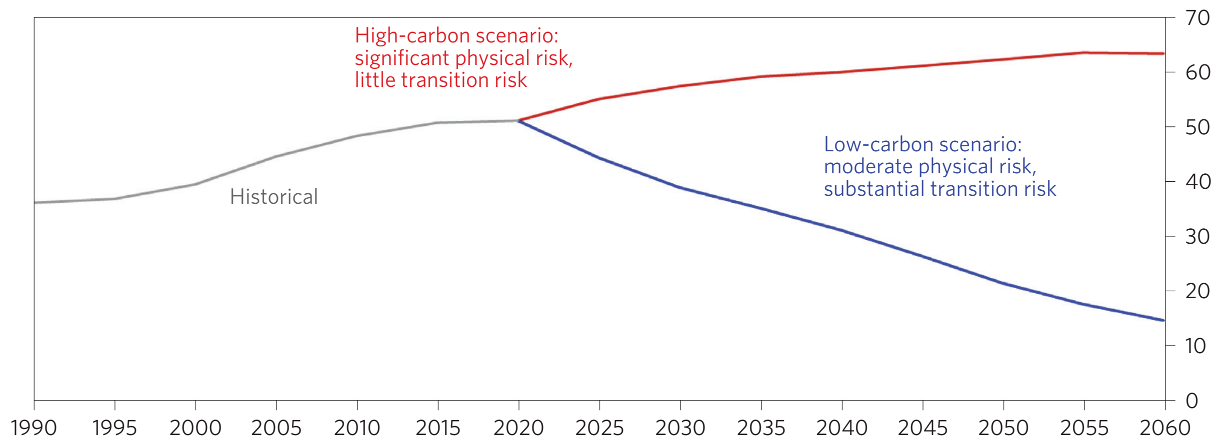
Financial Impact of China's ETS (% GDP)				
	Emissions Covered Under Scheme (% Potential)			
Carbon Price (USD/Ton)	37% (Today)	60%	80% (e.g., California)	100%
50 (World Bank)	1.1%	1.8%	2.3%	2.9%
80 (IMF)	1.7%	2.8%	3.7%	4.7%
140 (IPCC)	3.0%	4.9%	6.5%	8.2%

Estimates based on Bridgewater analysis. Data through August 2022 for the left-hand chart and December 2021 for the right-hand chart.

Turning next to the risk dimension of climate, we have researched the two major sources of climate risk (physical and transition). In the next section, we discuss how we manage these risks in our alpha and beta portfolios.

At the highest level, we think climate change risk can be divided into two categories: physical risk (risks due to the physical effects of climate change, such as increasingly intense droughts, heat waves, and storms) and transition risk (risks from societal changes and policy efforts to mitigate climate change, such as carbon pricing mechanisms or restrictions designed to squeeze the supply of fossil fuel). These are not binary options—in a muddle-through path of impactful but insufficient transition policies, investors could be hit by both the impacts of accelerating climate policies and the impacts of increasing physical damages from climate change.

Global Annual Carbon Emissions (GtCO2e/year)



Data from the IEA.

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Physical Risk

We have developed an understanding of the physical risks of climate change, with a focus on the asymmetric impact on different countries. We have mapped the risks each country faces based on factors relative to their exposure and sensitivity (e.g., the threat to crop yields) and their adaptive capacity (e.g., infrastructure quality). The range of potential outcomes is wide. Some commonly cited models project that if emissions remain at roughly today's level going forward, economic losses will be moderate—just a few percent of global GDP over many years, the equivalent of a 0.2% drag on growth per year* in the hardest-hit countries in which we invest (e.g., India, the Philippines, Indonesia, Thailand). Other researchers predict much more severe loss scenarios (10x or higher compared to more common models). For example, one predicts that if emissions continue growing in line with current practices, the growth rates of most emerging Asian and Latin American countries will fall by half (by 2-3% a year) and US growth will experience a drag of 0.5% a year. In other words, much more is unknown than known about the future impacts of climate change. And while the largest physical risks are most likely to manifest over the long-term time frame of decades, acute physical shocks impacting economies, markets, and portfolios are always possible.

Country	Low-End Scenario %GDP Loss Given ~2.5°C Warming by 2100	High-End Scenario %GDP Loss Given ~4.5°C Warming by 2100	Low-End Scenario Avg Annual Growth Drag	High-End Scenario Avg Annual Growth Drag	Long-Term Potential Growth (Without Drag)
India	-12%	-92%	-0.2%	-3.1%	7%
Philippines	-12%	-84%	-0.2%	-2.2%	6%
Indonesia	-12%	-85%	-0.2%	-2.3%	5%
Venezuela	-10%	-91%	-0.1%	-3.0%	3%
Thailand	-11%	-90%	-0.1%	-2.8%	4%
Colombia	-10%	-77%	-0.1%	-1.8%	2%
Malaysia	-10%	-87%	-0.1%	-2.6%	4%
Brazil	-10%	-83%	-0.1%	-2.2%	2%
Saudi Arabia	-8%	-96%	-0.1%	-3.9%	3%
Ecuador	-9%	-69%	-0.1%	-1.5%	4%
South Africa	-6%	-66%	-0.1%	-1.3%	3%
Mexico	-7%	-73%	-0.1%	-1.6%	2%
Peru	-8%	-51%	-0.1%	-0.9%	4%
Argentina	-5%	-53%	-0.1%	-0.9%	3%
China	-3%	-42%	0.0%	-0.7%	6%
Singapore	-7%	--	-0.1%	--	2%
Turkey	-3%	-17%	0.0%	-0.2%	3%
Australia	-5%	-53%	-0.1%	-0.9%	2%
Greece	-3%	-51%	0.0%	-0.9%	0%
Spain	-2%	-46%	0.0%	-0.8%	1%
Portugal	-3%	-41%	0.0%	-0.7%	1%
Italy	-2%	-26%	0.0%	-0.4%	1%
Japan	0%	-35%	0.0%	-0.5%	1%
United States	1%	-36%	0.0%	-0.6%	1%
Source:	Tol (2018)	Burke, Hsiang, Miguel (2015)			Bridgewater

Analysis as of May 2020.

*To be precise: a %GDP equivalent decrease in consumption, which includes some damages not counted in GDP.

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Transition Risks

As we discuss in our research on climate transition risk, there are many drivers that could help accelerate the climate transition, encompassing government policy, corporate action, investor and consumer preferences, etc. In particular, **it looks to us that governments increasingly have a strong mandate for a policy response to climate change**—with strong public sentiment for climate action around the world, as well as global policy makers making climate transition commitments and taking actions in line with those commitments (see, for example, Climate Action Tracker for quality coverage). We see this—what the Principles for Responsible Investment (PRI) describes as an "inevitable policy response"—as a key transition risk to focus on. In addition to these transition policies having the potential to shape economic and market activity over the long term, they also pose meaningful risks over the short term. Policy changes can be both relatively sudden and of a magnitude that can significantly impact economies and markets, as illustrated by the economic shutdowns and shift to coordinated fiscal and monetary policy ("Monetary Policy 3") in response to COVID.

We focus on four primary mechanisms that would accelerate a green economic transition. Any combination of these is plausible. A Goldilocks outcome is a pathway that balances these, transitioning the global economy to lower carbon emissions without creating meaningful adverse economic conditions:

- **Green Tech Breakthrough:** An investment boom and step change in technology rapidly changes the trade-off faced by various entities today in favor of greener technologies. This increases productivity, likely stimulates meaningful private sector investment, and results in a growth boom that is likely disinflationary over time.
- **Green Fiscal Spending:** Governments borrow and/or print and spend directly on green initiatives. This lowers the cost of renewable energy, accelerating the transition. Rising direct government spending is likely to exert upward pressure on both growth and inflation.
- **Carbon Pricing:** A meaningful ramp up in mandatory carbon pricing that raises the cost of emitting greenhouse gases. This is by its nature inflationary—as the mechanism through which it operates is increasing the costs of today's activities in order to discourage them. The growth impact depends on who bears the tax burden and how the revenue is spent.
- **Supply Squeeze:** Limits on the supply of carbon-intensive energy (e.g., quotas on fossil fuel exploration, limits on financing to fossil fuel companies) force entities to reduce fossil fuel consumption. Energy shortages are likely to slow economic growth (as some activity is not replaced with greener alternatives). The first-order impact is inherently inflationary, as a supply squeeze leads to increases in energy prices; the second-order impacts of the slowdown in the economy are deflationary.

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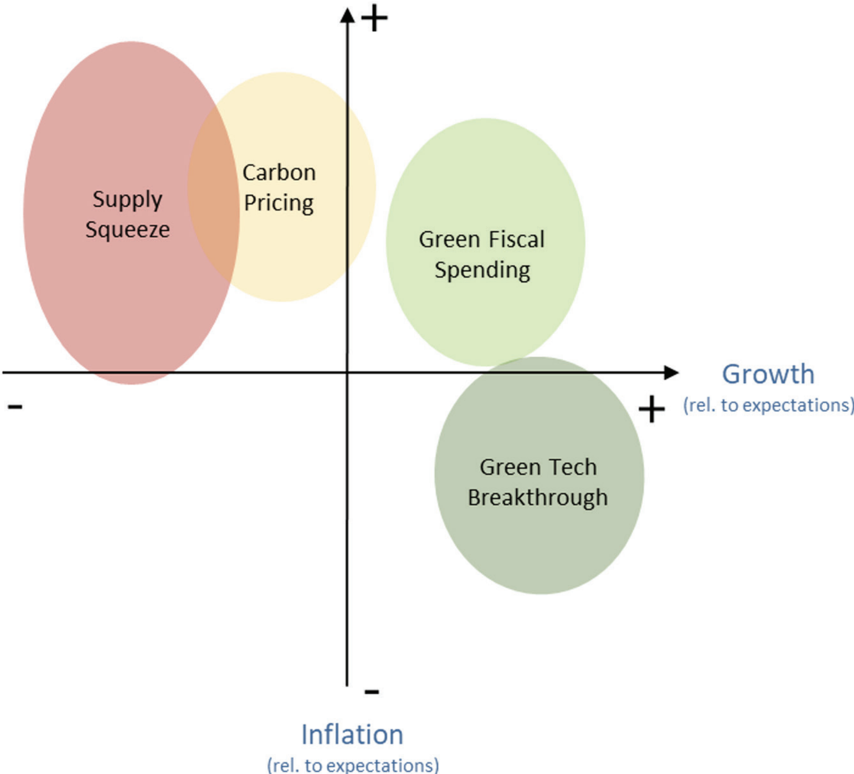
Each of these mechanisms could significantly reduce greenhouse gas emissions (which is essential for the climate transition) but would have very different impacts on economies and asset prices (e.g., green fiscal spending would be stimulative, while a supply squeeze on fossil fuels could lead to energy shortages and slower growth). The charts below show these four climate transition mechanisms roughly mapped to their impacts on growth and inflation, as well as our penciled-out expectations of the impact on traditional investment portfolios of a faster-than-discounted climate transition occurring through each of these mechanisms. We focus on growth and inflation because these macro drivers are likely to have significantly larger portfolio impacts than the relative winners and losers within specific markets.



Estimated transition scenario impacts are based on Bridgewater analysis and are not guaranteed.

Beyond the macro effects described above, any successful transition will also create relative winners (e.g., green industry) and losers (e.g., carbon-intensive industry). For example, the transition will flow through to impact the supply and demand for the most relevant commodities and, in turn, the countries and companies most exposed to those commodities. If a transition is successful, fossil fuels will be used less while commodities that are inputs to green technologies will be more widely utilized. We have explored some of these potential winners and losers in previous research regarding the sensitivities of commodities such as oil, coal, and industrial metals, among other markets.

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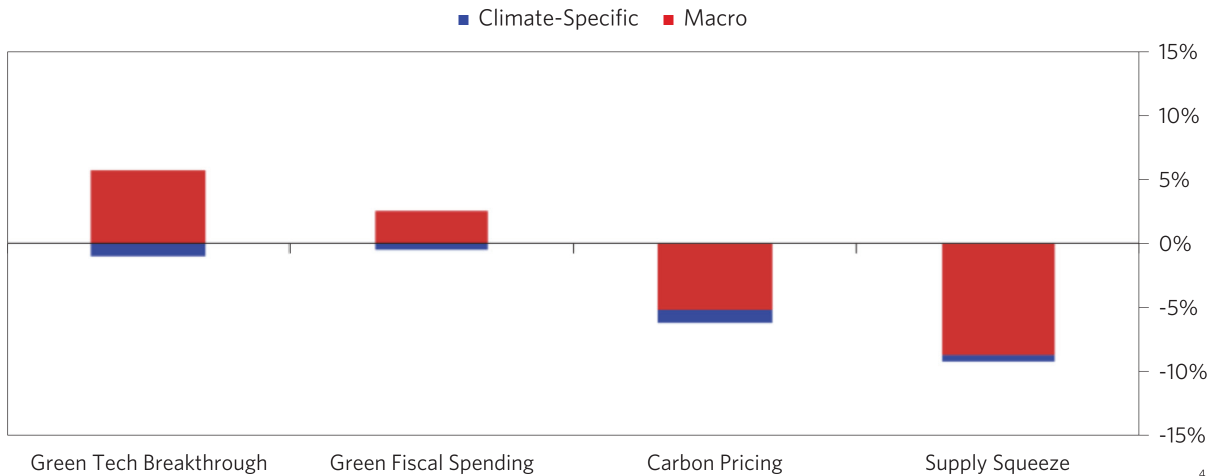
Commodity Producter Heat Map: Exposure in Low-Carbon Transition

	#1 Producer	#2 Producer	#3 Producer	#4 Producer
Aluminum (Bauxite)	Australia	Guinea	China	Brazil
Copper	Chile	Peru	China	United States
Zinc	China	Peru	Australia	India
Iron Ore	Australia	Brazil	China	India
Nickel	Indonesia	Philippines	Russia	New Caledonia
Coffee	Brazil	Vietnam	Colombia	Indonesia
Corn	United States	China	Brazil	Argentina
Cotton	China	India	United States	Brazil
Soybeans	Brazil	United States	Argentina	China
Sugar Cane	Brazil	India	China	Thailand
Wheat	China	India	Russia	United States
Pork	China	United States	Brazil	Russia
Beef	United States	Brazil	China	Argentina
Oil Products	United States	Saudi Arabia	Russia	Canada
Natural Gas	United States	Russia	Iran	Qatar
Coal	China	India	Indonesia	United States

Data as of December 2021.

Pulling together the macro and the climate-specific effects, we sketch preliminary expected return impacts for portfolios under our faster-than-expected transition scenarios. There is a wide range of outcomes, largely driven by the variable macro outcomes. Any combination of these transition mechanisms is plausible, including a Goldilocks scenario that balances these mechanisms as described earlier.

Global 70/30 Portfolio: Estimated Climate Transition Return Impact



Global 70/30 composed of 70% capital allocation to global equities and 30% capital allocation to developed world nominal government bonds, both currency hedged. Estimated transition scenario impacts are based on Bridgewater analysis. There can be no guarantee that any expected performance can or will be achieved and expected performance should not be solely relied upon in making any investment decision.

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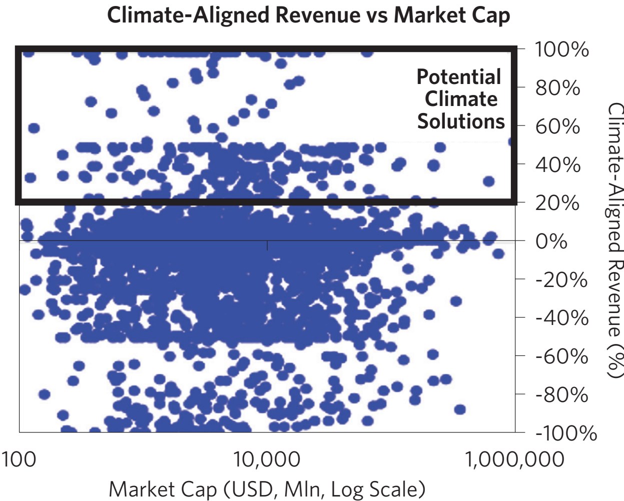
Impact

While our investment process incorporates climate-related considerations from a financial perspective (as per our description above and in the next section), we are also prioritizing constructing new portfolios to help our clients pursue their sustainability-related impact goals (including net zero). For example, our live 3-D strategies reflect our best thinking on how to align portfolios with the net zero transition and the UN Sustainable Development Goals (SDGs). To be clear, many of our strategies (such as Pure Alpha and All Weather) do not have explicit impact or net zero goals.

Our starting point for supporting the net zero transition is to first fundamentally understand the levers by which investors can contribute to the net zero transition and how each can be approached systematically at the total portfolio level, and then combining that understanding with our expertise in portfolio construction to create investment strategies that help our clients pursue both their climate and financial goals.

As we wrote about in recent research, we see three central levers by which investors can help accelerate the transition to a net zero economy, each of which is just one piece of the puzzle:

Financing climate solutions and low-carbon alternatives: Financing companies with products and services that enable the transition to net zero is a key mechanism for investors to support decarbonization. Investors have a crucial role to play in financing the companies developing these technologies and building the infrastructure needed to expand their impact, even though these activities may require meaningful emissions. For example, investors can finance auto companies transitioning into EVs and renewable-intensive electric utilities.



Perspective based on Bridgewater analysis, as of November 2022.

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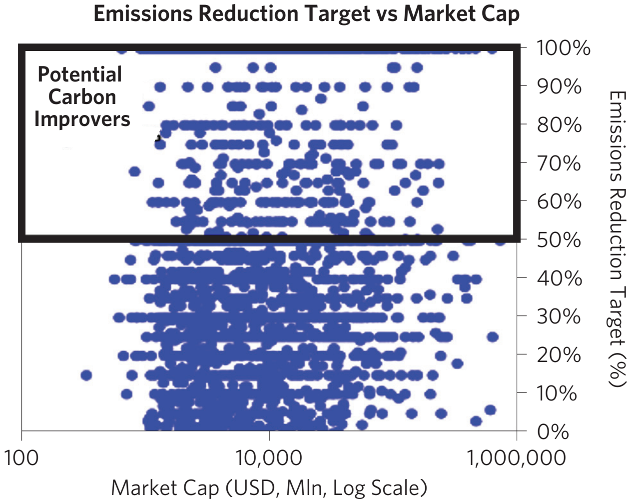
Financing carbon improvers: Through capital allocation, investors can provide incentives for companies to lower emissions and potentially lower the cost of capital for those companies over time. By financing carbon-intensive companies with clear and credible decarbonization initiatives, investors maximize their impact on future decarbonization. In avoiding high-emissions sectors altogether, investors may reduce the spot emissions of their portfolio but are unlikely to support real-economy decarbonization.



Perspective based on Bridgewater analysis, as of November 2022.

Supporting the net zero transition through a variety of engagement channels: By using their position in the financial system, investors can potentially impact the behavior of companies, regulators, and other entities that directly and indirectly affect emissions.

In All Weather Sustainability and Active Sustainable Equities, we seek to direct capital toward assets that are positively aligned to the UN Sustainable Development Goals, of which the transition toward a net zero greenhouse gas emissions economy is an integral part. These strategies represent our best current thinking on how to balance net zero alignment, other impact goals, and strong financial performance in a strategic asset allocation and a long-only active equity portfolio, respectively.

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Bridgewater's investment process seeks to understand the cause and effect linkages that drive markets over time. To assess and refine its understanding of these linkages, Bridgewater performs historical stress tests across a wide range of timeframes and market environments. From these stress tests, Bridgewater is able to simulate how its strategies would have performed prior to their inception. Bridgewater has the ability to run multiple simulations and select the simulation with the best results, returns or performance. For strategies that include active decision making, Bridgewater often "humbles" its simulated alpha returns (by systematically adjusting downward the simulated results that Bridgewater's current alpha investment logic produces) to account for the possibility that it could be wrong. Because this stress testing is a core component of Bridgewater's investment process, it shares these simulations with current and prospective investors to demonstrate its thinking. However, because they do not demonstrate actual results, these simulations are hypothetical, and inherently limited and should not be relied upon to make an investment decision.

The recipient should not solely rely upon these hypothetical performance results in making an investment decision. In constructing hypothetical performance and determining their appropriateness for use in materials, Bridgewater has an incentive to do so in a manner that shows beneficial characteristics of a given, hypothetical return stream.

All hypothetical performance is subject to revision and provided solely as a guide to current expectations. The recipient should not solely rely upon these hypothetical performance results in making an investment decision. Hypothetical performance results can provide insight into the level of risk

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that a strategy will seek with respect to its investments, with higher hypothetical performance results generally reflecting greater risk. Some or all results may be substantially lower than these hypothetical results and, as with any investment, there is a risk of loss of the entire investment.

Hypothetical performance results rely on numerous criteria, assumptions, risks and limitations and are inherently uncertain. There are multiple assumptions and possible adjustments Bridgewater may make in its underlying calculations that are reasonable, but other criteria, assumptions, methodologies and adjustments could also be reasonable and could lead to materially different and lower actual results and higher risks than those presented. In addition, the hypothetical performance results may prove to be invalid, inaccurate, incomplete or change without notice. Variation in any of these factors (or factors or events that are unknown or unaccounted for) could cause actual returns to substantially differ. In constructing hypothetical returns and determining their appropriateness for use in materials, Bridgewater has an incentive to do so in a manner that shows beneficial characteristics of a given, hypothetical return stream. Furthermore, any hypothetical or mathematical calculations or data might contain errors, and could rely on third-party inputs, which Bridgewater believes to be reliable but whose accuracy cannot be guaranteed.

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