NEUBERGER BERMAN

JONATHAN BAILEY
Head of ESG Investing

JENNIFER SIGNORI
Managing Director, Private Markets ESG and Impact Investing

CHARLES NGUYEN
Managing Director, Asia ESG Investing

CAITLIN MCSHERRY
Director of Investment Stewardship

SARAH PEASEY
Director of European ESG Investing

LAURA KUNSTLER-BROOKS
ESG Investing Associate

Key Considerations When Navigating the Net-Zero Transition

What investors should keep in mind when decarbonizing their portfolios

The march toward net zero remains a daunting trek for investors.

Eighteen months ago, we mapped considerations for the industry's forward path through the unfolding low-carbon transition (see Transitioning to Net-Zero Investing, April 2021). At the time, the Net-Zero Asset Owner Alliance had just added five members to its ranks, bringing the overall number of signatories to 42 owners, with a total of $6.6 trillion in assets under management. It was a crucial tipping point for net zero.

Since then, macroeconomic conditions and the political landscape have shifted dramatically. Rising energy prices and regulatory scrutiny of ESG and climate commitments have created a more challenging environment for investors aiming to decarbonize their portfolios. And yet, the number of new net-zero commitments keeps ticking up, and many of our clients continue to make excellent progress implementing the ones they have already made.

In this paper, we present 11 key issues we believe asset owners should take into consideration right now—as well as the significant challenges that come with them—based on feedback from numerous well-informed clients and industry experts. The discussion spans all phases of implementing a net-zero commitment—from initially codifying it, to sharing progress with key stakeholders—and offers food for thought on navigating next steps.

Clearly these are still early days. This transition will take time and diligence. And while challenges abound, we remain encouraged by the simmering urgency among investors and companies to meet their climate goals and ultimately reduce emissions and the risks they pose to their portfolios, businesses and the planet.

Key Consideration #1: What should a net-zero commitment include?
Before implementation even starts, asset owners need to consider the scope of their net-zero commitments. We have seen two common approaches—some investors set targets from the top down, immediately including large asset pools, while others do it from the bottom up for each individual asset class—and both carry their own risks and opportunities.

Key Consideration #2: Should a net-zero commitment appear in an IPS/IMA?
Asset owners can codify their net-zero commitments within an Investor Policy Statement (IPS) or an Investment Management Agreement (IMA), though there are important differences between them. An IPS has broader implications for managing entire investment portfolios, while an IMA governs specific asset pools—and that difference in scope makes incorporating net-zero targets within an IPS potentially more complicated and onerous for asset owners.

Key Consideration #3: How to develop a strategic asset allocation that meets your net-zero commitment?
Different SAA approaches have raised varying conclusions: some argue that investments made to battle climate change may curtail capital markets over time, while others believe opportunities in the greener economy will expand overall GDP growth. We believe a comprehensive framework is ideal when it both incorporates Climate Value-at-Risk for corporate securities and estimates climate effects on the traditional efficient frontier.

Key Consideration #4: How to deploy active and passive strategies when trying to meet net-zero commitments?
Active investors seek alpha based on fundamental insights gleaned through deep investment analysis that often includes engagement with corporate management. We believe this makes them better positioned to identify winners and losers from the climate transition while systematically engaging with management teams to support their decarbonization efforts. If after engagement a company's business model is deemed to not be sustainable for the future, they can make an informed decision to divest. Passive investors, on the other hand, track indices over the long term, meaning the only way they can transition to net zero is by tracking low carbon indices that divest a large part of the original benchmark, which may not ultimately lead to real-world emissions reductions.

Key Consideration #5: What are some effective methods of active engagement when trying to meet your net-zero commitments?
Asset owners should be prepared to increase their engagement with companies to meet net-zero goals. We recommend five steps along the engagement-escalation ladder: setting baseline net-zero expectations; tailoring engagement to meet sector-specific objectives; joining collaborative engagements; using your vote when companies fail to manage climate risks; and using your voice, as we do through our advance proxy voting program, NB Votes.

Key Consideration #6: How to set net-zero targets in both developed and emerging markets?
Prioritizing investment in emerging market (EM) climate solutions—from renewable energy innovations to carbon-removal technologies—could have a significant impact in accelerating an overall net-zero transition. However, achieving net-zero targets for EMs likely will require investors to adapt their developed-markets methodology to overcome specific challenges.

Key Consideration #7: How to implement net-zero strategies in private markets?
Private markets have several characteristics that are well suited for decarbonizing portfolios. Private equity (PE) managers tend to take controlling stakes in their targets, which gives them more direct influence over key strategic decisions. They may also focus their investments on climate solutions that can enable the transition to net zero. And finally, PE allocations tend to skew toward lower-carbon industries, such as technology and healthcare. However, standard practices for measuring and disclosing ESG-related data—essential for setting net-zero targets— are still in development.

Key Consideration #8: What is the role of "avoided emissions"?
Avoided emissions identify the emissions that would have been produced in the absence of a specific decarbonization strategy. When used alongside Scope 1 – 3 measurements, avoided emissions can provide a more comprehensive assessment of a company's climate impact—but we believe they shouldn't count toward a portfolio's net carbon footprint.

Key Consideration #9: Do carbon credits count toward a net-zero portfolio?
Carbon credits remain controversial as critics question whether the system ultimately incentivizes the economy to reduce overall emissions in the real world. But without them, how can you get to the "net" in net zero? For now, industry associations—such as the IIGCC—only deem regulated carbon markets and certain scarce and expensive carbon-removal projects to be viable instruments for hitting net-zero targets.

Key Consideration #10: What are the primary net-zero reporting challenges?
We discuss four main reporting challenges: 1) delayed issuer-level emissions reporting (which can thwart tracking annual progress); 2) estimating Scope 3 emissions (which many companies currently don't clearly disclose); 3) metric volatility (because some measures, such as carbon footprint, include a market-based input); and 4) lack of standardization across various frameworks and asset classes (often a logistics nightmare).

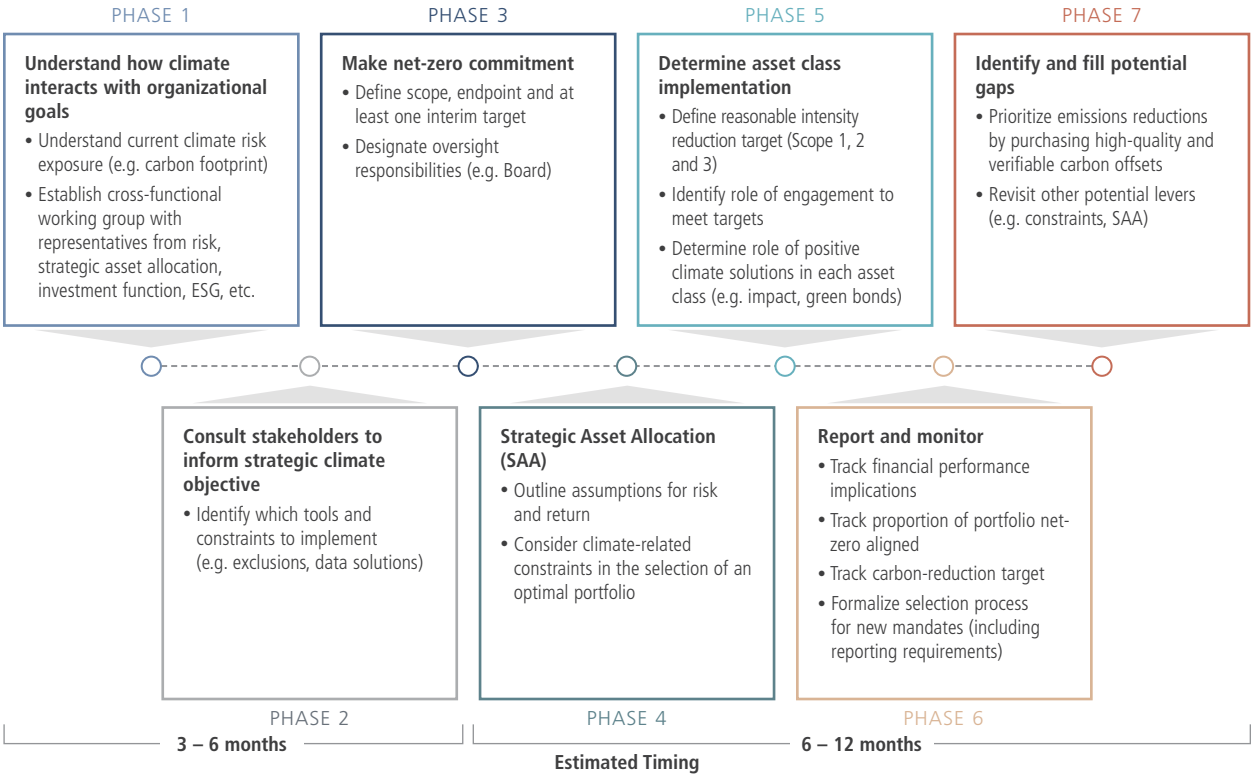
Key Consideration #11: How to communicate your net-zero progress to key stakeholders?
While communicating progress can be challenging, asset owners can rely on metrics that more easily aggregate, such as engagement metrics or the percentage of a portfolio invested in climate solutions. Publishing position papers on climate-related topics—such as climate policy—can help, too.

Introduction

In 2020, the Institutional Investors Group on Climate Change (IIGCC) unveiled guidelines for managing portfolios in keeping with the Paris Agreement. As detailed in our previous report, Transitioning to Net-Zero Investing, we reframed the IIGCC's guidelines into a seven-phase net-zero action plan for asset owners (see figure 1).

Early phases involve assessing potential portfolio impacts of climate change and making a commitment to addressing them, while later ones include implementing, adjusting, reporting and monitoring an asset owner's ongoing transition.

FIGURE 1: NEUBERGER BERMAN'S ACTION PLAN TO A NET-ZERO STRATEGY[1]



Eighteen months ago, most of our climate-focused clients were wrestling with the earlier assessment stages (phases 1 – 3). Many still are; however, more have begun to implement their strategies (phases 4 and 5) and even navigate the complex reporting and monitoring requirements (phases 6 and 7).

To help them, we've distilled 11 key issues—grouped by transition phase—they should be taking into consideration.

PHASE 1, 2 AND 3: ASSESSMENT AND PLANNING

Key Consideration #1: What should a net-zero commitment include?

Before implementation even starts, asset owners need to consider the scope of their net-zero commitments. Some are choosing to set targets from the top down across large asset pools (which could involve divesting whole swaths of holdings later on in the process), while others are setting targets from the bottom up for each asset class (which might require considerable time for larger portfolios).

The Challenges

Top-down target-setting presents several challenges. First, for some asset classes, investors could be setting targets in the absence of formalized guidance from industry bodies or tools to implement their net-zero targets. In other cases, as with real estate, decarbonization pathway tools may exist, but be limited only to investments in certain regions. Second, those who set targets for large asset pools where data availability is still limited may need to compromise in other areas, such as excluding material Scope 3 emissions from the net-zero target. Finally, given the largely asset class-agnostic approach in which each top-down target is set, the expectation is that real-world emissions will follow a predictable decarbonization pathway. If that pathway fails to materialize as expected, investors may face having to pivot in their strategy, possibly through systematically divesting from certain sectors.

[1] Adapted from "Net-Zero Investment Framework", IIGCC (2021).

The Path Forward

We advocate a bottom-up approach to determining what is in-scope for a net-zero commitment. The Net-Zero Asset Owner Alliance guidance states that an initial target should include public equities, corporate fixed income, infrastructure and real estate. Asset owners should carefully determine implementation potential for each asset class based on the investment strategies they manage internally or allocate to external managers. Then, asset owners should set baseline emissions performance by asset class and assess decarbonization pathways for each, followed by setting sub-sector and engagement targets. Finally, these targets can be amalgamated at the portfolio level.

Key Consideration #2: Should a net-zero commitment appear in an IPS and/or an IMA?

Asset owners can codify their net-zero commitments within an Investor Policy Statement (IPS) or an Investment Management Agreement (IMA), but there are important differences to consider.

The Challenges

An IPS not only serves as a formal, comprehensive roadmap to implementing an investment program, it also establishes the accountability of an asset owner's various constituents, from the investment analysts to the board of directors. By contrast, an IMA is a more targeted agreement governing the terms under which a manager is authorized to invest a specific pool of assets, including strategy mandates, performance metrics and fee structures. In short, an IPS is a broader guide—and that additional scope makes including net-zero targets within it potentially more complicated.

For example: could adding net-zero targets affect performance relative to peers for an asset owner's in-house investment team? Might asset managers and investment consultants look to raise their fees given the challenge of hitting climate targets while meeting clients' investment goals? And would board members balk at their net-zero oversight duties in an increasingly regulated—and politicized—environment?

The Path Forward

For now, most asset owners are sticking with IMAs to codify more-targeted net-zero commitments. An IMA that explicitly incorporates a net-zero target allows external managers to deviate (or not) from specific sectors or investment factors to achieve it. (IMAs are easier to amend, too.) However, an IPS approach may be suitable for asset owners who believe that incorporating climate considerations will enhance risk-adjusted returns in line with their established investment horizons. If investors do go this route, we believe net-zero language should be principles-based and broad enough to accommodate evolving net-zero guidelines.

There are less formal options, too. For example, side letters are used primarily by private fund investors to agree to negotiated terms outside of the primary limited partnership agreement. They typically allow special treatment for specific investors, including preferential reporting. Many sustainability-minded asset owners have used side letters to require reporting on ESG and diversity, prompting fund managers to review and augment their practices. This can be similarly done for net zero. However, a proposed SEC rule published in February 2022 could seek to restrict side letters that offer certain LPs "preferential information and rights". Another option is to establish an informal agreement regarding net zero, which could appeal to those who believe that net-zero implementation should start as soon as possible.

Finally, asset owners should anticipate their response if the global economy ultimately fails to make the net-zero shift. This might mean adjusting their long-term emissions targets; resorting to greater systematic divestment to meet emissions-reduction pledges; or purchasing carbon credits to stay within stringent net-zero frameworks.

PHASE 4 AND 5: IMPLEMENTATION

Key Consideration #3: How to develop a strategic asset allocation that meets your net-zero commitment?

Traditional capital market assumptions have tended to ignore climate factors due to the lack of a standard climate-integrated framework and historical carbon data for financial assets (although global regulators and central banks are gradually addressing that issue).

The Challenges

We believe an effective climate SAA should identify, align and incorporate forward-looking climate-related data across asset classes, types of climate risk (i.e., transition and physical risk) and temperature scenarios. Historical research has focused on certain parts of this problem by addressing specific asset classes or a single type of climate risk, but we believe investors must now take a more holistic view to meet their net-zero commitments.

Traditional climate SAA approaches have ranged from qualitative, top-down assessments of macroeconomic climate impacts, to stochastic financial modeling that estimates climate impacts across myriad financial and economic variables. Different approaches have raised varying conclusions: some papers argue that investments made to battle climate change may curtail capital markets over time, while others argue that new opportunities in the greener economy will expand overall GDP growth.

The Path Forward

The IIGCC's framework offers guidance for implementing a climate-integrated SAA. At the optimization stage of the SAA, it recommends including two primary metrics: Scope 1 & 2 emissions intensity and climate-solutions allocation as a percentage of an investment portfolio. These constraints are relatively easy to implement; what's harder is evaluating the impact of climate risks on potential returns. The IIGCC framework also stresses using metrics designed to capture changes at the company, sector or market level that reflect the likely trajectory of emissions and climate solutions.

Based on this guidance, we have created a more comprehensive climate-integrated SAA model that incorporates Climate Value-at-Risk for corporate securities, as well as a proprietary sovereign framework to estimate climate impacts on the traditional efficient frontier.

Overall, our framework suggests:

- A shift away from traditional high yield and emerging markets debt, where issuers have some of the highest environmental costs and exposures
- A shift into U.S. equities from other developed markets, given extended environmental policy timelines (with faster action anticipated in Europe than in emerging countries)
- A broad rotation away from the energy, industrials and basic materials sectors into technology, communications and non-cyclical consumer sectors
- A modest shift into low-carbon asset classes, which can lower a portfolio's financed carbon emissions without impairing its risk-return profile

The structure of our framework enables these considerations to be implemented alongside an investor's own unique set of objectives and constraints, such as liability and capital considerations for pension plans or insurers. The results of our framework should also not be viewed in isolation: we are focused on offering our clients holistic net-zero solutions informed by active management insights, such as our net-zero alignment indicator, to be used alongside top-down SAA.

Key Consideration #4: How to deploy active and passive strategies when trying to meet net-zero commitments?

Asset owners will likely need a smart mix of active and passive strategies to make their net-zero transitions. Active strategies typically seek alpha based on fundamental insights gleaned from investment analysis, and often include engagement with corporate management teams on a variety of topics, including minimizing climate risks, and as a result, net-zero transitions; passive strategies, by contrast, typically aim to hit net-zero targets by divesting at scale within passively managed portfolios.

The Challenges

Active management. Every company is on its own unique journey to net zero—and given the expertise needed to assess decarbonization strategies and new low-carbon technologies, some argue that active managers have a valuable edge in sifting for winners in the transition. At Neuberger Berman, we've developed a net-zero alignment indicator—based on more than 30 metrics from leading ESG data providers and specialized climate data sets—to calculate a quantitative alignment status for each company.

Our central research analysts then factor in sector-specific variables and qualitative insights based on interactions with management, resulting in an analyst-adjusted net-zero alignment status.

Active managers can also help laggards get over the hump by engaging with them to set credible net-zero targets. This approach can lead to targeted real-world results in relatively short time periods—12 to 18 months[2] —compared with simply selling shares or bonds and hoping the threat of higher capital costs spurs companies to take climate action.

Indeed, active shareholders have been able to create real change at large companies. In one recent example, a software billionaire amassed a large stake in AGL, an Australian energy firm, to stop a demerger that would have extended the life of its coal-fired plants.

Active management does have its limitations, however (see chart below). For all good intentions, engagement campaigns don't always lead to lower carbon emissions in the real world. When investors in Anglo-American convinced the London-based global miner to spin off Thungela, its South African coal operation, they managed to shrink the company's own carbon footprint, but likely not the planet's. And despite its own net-zero transition plan, Thungela has since announced the construction of new coal mines to replace existing production.

Benefits	Limitations
• Less punitive to returns vs. divestment while achieving targeted real-world results	• Significant investments in time and resources make engagements difficult to scale
• Effective over shorter horizons vs. increasing a target's cost of capital through divestment	• Collaborative engagements can hamper decision-making and invite free riders
• Additive to traditional fundamental analysis in understanding a target's corporate culture	• Real-world outcomes can require an escalating approach, sometimes accompanied by regulatory hurdles

Passive management. Some asset owners believe that active management's primary purpose is to generate alpha, while leaving the heavy lifting of emissions reduction to passive divestment. But as with active management, there are trade-offs (see chart below).

According to the United Nations-supported Principles for Responsible Investment (PRI), divestment may be most appropriate in cases where 1) other escalating engagement measures have been exhausted; 2) there are limited ways to pursue a more sustainable business model; and 3) investors have little negotiating leverage due to lack of control or legal recourse. Further research suggests that divestment is most effective where there is a critical mass of aligned investors in less-liquid asset classes.[3]

Take the thermal-coal industry as an example. A recent study by the Oxford Leading Sustainable Corporations Programme found that the average increase in coal miners' loan spreads in developed markets outpaced increases in emerging markets over the last two decades.

And yet the real-world impacts of that capital squeeze are up for debate. While coal's share of the power mix declined by 5% versus its 2007 peak, to about 36% in 2021,[4] total coal production may hit an all-time high over the next few years driven by demand in emerging markets (especially China and India) and geopolitical factors (such as the conflict in Ukraine).

Benefits	Limitations
• Simple to understand and easy to implement	• Critical mass required to achieve real-world results
• Can trigger positive multiplier effects, such as the proliferation of coal exclusions	• Less effective with highly liquid asset classes and large public companies
• May achieve portfolio-financed emissions targets	• Avoiding certain assets can create tracking error

The Path Forward

Ultimately, we believe making the transition to net zero will demand a thoughtful mix of active and passive strategies—with a sharp eye on trying to minimize climate risks by achieving the most significant real-world emissions reductions.

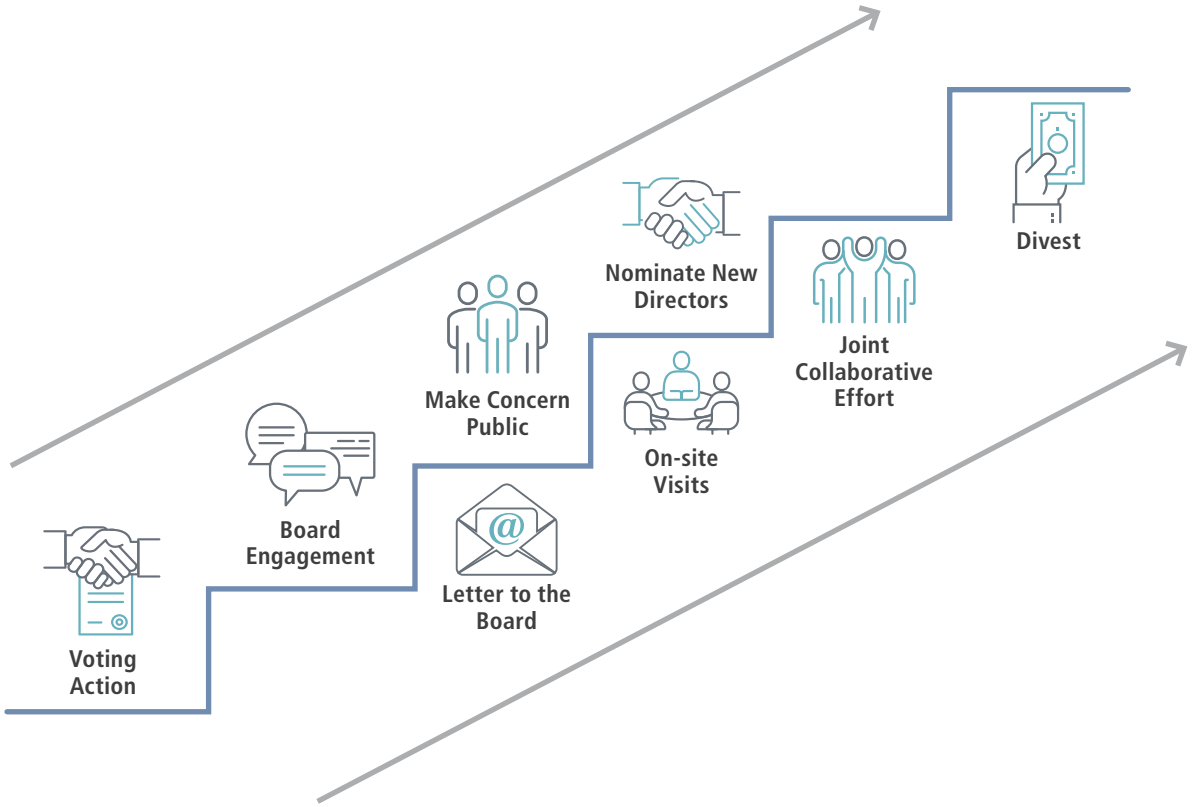
[2] Elroy Dimson, Oğuzhan Karakaş, Xi Li, "Active Ownership", The Review of Financial Studies 28 (2015): 3225-3268.
[3] Lütkehermöller et al.,"Unpacking the finance sector's climate-related investment commitments", NewClimate Institute and Utrecht University (2020).
[4] "Coal 2021", International Energy Agency (2021).

Key Consideration #5: What are some effective methods of active engagement to meet your net-zero commitments?

Asset owners should be prepared to escalate their engagement with companies that consistently fail to meet baseline net-zero expectations and specific key performance metrics. Engagement campaigns start with routine meetings, but can escalate into voting actions and may also involve collaborative efforts with other influential asset owners (see figure 2).

FIGURE 2: THE ENGAGEMENT-ESCALATION LADDER

When a company does not respond to our concerns or our concerns have not been sufficiently addressed, we may take escalated action.



The Challenges

While active engagement can ultimately change corporate behavior, the process is difficult to scale. To succeed, assets owners must have a deep understanding of the company's business model—and plenty of persistence. At Neuberger Berman, our portfolio managers recently engaged with an aerospace company that didn't disclose Scope 3 emissions related to the use of its products (the largest source of its emissions). After a multi-year campaign, including calls with management and the board, we managed to convince the company to add that additional level of disclosure.

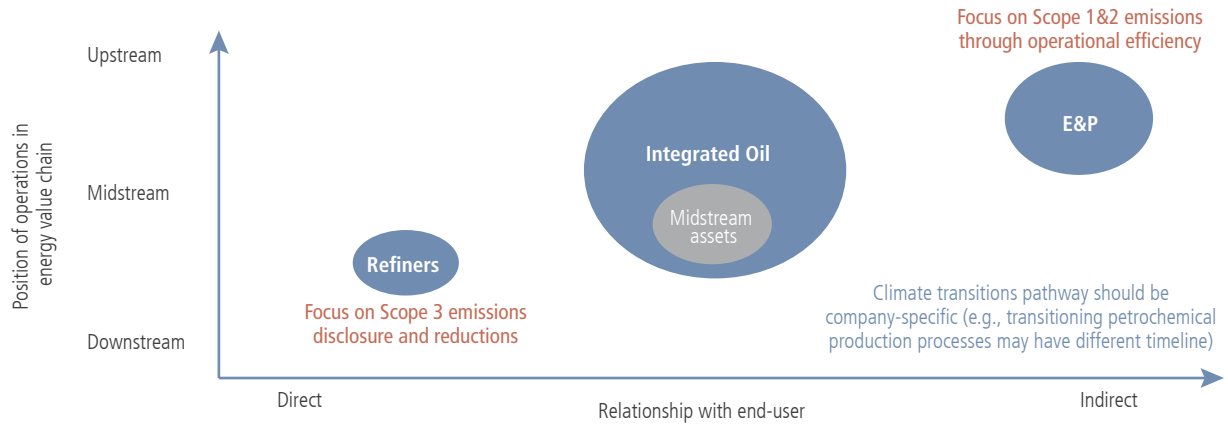
The Path Forward

Here are some best practices for engaging with companies to accelerate their net-zero transitions:

1. Establish baseline expectations. These can cover everything from emissions-reporting requirements to board oversight responsibilities. Once baselines are set, investors can focus their engagement on laggards in their portfolios. For example, after carefully reviewing one company's governance documents, our analysts discovered that its board didn't have formal oversight of climate risk. We chose to write a letter to the board explaining our views and the voting actions we would take if our concerns weren't addressed. Soon after, the board formalized its climate-oversight duties and updated its committee charters accordingly.

2. **Tailor engagements to meet specific objectives.** Every company charts its own path to net zero, which means asset owners should focus their engagement on specific areas of improvement (see figure 3). For example, while a company might clearly disclose its decarbonization objectives, it might need additional encouragement to share how it plans to finance them. This was the case with one privately owned utilities company that, in our view, had significant potential to reduce its environmental impact and risk profile through operational improvements, equipment retrofits and plant retirements. After regular engagements with management over multiple years, the company implemented a more conservative financial policy and disclosed emission-reduction objectives, including the phase-out of its coal plants.

FIGURE 3: ENGAGEMENT FRAMEWORK FOR ENERGY SUB-SECTORS
Engagement Priorities and Objectives Are Informed by Company Size of Operations



This chart shows how asset owners might tailor their engagement strategies for different parts of the energy ecosystem—from the "upstream" energy exploration-and-production companies (E&Ps), to the "downstream" refiners who turn oil and gas into consumable fuel. (The diameter of each bubble represents that sub-sector's relative weight in the MSCI All Country World Index.) Engagements with E&Ps—which generate significant Scope 1 and 2 emissions—might emphasize operational efficiencies gained from using lower-carbon fuels, while campaigns with refiners might focus on limiting emissions from plants or seeking out carbon-capture-and-sequestration projects to support emissions reductions.

3. **Join forces with other investors.** Active collaboration by investors with particular expertise can help drive consensus and draw attention to key issues. However, efforts to coordinate logistics and build consensus prior to engagement may stretch campaign timelines and delay tangible results.
4. **Use your vote.** If a company doesn't respond to engagement or isn't adequately managing its climate-related risks, investors can escalate their concerns by backing climate-related shareholder proposals or opposing reelection of the board. Neuberger Berman will typically support related resolutions or oppose directors at companies with poor emissions or climate risk disclosure, or even no board oversight of material ESG issues.
5. **Use your voice.** Investors may also publicly disclose their vote intentions ahead of annual meetings. We believe our advance proxy vote disclosure initiative—called NB Votes—fosters robust dialogue with management teams, encourages best practices across industries and ultimately amplifies our impact on the overall net-zero transition.

Key Consideration #6: How to set net-zero targets in both developed and emerging markets?

Net zero is a global pursuit, yet the transition will likely play out very differently across developed markets (DMs) and emerging ones (EMs), thus presenting a host of decisions for asset managers. While DMs tend to make clearer emissions disclosures and transition plans, EMs represent two-thirds of global emissions.[5] This suggests that prioritizing investment in EM climate solutions—from renewable energy innovations to carbon-removal technologies—could have a more significant impact in accelerating an overall net-zero transition.

[5] https://www.climatewatchdata.org/ghg-emissions?end_year=2019&start_year=1990.

The Challenges

We anticipate two big challenges in pursuing EM climate-related investments.

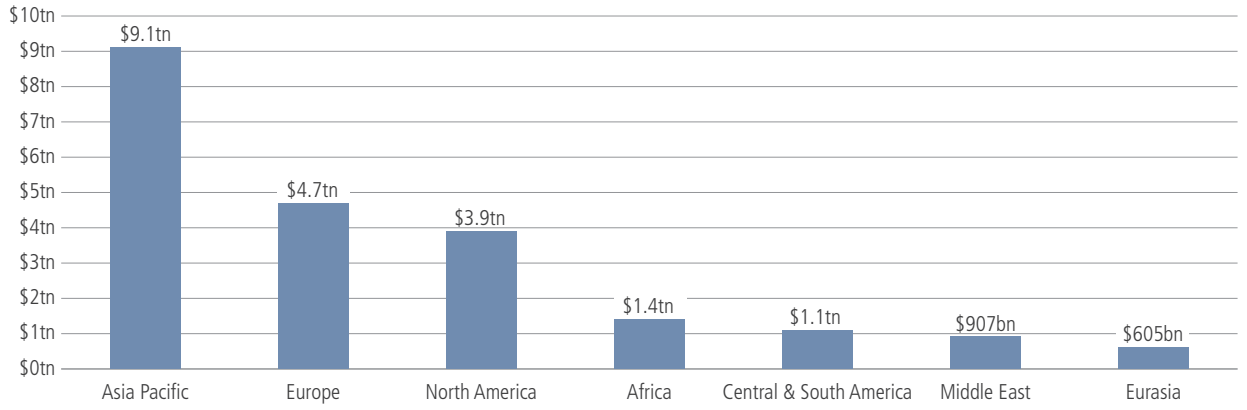
First, EMs have different timelines for getting to net zero. While the Net-Zero Asset Owner commitment requires a transition by 2050 (and the Net Zero Asset Managers commitment goes even further by urging governments to exceed their agreed-upon Nationally Determined Contributions), EM benchmarks include many countries with longer-term targets, such as China and Indonesia (2060), and India (2070). Those timing mismatches will make it difficult for EM funds to set 2050 net-zero targets.

Second, asset managers may find it hard to run productive engagement campaigns in countries with many state-owned or family-controlled companies. Scaled divestment within such closed-capital systems may also prove inefficient.

The Path Forward

To get to net zero, the IIGCC estimates the Paris Agreement will require at least $126 trillion of investment in climate solutions, with perhaps 70% coming from the private sector. EMs represent a majority of that investment (see figure 4). Of the $20 trillion (or more) in incremental capital needed by 2030, about 42% will flow toward the Asia-Pacific region—about $1 trillion per year. China alone will need an additional 2.5 trillion RMB (about $350 billion) annually to make its transition, estimates China's National Development Reform Commission.[6]

FIGURE 4: INVESTMENT GAP IN A PARIS-ALIGNED PATHWAY (2021 – 30)[7]



Historically, green financing in China came from banks, but there is now increasing demand for green bonds. From 2020 to 2021, green bond issuance more than doubled, to $110 billion, following Xi Jinping's 2020 commitment to carbon neutrality by 2060. And with China recently publishing a set of new green bond principles to further align with global standards, more demand is likely on the way.

There are also significant equity-investment opportunities in the APAC region. According to researchers at Harvard Business School, the opportunity set for climate solutions is now greater in China than in the U.S. (see figure 5).

FIGURE 5: CLIMATE SOLUTION STOCKS ACROSS REGIONS (2011 – 2021)[8]

Region	Average Market Cap ($M)		Average No. of Stocks	
U.S.	152,612	31%	31	7%
Europe	72,126	14%	92	21%
China	180,169	36%	79	18%
Other	94,075	19%	229	53%

[6] Exchange rate as of October 4, 2022.
[7] "Climate Investment Roadmap", IIGCC (2022).
[8] Cheema-Fox, Serafeim and Wang, "Climate Solutions", Harvard Business School (2022).

At Neuberger Berman, our net-zero frameworks require asset managers to decarbonize their portfolios to the extent broader technological innovation will allow. While DM portfolios are able to adhere to current industry frameworks—such as the SBTi, Climate Action 100+ and the IIGCC—EM managers may have access to a growing and potentially underappreciated pool of climate-related innovation.

Key Consideration #7 How to implement net-zero strategies in private markets?

Private markets have several characteristics that make them suitable for net-zero portfolios. The PE industry as a whole tends to invest in lower-carbon industries (such as technology and healthcare), and GPs tend to take controlling stakes in their targets (generally giving them more direct influence over climate-related decisions), Meanwhile, however, many net-zero standards and best practices for private markets remain in development.

The Challenges

Of major consideration is the balance of responsibilities between general partners (GPs) and limited partners (LPs). GPs with majority ownership and board positions may hold greater influence on net-zero issues at the portfolio-company level, while LPs may have to exert their preferences mainly through their capital commitments and by monitoring and engagement of GPs.

A second challenge is target-setting. Given PE's multi-year investment period, with companies entering and exiting the portfolio at different stages, setting annual fund-level climate targets may not be the most appropriate means to fully capture an investor's true progress toward net-zero when managing a diversified multi-fund portfolio.

Yet another net-zero hurdle for private markets is the lack of available and consistent emissions reporting by portfolio companies. That dearth of data makes target-setting and alignment analysis difficult for GPs and LPs (especially those invested across a number of PE funds).

The Path Forward

In February 2022, the IIGCC published its initial guidance for net-zero implementation in PE portfolios; other industry groups, such as the Initiative Climat International ("iCI"), are developing their own guidance, too.

Current guidance addresses several challenges. First, PE-backed companies may have a tilt toward growth, and reconciling absolute carbon footprint reduction versus the high growth trajectory of many PE-backed companies is challenging. In these instances, it is important to focus on carbon intensity and consider growth in setting the baseline for targets in a manner that is appropriate for the asset class and investment strategy.

Second, the guidance for investors in multiple PE funds appropriately differs than for those in a single fund. At a PE portfolio level, where the underlying holdings are evolving throughout the natural cycle of each underlying fund's investment period and individual commitment timing is staggered to maintain net asset value targets, there is greater emphasis on the usage of a portfolio coverage metric, e.g., the number of portfolio companies that have set science-based targets.

But more remains to be done. Given the governance characteristics of PE ownership, PE firms could use additional criteria beyond targets set when measuring portfolio companies' progress toward net-zero alignment. In particular, there is an opportunity for PE firms to encourage portfolio companies to set a climate strategy with appropriate governance and greater disclosure related to emissions, as well as promote initiatives to improve efficiencies and carbon profiles of portfolio companies.

PHASE 6 AND 7: REPORTING, MONITORING AND FILLING POTENTIAL GAPS

Key Consideration #8: What is the role of "avoided emissions"?

The widely observed Greenhouse Gas Protocol groups carbon emissions into three categories: Scope 1 includes direct emissions from internal company operations such as running vehicle fleets and the like; Scope 2 tracks indirect emissions from off-site power generation; and Scope 3 covers all other indirect emissions, from activities including travel to waste removal.

"Avoided emissions" don't fall into any of these buckets; some investors have termed them "Scope 4", i.e., emissions that would have been produced in the absence of a specific decarbonization strategy. When used alongside Scope 1 – 3 measurements, Scope 4 emissions can provide a more comprehensive assessment of a company's climate impact.

The Challenges

One reason it's hard to compare avoided emissions is that there isn't a broadly accepted reporting standard. While some climate-solutions companies provide detailed justifications to support their claims, many others don't report at all.

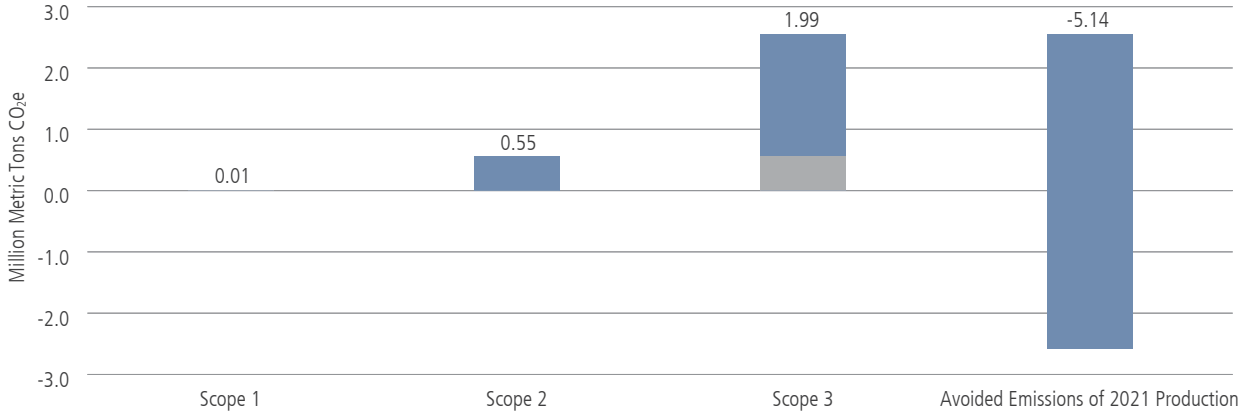
Also, counterfactuals—as in, "if X solution didn't exist, then Y tons of emissions would have been emitted"—are hard to prove without standardized disclosures and agreed-upon assumptions.

Here are two examples—one relatively straightforward, the other more nuanced—that highlight the challenges of incorporating avoided emissions across different net-zero enablers.

Tempe, Arizona-based First Solar manufactures solar panels and photovoltaic power plants. In 2021, the company claimed it produced 5 million metric tons of avoided carbon emissions—or about twice the Scope 1 – 3 emissions associated with making its products (see figure 6).

FIGURE 6: FIRST SOLAR'S ANNUAL AVOIDED EMISSIONS WERE TWICE AS LARGE AS ITS SCOPE 1 – 3 EMISSIONS[9]

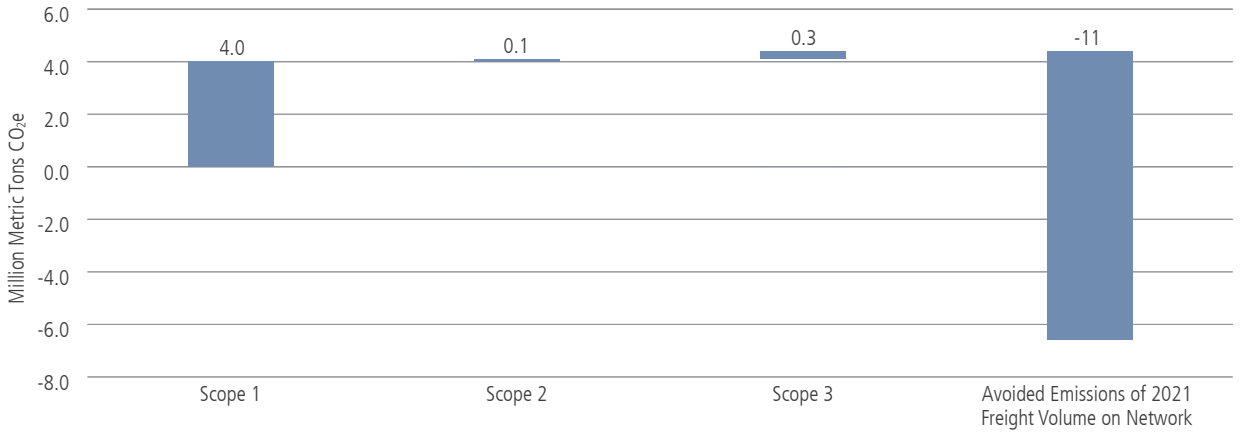
2021 First Solar Emissions



Other companies—like railroad operator CSX—pose a thornier challenge. While its diesel locomotives generate fairly high Scope 1 emissions, they're also 75% more carbon-efficient than the freight trucks that (theoretically) would have been used to move all those goods. Historically, CSX did not report avoided emissions, but our analysts still estimated them, based on real-world mileage and fuel-efficiency data; when CSX finally did publish its results, in 2022, they were roughly in line with our calculations (see figure 7).

FIGURE 7: CSX REDUCES NET EMISSIONS BY LETTING LOCOMOTIVES DO THE WORK OF CARBON-INEFFICIENT TRUCKS[10]

2021 CSX Emissions



[9] Source: First Solar 2021 Sustainability Report.
[10] Source: CSX 2021 Sustainability Report, Association of American Railroads.

The Path Forward

Despite their potential real-world impacts, we believe avoided emissions are unlikely to play a formal role in net-zero measurements or portfolio commitments. Nor do we think they should substitute for engagement campaigns to encourage further decarbonization efforts. However, their quantitative nature facilitates assessment of solutions within sustainable and impact investment strategies. (Indeed, we consider avoided emissions in our U.S. Equity Impact strategy.) At the portfolio level, positions with significant Scope 4 emissions can help offset the climate risk from higher-emitting holdings.

Key Consideration #9: Should carbon credits count toward a net-zero portfolio?

Carbon credits present a conundrum for climate-conscious investors. On the one hand, they are necessary to achieve the "net" in net zero. Some companies can only reduce emissions so much (given the nature of their business models and extended value chains), and carbon credits offer another way to shrink their theoretical carbon footprint; on the other, it's not clear whether carbon credits truly reduce emissions in the real world or if they allow certain companies to continue polluting with impunity. What role, then, should carbon credits play in net-zero portfolios?

The Challenges

Grappling with that question starts with a closer look at the current carbon-market infrastructure, which includes the "compliance" market and the "voluntary" market.

Carbon compliance markets allow companies to trade standardized carbon credits, with each credit representing the right to emit one metric ton of carbon dioxide. Companies are allowed a certain number of credits, up to a cap; heavier polluters that need more credits can buy from others with credits to spare in the regulated market, but once a credit is bought and held, it is permanently "retired." Thus, a "cap-and-trade" system reduces overall emissions as governments reduce the total number of available credits over time.

A big challenge, however, is that the average global price of carbon—around $4.5 per metric ton according to the real carbon index[10]—is arguably too low to incentivize companies to lower their emissions. For example, in IEA's World Energy Outlook model, carbon prices reach $\$75\text{-}100/tCO_2$ by 2030 and $\$125\text{-}140/tCO_2$ by 2040 in a scenario consistent with meeting Paris Agreement goals.

In the voluntary carbon market, companies aim to shrink their carbon footprints by investing in decarbonization projects conceived by private developers, who register the emissions offsets on a public registry. The projects are designed to either reduce or remove emissions—and there is crucial difference between them.

Reduction projects (as with avoided emissions) rely on a counterfactual: Developers must certify that their efforts—say, to improve forest management or capture landfill methane gas—in fact lowered emissions more than business as usual, even though those benefits are almost impossible to measure. (In other words, forests wouldn't have been planted without carbon finance, whereas a landfill operator might install a methane-capture device during the course of business, perhaps to meet regulatory requirements.)

Removal projects, however, actually eliminate a quantifiable ton of carbon from the atmosphere and store it over the long term. Examples include climate-solution technologies, like "direct air carbon capture and storage" (DACCS) or "bioenergy carbon capture and storage" (BECCS)—or nature-based approaches, such as planting new forests or restoring mangroves to increase carbon-storage capacity.

The Path Forward

For now, industry associations—such as the IIGCC—only deem regulated carbon markets and certain scarce and expensive carbon-removal projects to be viable instruments for hitting net-zero targets, though offsets generated by some projects can be dearly priced. For example, emissions reductions from DACCS/BECCS can be north of $500 per ton.

Asset owners have yet another option: instead of buying offsets or allowances from a marketplace, asset owners can invest directly in long-term infrastructure projects—like a carbon land bank—or invest in a fund and get access to offsets from a pipeline of projects. New ways to finance these types of removals include direct project finance, fund investment in natural capital strategies and listed Natural Asset Companies.

[10] https://www.realcarbonindex.org/indices?lightbox=dataItem-kud8qiho__item1.

Carbon markets will likely remain complex and in some instances controversial. In their current state, most carbon credits continue to be either extremely expensive or at risk of not delivering real emissions reductions. For now, we think they should be treated as a last resort after other options to decarbonize have been exhausted.

Key Consideration #10: What are the primary net-zero reporting challenges?

Delayed reporting
Companies tend to report their emissions 12 to 18 months after their financial reports, which can make it difficult to track their annual progress. In the absence of mandatory climate-related disclosures, Neuberger Berman uses the latest reported emissions numbers instead of relying on estimates.

Estimating Scope 3 emissions
Many companies don't clearly disclose their Scope 3 emissions—and dependable estimates remain hard to come by, as shown by our analysis of extensive data from two leading providers, MSCI and TruCost. While MSCI estimates emissions with a blend of bottom-up and top-down approaches, TruCost primarily uses Environmentally Extended Input-Output (EEIO) analysis, which evaluates links between economic consumption and its associated environmental impacts.

Examining common issuers, we found:

- MSCI's Scope 3 estimates exceeded TruCost's about 75% of the time.[11]
- The variance between the two providers was greater than 75% nearly 60% of the time.[12]
- The correlation between the providers' respective Scope 1 and Scope 2 emissions was greater than 95%, but plummeted to 47% for Scope 3.[13]

Carbon intensity vs. carbon footprint
"Carbon intensity" measures emissions from a company's perspective by measuring the tons of CO_2 equivalents emitted for every $1 million in revenue—while "carbon footprint" takes matters from the investor's perspective by estimating the emissions attributed to the owner's share of an emitter's total invested capital, defined as enterprise value plus cash.

But because enterprise value includes a market-based number, it can fluctuate a lot in a turbulent economy. We suggest asset owners use a combination of metrics and also look at context for changes over time to determine whether the true source of emissions reductions stem from a company's operational improvements or an investment team's portfolio-allocation decisions.

Standardization across reporting frameworks and asset classes
Net-zero reporting at the asset-owner level—which demands aggregating metrics across underlying managers and asset classes with different reporting templates and frameworks—can be a logistical nightmare. We believe reporting will improve as more investment portfolios have net-zero mandates. In the meantime, we suggest asset owners work with a few trusted partners to streamline their emissions-reporting processes.

Key Consideration #11: How to communicate your net-zero progress to key stakeholders?

There are a number of ways asset owners can demonstrate progress on their net-zero transitions.

The Net-Zero Asset Owner Alliance recommends that asset owners communicate their annual emissions-reduction efforts across all asset classes with developed net-zero frameworks—including listed equities, publicly traded corporate bonds, infrastructure and real estate. Disclosures can be on an absolute basis or against relevant benchmarks. And regardless of the chosen carbon-target metric for target-setting, we recommend reporting or tracking absolute emissions, carbon intensity and carbon footprint.

Given the difficulty of aggregating metrics across numerous investment managers, asset owners may find it easier to communicate their progress on direct engagement with companies rather than through collaborative engagement initiatives such as Climate Action 100+.

[11] Sample size of 2,400+ common issuers, includes reported and estimated Scope 3 values.
[12] Sample size of 2,400+ common issuers, includes reported and estimated Scope 3 values.
[13] Sample size of 1,400+ common issuers, reported values only.

They may also choose to report their progress toward investing in climate solutions that substantially contribute to climate-change mitigation or adaptation. In Australia, we have seen net-zero-committed superannuation funds "color-code" their portfolios to communicate the increase of "green" investments over time. Likewise, a large California state pension fund discloses total funds allocated to climate solutions in various asset classes, including fixed income, private markets and infrastructure.

Finally, asset owners can showcase their abiding commitment to net zero by publishing position papers on climate-related topics, such as climate policy.

Neuberger Berman
1290 Avenue of the Americas
New York, NY 10104-0001

www.nb.com

X0285 01/23 1216292