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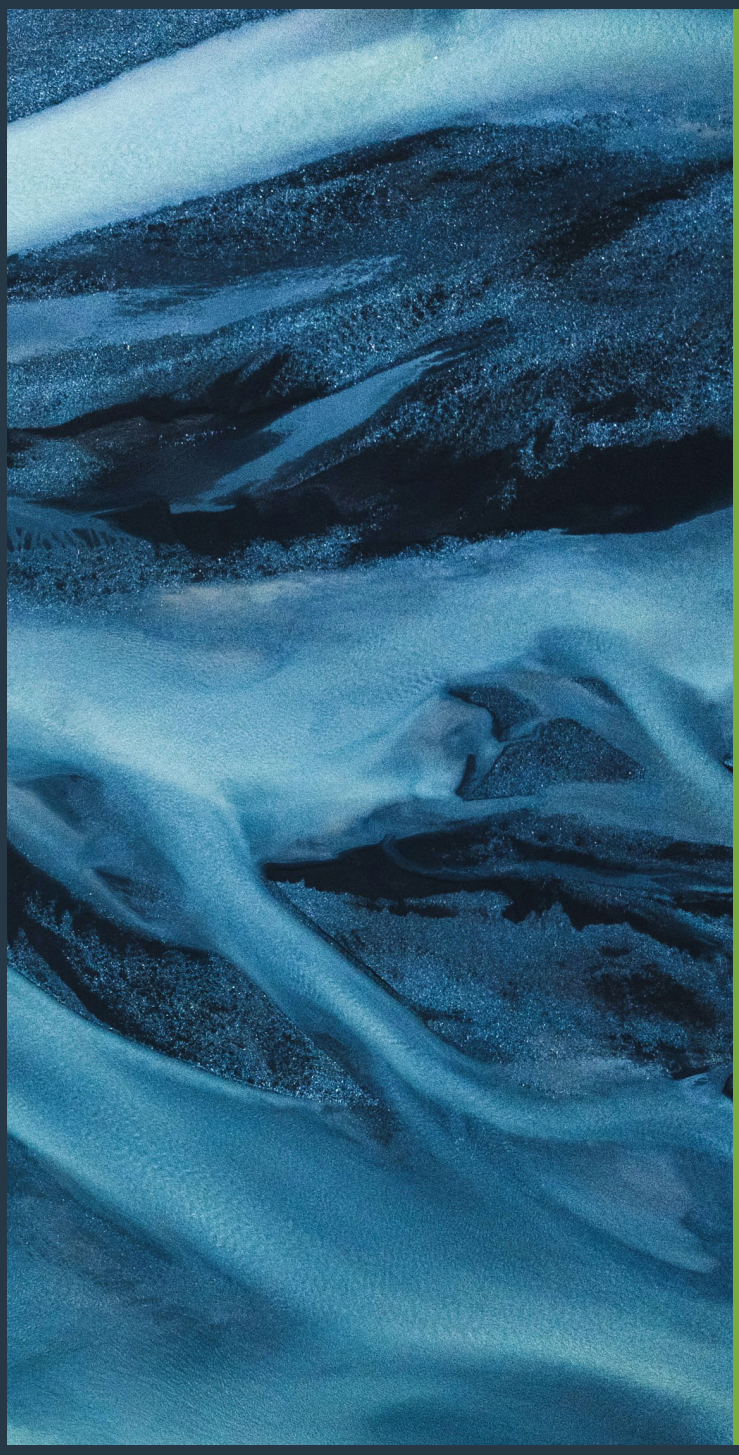
Think carbon optimization

Trade-offs between risk, return and net zero carbon



Transitioning to a low-carbon economy

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Institutional capital has a powerful role in supporting and accelerating the transition to a low-carbon economy. Institutional investors have several mechanisms to align portfolios with the Paris Agreement, which include divesting from carbon-intensive sectors, increasing allocations to carbon-efficient or low-carbon investments, and investing in climate solutions that remove CO_2 from the atmosphere. The goal of the international treaty on climate change is to limit global warming to well below 2 degrees Celsius (ideally no more than 1.5°C) compared with pre-industrial levels, which has prompted many asset owners, asset managers, corporations and countries to establish net zero greenhouse gas emissions targets.

Of the many options available to investors, we explore the role real assets can play in portfolios with net zero carbon targets. This work builds on our ongoing research into the benefits that real assets — farmland, timberland and infrastructure — can bring to a portfolio: namely diversification, inflation hedging, yield and liability matching.

In addition to these traditional portfolio benefits, we show that real assets can also be a cost-effective solution to decarbonizing an investment portfolio. They offer institutional investors scalable, low-carbon investment opportunities and natural climate solutions strategies that increase carbon storage or avoid greenhouse gas emissions.

This research expands on our understanding of traditional portfolio construction tools.[1] It adapts the standard optimization model to include the carbon intensity characteristics of real assets. This allows investors to optimize portfolios across the three dimensions of risk, return and carbon, and to understand what trade-offs, if any, are required.

The role of real assets in achieving net zero globally

Natural climate solutions such as timberland and farmland are low-cost sources of climate mitigation with the greatest potential for scale.[2]

At the macro level, they can provide over one-third of emissions reductions needed by 2030 to limit global temperature increases under 2°C.[3] They can do this by:

- producing more timber and agricultural commodities on less land;
- reducing emissions through efficient operating practices; and
- sequestering and storing carbon in soil and trees.

The climate benefits of timberland and farmland range across a spectrum of investment strategies from sustainable forestry and agriculture to higher impact strategies like reforestation, improved forest management, avoided deforestation and regenerative agriculture. These higher impact strategies also have the potential to generate verified forest carbon offsets as well as provide other environmental benefits.

Growth in demand for natural climate solutions will drive investment and revenues in land-based real assets. The reforestation and afforestation market is expected to produce $2.8T in revenues through 2050, while global estimates for yield-enhancing technological investments in agriculture total $20T from 2015 – 2050.[4]

The climate benefits of infrastructure as an asset class are distinct from timberland and farmland. The asset class spans a wide range of services from transportation (such as highways and airports) to energy generation. These activities are currently associated with significant carbon emissions, raising the question of how to reconcile them with a place in a net zero portfolio, but they can offer potential as a source of emissions reductions. Infrastructure improvements are a key component in transitioning to a low-carbon economy, which creates opportunities for investors in renewable energy sources, energy-efficient technologies, and water and waste management to name a few examples.

The Paris Agreement is an international treaty that seeks to limit global warming to well below 2°C, ideally no more than 1.5°C, compared with pre-industrial levels. As a result, many asset owners, asset managers, corporations and countries have set net zero greenhouse gas emissions targets.

The benefits of real assets for institutional portfolios

The portfolio benefits of real assets are well known among many institutional investors. Adding them to a portfolio of traditional stocks and bonds can provide investors with diversification, cash flows that can improve yields and match liabilities, and inflation-hedging properties.

With climate risk increasingly coming into focus, real assets can provide further benefits. The low carbon intensity of farmland and timberland can help investors seeking to decarbonize their portfolios, and, in some cases, offer the potential to net out positive emissions from other parts of the portfolio.

Our recently published paper made the case for the traditional benefits of real assets and how they can be included in institutional portfolios.[5] The analysis supported the long-term investment thesis that real assets can improve the efficiency of traditional portfolios in multiple ways:

- **Diversification:** Real assets have shown to be powerful diversifiers, with low or negative correlations to traditional stocks and bonds — and to each other. Private investments rarely move in lockstep with traditional assets or commodities in part because they are relatively illiquid; they are not traded in public markets.[6]
- **Cash flow and liability-matching characteristics:** Real assets have potential to provide bond-like current income from contractual lease obligations, from revenue from selling commodities and from user revenues. Long-term capital appreciation from rising land values or from infrastructure development projects may also help meet future liabilities.
- **Inflation hedging:** Real assets have provided a strong hedge against inflation for several reasons. Often, long-term contracts include adjustments for inflation. Many commodities, such as foodstuffs and raw materials, are components of inflation measures, such as the Consumer Price Index. Driven by global demand trends, rising commodity prices increase the profitability of timberland and farmland, causing land values to rise and providing a long-term hedge against inflation. Our research showed that, since 1992, timberland and farmland returns have averaged 9.3% and 11.1%, respectively — more than double the inflation rate of 2% to 4% during the same time period. Their positive correlations with inflation, 0.40 and 0.23, respectively, were higher than for government bonds or stocks.[7]

The carbon benefits

Real assets such as farmland and timberland provide two additional benefits for investors with net zero carbon targets. Investments in renewable infrastructure may also provide similar benefits.

- **Low-carbon intensity:** Land-based real assets have lower carbon intensities (measured as net CO_2 emissions per million U.S. dollars invested) than the traditional asset classes of stocks and bonds in most cases. Exceptions can be found in markets that are dominated by low emission sectors, for example the U.S. equity market and its large technology sector. Land-based real assets also have significantly lower carbon intensities than private real assets such as conventional (non-renewable) infrastructure. In some cases, notably timberland, carbon intensities can be negative. Timberland investments, for example, can have a negative carbon footprint when the rate of carbon sequestration exceeds that of carbon stock lost through harvesting for timber sales, thereby increasing the overall forest carbon stock.
- **Potential for verified carbon credits:** In some cases, carbon credits can be generated from timberland or farmland investments. A carbon credit is a certificate representing one metric ton of carbon dioxide equivalent that is either prevented from being emitted into the atmosphere (emissions avoidance/reduction) or removed from the atmosphere as the result of a carbon-removal project. Projects must meet either a voluntary or compliance market standard with mechanisms for monitoring, reporting and verification to help ensure credits are real, additional and permanent. Carbon credits generated from timberland or farmland investments can be monetized to enhance financial returns or retained by the investor to balance emissions from another part of the portfolio. If credits are used to offset emissions, carbon intensity metrics must be adjusted accordingly to avoid double counting.

Sourcing standardized carbon data:

Standardized accounting methods for emissions and removals are critical for asset owners and managers to calculate a portfolio's carbon intensity and advance toward their net zero targets. However, global accounting standards for carbon removals do not yet exist. Until this occurs, the choice of carbon metrics is a source of uncertainty and risk. At the time of writing, several industry organizations are addressing the issue.

- The Financial Stability Board's Task force on Climate-related Financial Disclosures (TCFD) is developing consistent climate-related financial risk disclosures for use by companies, financial institutions and banks.
- The Partnership for Carbon Accounting Financials (PCAF) developed the Global GHG Accounting and Reporting Standard for the Financial Industry. The current edition of PCAF's Global GHG Accounting and Reporting Standard for the Financial Industry does not address land sector removals.
- The GHG Protocol is drafting carbon accounting guidance for land sector and removals guidance, which is expected to be aligned with the Science Based Targets Initiative (SBTi) and incorporated into PCAF's standard. Nuveen's timberland and farmland managers are pilot testing the GHG Protocol Land Sector and Removals Guidance.

Risk, return and carbon profiles of traditional and real assets

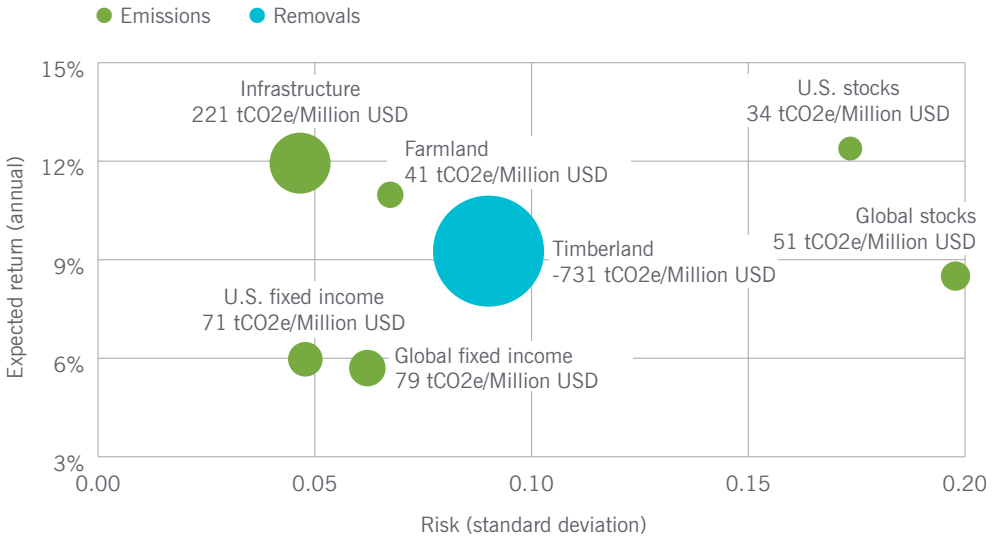
Not all asset classes are created equal when it comes to carbon intensity. They exist along a spectrum.

Figure 1 plots risk and return along the axes for a range of asset classes with the size and color of the circles representing the asset class's carbon intensity. For this analysis carbon intensity is defined as Scope 1 and 2 net CO_2 emissions divided by million USD invested.

The risk-return profile of traditional asset classes span the spectrum of lower risk and return for fixed income to the higher risk and return of equities. Real assets offer attractive risk-return characteristics within this range, providing higher returns than fixed income and lower risk when compared with stocks. It is important to note that real assets' risk may be understated given they are private market asset classes with fewer data points than publicly listed assets.

In terms of real assets' carbon intensity, infrastructure is the largest net emitter. Farmland has a considerably lower carbon footprint, while timberland is net negative with the ability to remove carbon from the atmosphere. Stocks and fixed income are also relatively low. It is worth noting that stock and bond indices comprise all sectors of the economy, which have a large variation in carbon intensities. For example, the utilities sector will likely have carbon intensities similar to that of private infrastructure, whereas the technology sector will likely have lower carbon intensities.

FIGURE 1: **Risk, return and carbon intensity**



Sources: MSCI; FactSet; Nuveen Real Assets. Asset class risk and return represented by the following indices: U.S. fixed income: Bloomberg US Aggregate Index; Global fixed income: Bloomberg Global Aggregate ex-USD Total Return Index, value unhedged USD; U.S. equities: Russell 300 Index; Global equities: MSCI ACWI ex-US Index; Infrastructure: MSCI Private Global Infrastructure Index; Farmland: NCREIF Farmland Index; Timberland: NCREIF Timberland Index. All returns in USD. Carbon intensity estimates are sourced from MSCI for the following indices: U.S. fixed income: Bloomberg US Aggregate Index; Global fixed income: Bloomberg Global Aggregate ex-USD Total Return Index, value unhedged USD; U.S. equities: Russell 300 Index; Global equities: MSCI ACWI ex-US Index; Infrastructure: S&P Global Infrastructure NR USD; Nuveen internal estimates for Farmland and Timberland.

Past performance is no guarantee of future results.

Note: All carbon intensities include scope 1 and 2 emissions and exclude scope 3. Timberland and farmland emissions exclude farm and forest management activities which are considered scope 3. Timberland removals are representative of average annual change in forest carbon stock for a portfolio that includes a mix of sustainable forestry and improved forest management strategies. Improved forest management strategies exhibit significant net removals whereas sustainable forestry strategies feature stable carbon stocks and do not have any net removals. Removals for improved forest management strategies are calculated by converting verified carbon credits of Nuveen-managed/administered properties into an annual rate of change in forest carbon stock. These rates of removals are not perpetual and may change over time as volume growth cannot exceed rate of harvest (and/or decomposition) perpetually.

The risk-return characteristics of the timberland portfolio from which carbon intensities are estimated may not exhibit that of NCREIF Timberland Index which includes primarily sustainable forestry strategies. The risk-return characteristics of the farmland portfolio from which carbon intensities are estimated may not exhibit that of NCREIF Farmland Index. The risk-return characteristics of the S&P Global Infrastructure Index from which carbon intensities are calculated may not exhibit that of the MSCI Private Global Infrastructure Index.

Adapting standard portfolio optimization model to incorporate carbon objectives

A portfolio optimization framework can help investors understand the trade-offs between risk, return and carbon intensity across different investment types, and it can be applied to a multi-asset class portfolio.

The portfolio optimization model starts with defining the investable universe — the set of all possible investment opportunities an investor could allocate to across the capital spectrum. Each one is defined by geography, management strategy, business model or product. For natural resources, this can also be by crop type or tree species.

Inputs into the traditional portfolio optimization model are the unique investment profile for each opportunity. This includes expected return, return variance and covariance with other opportunities in the universe.

The solution to the optimization problem is an efficient frontier, which describes the trade-offs between risk and return that are possible given a set of opportunities. Every point along the frontier is an optimal portfolio of investments, maximizing return for a given level of risk.

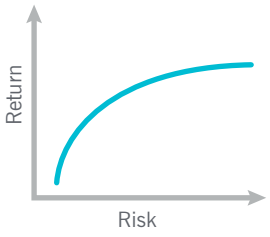
The carbon portfolio optimization model begins with a framework similar to the standard mean variance model, but it allows investors to consider trade-offs between risk, return and carbon intensity for each asset class or investment opportunity.

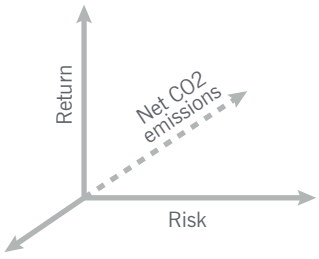
We define the investable universe as the set of traditional asset classes as well as private real assets. Every asset class in the universe has a unique profile described in terms of financial return, return variance and covariance with other opportunities, in addition to carbon intensity.

Similar to the standard portfolio model, the solution to the optimization problem is an efficient frontier, but it is optimized over three variables instead of two. As such, the efficient frontier becomes a three-dimensional surface. Every point along the carbon efficient frontier is an optimal portfolio investment that maximizes return for a given level of risk *and* carbon intensity.

FIGURE 2: **The similarities and differences between a standard portfolio model and a carbon portfolio model**

	Standard portfolio model	Carbon portfolio model
Framework	Analytical framework for evaluating investment opportunities and maximizing risk-adjusted returns through optimal portfolio design.	Analytical framework for evaluating investment opportunities and maximizing **climate benefits** *and* risk-adjusted returns through optimal portfolio design.
Inputs	Expected return, return variance, and covariance across investment opportunities.	**Quantified carbon metrics,** expected return, return variance, and covariance across investment opportunities.
Outputs	Risk-return efficient portfolios of investments at every level of expected return or risk tolerance.	**Carbon-risk-return** efficient portfolios of investments at every level of net CO_2 emissions, expected return or risk tolerance.





Source: Nuveen

Notes on model and results: The results from this modeling exercise should be considered broadly illustrative and not specific investment recommendations. Data limitations, such as the relatively short time series, self-reporting and a smoothing effect from periodic appraisals, are likely to understate actual volatility of private real assets returns. Additionally, carbon accounting standards continue to improve and evolve, which will inform carbon intensity metrics for both modeling and performance toward climate commitments. Traditional mean-variance optimization has well-known drawbacks that are not tied to a specific asset class, including the assumption that returns are normally distributed and reliance on historical returns that cannot predict future results.

Optimizing for carbon with real assets: three observations

The question of how private real assets impact the risk and return attributes of a portfolio of stocks and bonds is one that has been examined closely.[8] Investors are also asking: How do real assets impact the carbon intensity of a portfolio of stocks and bonds?

Observation 1:

The addition of real assets improved the risk-adjusted returns of a traditional stocks and bond portfolio but had a mixed effect on carbon intensity. Adding timberland and farmland reduced carbon intensity, whereas adding infrastructure increased carbon intensity.

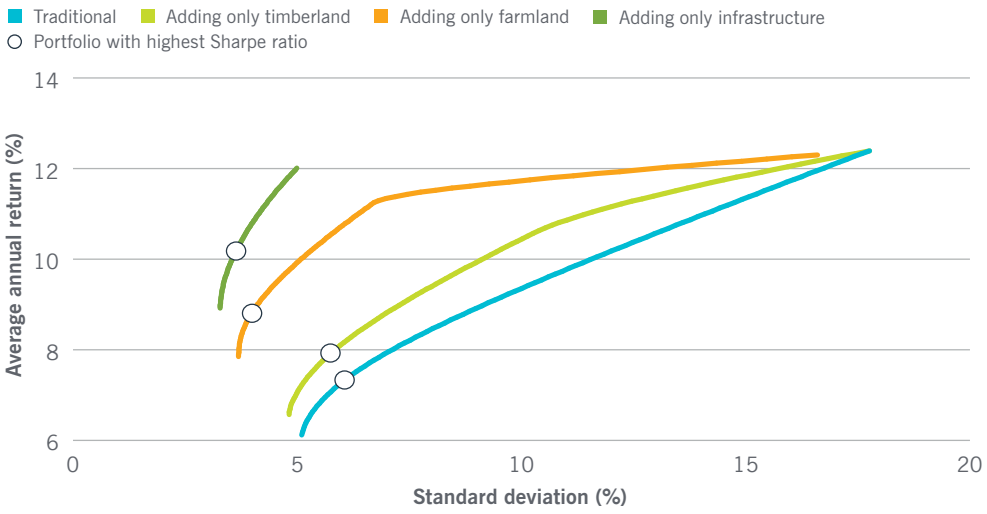
In Figure 3, efficient frontiers show the impact of adding farmland, timberland and infrastructure individually to a stock and bond portfolio. The table also shows the impact of combining all three categories. In this example, we constrained real assets to 15%, divided evenly at 5% in each.

Results

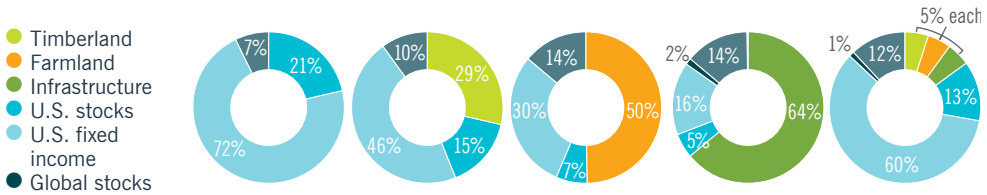
- Each category of real assets increased returns, with similar or lower levels of risk, resulting in higher Sharpe ratios.
- The addition of timberland to a traditional portfolio produces the greatest reduction in carbon intensity.
- The addition of infrastructure to a traditional portfolio produced the greatest increase in Sharpe ratio.

FIGURE 3: **Real assets' risk-return performance and carbon intensity — individually and combined**

Standard portfolio model



Comparing risk, return, Sharpe ratios and carbon intensity (1991 – 2020)



	100% traditional portfolio	Adding only timberland	Adding only farmland	Adding only infrastructure	Adding all real assets, fixed at 5% each
Expected return (%)	7.33	7.87	8.86	10.15	7.50
Standard deviation (%)	6.03	5.67	4.00	3.63	4.76
Sharpe ratio	0.77	0.91	1.54	2.06	1.01
Carbon intensity (tCO_2e/MM USD)	63.6	-165.2	54.8	165.6	32.9

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information. Allocations may not sum to 100% due to rounding.

Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.

Sources: NCREIF, FactSet, Nuveen, LLC.

Past performance is no guarantee of future results.

Observation 2:

In a portfolio consisting only of private real assets, infrastructure and farmland dominated from a risk-return perspective (Figure 4). However, achieving a net zero portfolio required a greater allocation to timberland than indicated by the traditional optimization model (Figure 5).

Standard portfolio model results

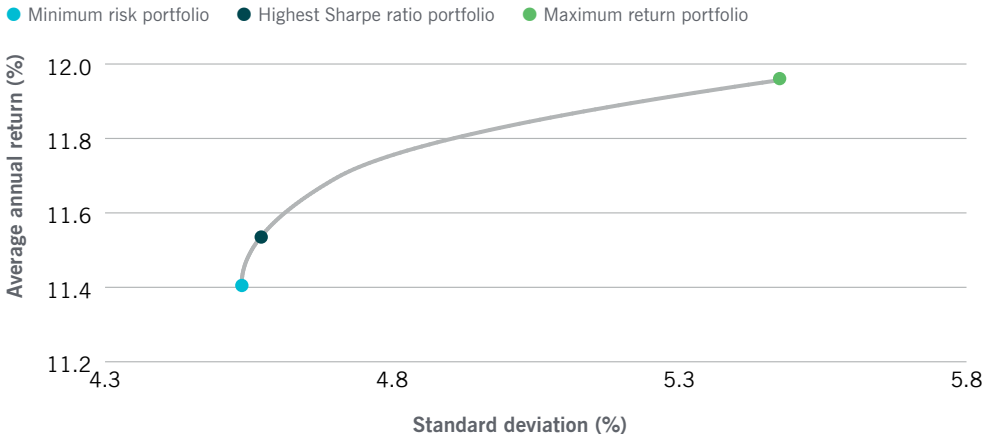
- The most risk-efficient portfolio was dominated by infrastructure at 67%, but also included 28% farmland and 5% timberland, benefitting from low correlations among the categories.
- The lowest-risk portfolio reduced infrastructure exposure to 62%, held farmland constant at 28% and increased timberland to 10%.
- The highest-return portfolio consisted of 100% infrastructure, reflecting higher returns and lower volatility compared to timberland and farmland.
- Overall, the most efficient real asset portfolio generated much higher risk-adjusted returns than the most efficient combination of traditional stocks and bonds. However, the highest Sharpe ratio real assets portfolio also had twice the carbon intensity of the stock and bond portfolio.

Carbon portfolio model results

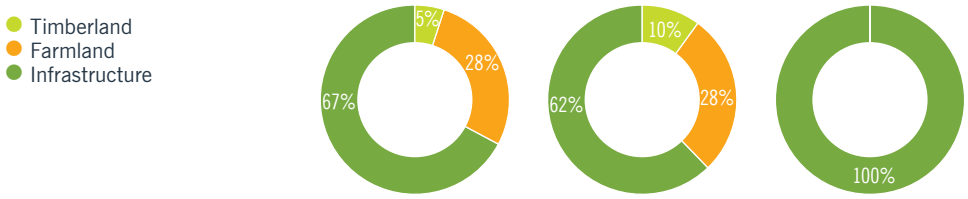
Solving the carbon portfolio model demonstrates that achieving a net zero portfolio requires a greater allocation to timberland, with its net negative carbon profile. Solving the carbon portfolio optimization model for net zero gives a Sharpe ratio maximizing portfolio that includes 18% allocation to timberland and a 57% allocation to infrastructure. This is the optimal net zero portfolio, achieving the target carbon intensity most efficiently.

FIGURE 4: **Structuring a portfolio of timberland, farmland and infrastructure**

Standard portfolio model



Portfolios on the efficient frontier



	Highest Sharpe ratio portfolio	Minimum risk portfolio	Maximum return portfolio
Average annual total return (%)	11.54	11.41	11.96
Standard deviation (%)	4.58	4.54	5.48
Sharpe ratio	1.93	1.92	1.69
Carbon intensity (tCO2e/MM USD)	119.0	75.5	220.7

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information. Allocations may not sum to 100% due to rounding.

Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.

Sources: NCREIF, FactSet, Nuveen, LLC.

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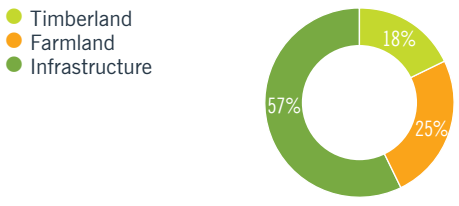
FIGURE 5: **Net zero portfolio with highest Sharpe ratio**

Carbon portfolio model



Average annual total return (%)	11.21
Standard deviation (%)	4.63
Sharpe ratio	1.84
Carbon intensity (tCO_2e/MM USD)	0.00

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information.

Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.

Sources: NCREIF, FactSet, Nuveen, LLC.

Past performance is no guarantee of future results.

Real assets provide a source of uncorrelated returns and low or even negative carbon intensity but how much real assets exposure is reasonable for institutional investors?

Observation 3:

Including real assets, even when constrained within practical limits, improved performance and achieved net zero outcomes across the institutional portfolio.

Real assets are expected to continue their recent steady growth. Estimates of alternative exposure for institutional investors vary from a "typical" allocation of 16%, to 26% for pension plans and over 50% for U.S. foundations.[9] Institutions are increasing their exposure to alternatives in an effort to increase current income and risk-adjusted returns, dampen volatility and meet specific needs, such as portfolio decarbonization.

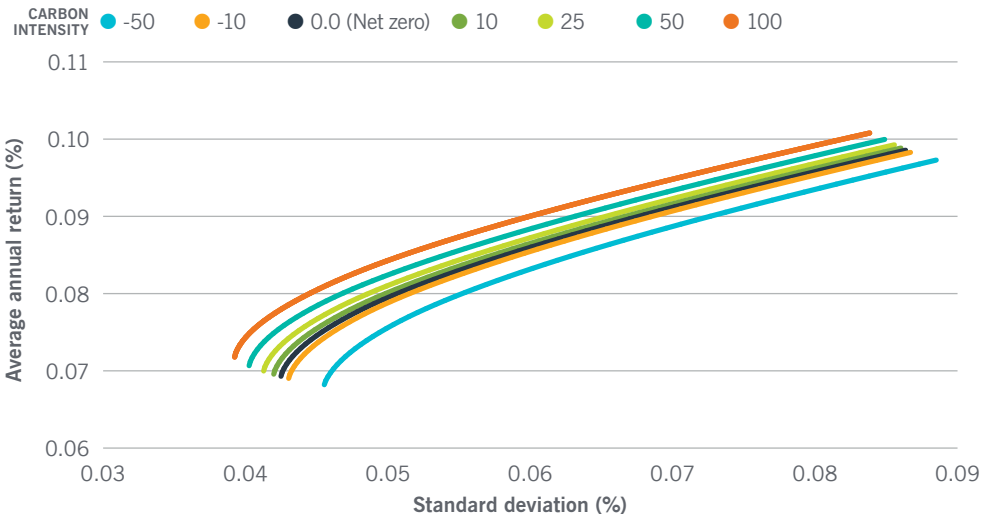
The carbon portfolio model can determine two things. First, it indicates whether it is feasible to achieve a net zero institutional portfolio through an allocation to real assets when real assets exposure is limited to 20%. Second, it identifies the allocation across timberland, farmland and infrastructure that achieves net zero most efficiently, without sacrificing any element of risk-adjusted return.

Results

- With a 20% allocation to real assets, it is possible to achieve a net zero or even net negative institutional portfolio.
- The net zero portfolio with the highest Sharpe ratio has a 9% allocation to timberland, 8% to farmland and 4% to infrastructure (Figure 7).
- Overall, the most efficient net zero portfolio generated much higher risk-adjusted returns than the most efficient combination of traditional stocks and bonds (see the 100% traditional portfolio in Figure 3) and drove portfolio carbon intensity down from 63.6 tCO_2e/MM USD to zero.
- The net zero portfolio with the highest Sharpe ratio outperformed other net zero portfolios by nearly 70% more risk-adjusted return.

FIGURE 6: **Carbon efficient frontiers limiting real assets exposure to 20% of traditional portfolios (1991 – 2020)**

Carbon portfolio model



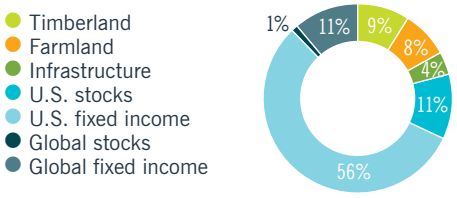
Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information.

Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.

Sources: NCREIF, FactSet, Nuveen, LLC.

Past performance is no guarantee of future results.

FIGURE 7: **Net zero portfolio with highest Sharpe ratio**



Average annual total return (%)	7.59
Standard deviation (%)	4.60
Sharpe ratio	1.07
Carbon intensity (tCO_2e/MM USD)	0.0

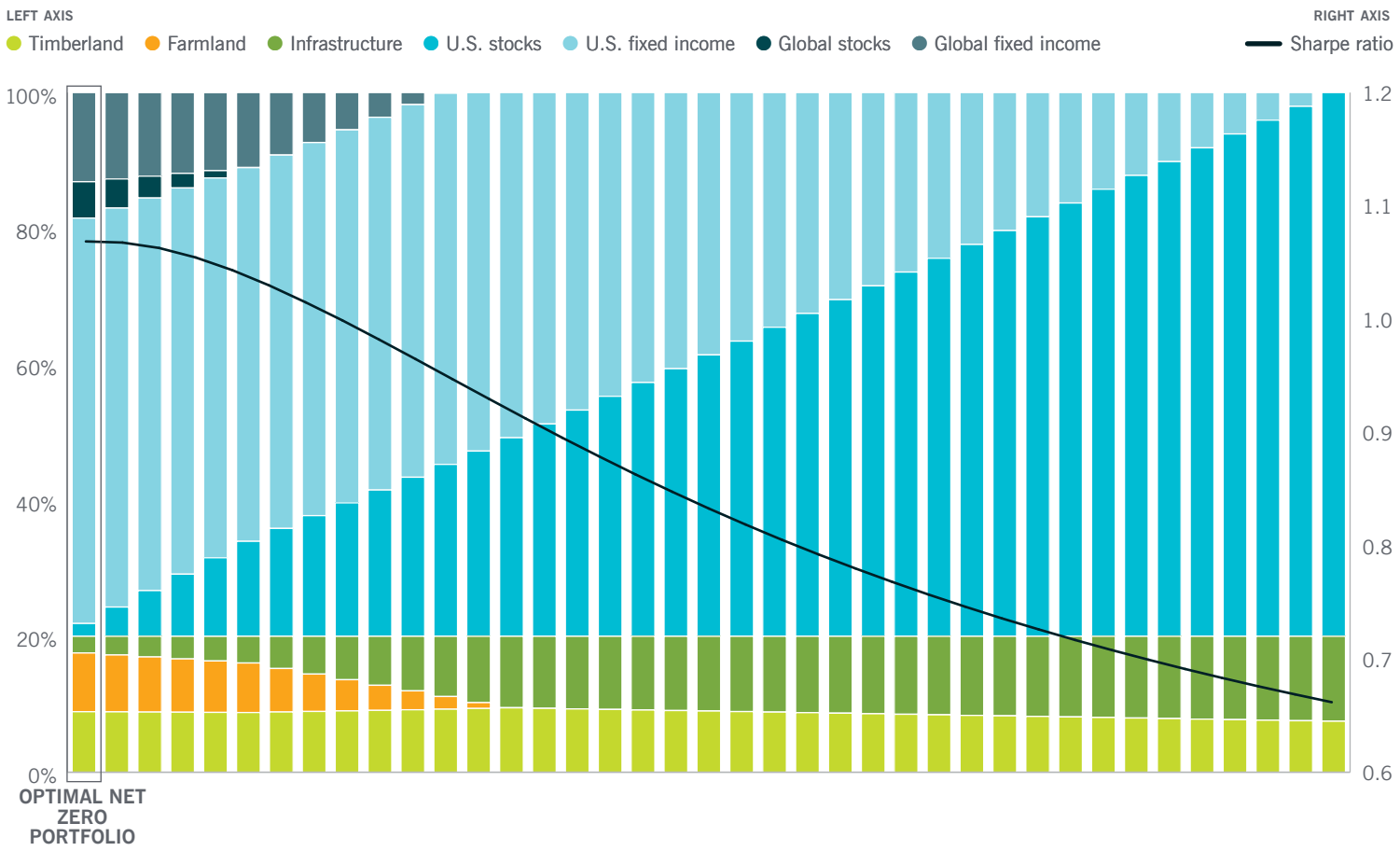
Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information.

Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.

Sources: NCREIF, FactSet, Nuveen, LLC.

Past performance is no guarantee of future results.

FIGURE 8: **Net zero efficient portfolio allocations**



Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2020. See notes to Figure 1 for representative indexes and carbon intensity information. Mean-variance optimization based on historical returns is intended for illustration purposes only and should not be considered investment recommendations.
Sources: NCREIF, FactSet, Nuveen, LLC.
Past performance is no guarantee of future results.

Figure 8 describes the portfolios along the net zero efficient frontier. Every portfolio shown above delivers net zero emissions, but only one maximizes the Sharpe ratio. As specified in Figure 7, the optimal net zero portfolio includes a mix of timber, farmland, infrastructure, stocks and bonds.

Results

- Across the net zero efficient frontier, portfolios include a stable allocation to timberland, which serves as the source of negative emissions that balances positive emissions from other allocations.
- All portfolios also include a positive allocation to infrastructure, indicating that divestment from this relatively carbon intensive asset class is not required to achieve net zero. Allocations to lower carbon intensive asset classes, such as timberland and farmland, balance infrastructure's positive emissions.
- The optimal net zero portfolio achieves the emissions target most efficiently, suggesting that climate targets do not necessarily come at the expense of risk-adjusted returns. It is important to note, however, the results also suggest that avoiding material trade-offs to achieve net zero are driven largely by the inclusion of timberland, which can deliver net removals while also offering compelling risk-adjusted returns.

Investment implications and conclusions

The crux of this analysis is to understand what trade-offs may be required in terms of financial performance and climate objectives. It provides a framework for incorporating carbon metrics and climate targets into portfolio allocation decisions, and for optimizing across risk, return and carbon intensity.

Understanding what the trade-offs are and knowing that we can quantify and measure risk, return and carbon in a unified framework makes it possible to use this information to inform portfolio design for net zero. The analysis shows that a net negative institutional portfolio can be achieved by increasing allocations to low-carbon intensity private real assets, such as timberland and farmland.

This research shows that unconstrained by asset allocation limits and carbon intensity, infrastructure tended to dominate timberland and farmland, based on historical returns. The resulting large allocations suggested by the portfolio optimization model require practical constraints to address availability, prudent diversification and liquidity needs.

That said, even adjusting for these features, the modeling exercise showed that infrastructure still had a role to play in a net zero portfolio despite its relatively high carbon intensity. This was at a lower level than when unconstrained and required an increased allocation to timberland. An extension of this paper's analysis may include a discrete look at low and zero carbon infrastructure sub-sectors that may support a higher relative allocation to infrastructure even when carbon emissions are taken into consideration.

Overall, results support the case for diversifying traditional stock and bond portfolios with multiple categories of real assets within realistic limits. A combined allocation of 20% significantly improved portfolio risk-adjusted returns and was sufficient to achieve a net zero carbon intensity.

APPENDIX:

Nuveen's work with the Impact Management Project

In 2020, Nuveen applied insights from the Impact Frontiers approach to a broader set of real asset classes, such as farmland, timberland and infrastructure, to focus on climate impact in the context of optimizing for net zero carbon emissions.

Impact Frontiers, an initiative of the Impact Management Project, is a learning and innovation collaboration of investors dedicated to advancing the integration of impact into financial frameworks, processes and decision-making. The Impact Management Project provides a forum for building global consensus on how to measure, manage and report impacts on sustainability. It is relevant for enterprises and investors who want to manage environmental, social and governance (ESG) risks, as well as those who also want to contribute positively to global goals.

In 2018, Impact Frontiers invited Nuveen and other impact investing organizations to participate in a two-year collaborative project to pioneer new ways to integrate impact management with financial management. Nuveen developed an impact rating aligned with the United Nations' Sustainable Development Goals for its private equity and affordable housing impact investing strategies, which it uses as a management tool to maximize positive impact while meeting risk-return objectives.

Investing with Nuveen

Nuveen offers solutions for a range of institutional investors. We provide investors access to liquid and illiquid alternative strategies, such as real estate, real assets (farmland, timber, infrastructure), private equity and debt, in addition to both traditional and fixed income assets. Access to these strategies includes pooled funds, separate accounts and co-investment opportunities. Our heritage as a pension fund means we understand the challenges other like-minded investors face. We have successfully been investing through market cycles for more than 100 years, for both ourselves and our investment partners. We work closely with our clients to understand their requirements and develop forward-thinking investment opportunities. Short-lived market cycles, evolving investor needs and sustainability pressures bring significant opportunities and challenges. We focus on three investor objectives across all of our client solutions:

- Generating income and capital growth
- Managing risk in a world of ongoing uncertainty
- Managing assets cost-effectively via optimal scale and access

For more information, please visit nuveen.com.

Endnotes

1 The authors acknowledge the work of Nuveen colleagues and Impact Management Project, which informed this analysis. See Appendix for details.

2 Griscom et al., 2017; Bastin et al., 2019; Busch et al., 2019; Fargione et al., 2018. *The Nature-Based Solutions for Climate Manifesto,* developed for the UN Climate Action Summit, 2019.

3 Griscom et al., 2017; Bastin et al., 2019; Busch et al., 2019; Fargione et al., 2018. *The Nature-Based Solutions for Climate Manifesto,* developed for the UN Climate Action Summit, 2019.

4 Vivid Economics and Energy Transition Advisers, Climate change: Preparing for an Inevitable Policy Response, May 2020.

5 Busby et al. *Resiliency and diversification from uncorrelated market exposure*, Nuveen, May 2021. The real assets analyzed were farmland, timberland and real estate.

6 Pricing data for private investments is reported less frequently than for publicly listed investments and often after the time of transaction.

7 Busby et al. *Resiliency and diversification from uncorrelated market exposure,* Nuveen, May 2021.

8 Busby et al. *Resiliency and diversification from uncorrelated market exposure,* Nuveen, May 2021.

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Sources

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