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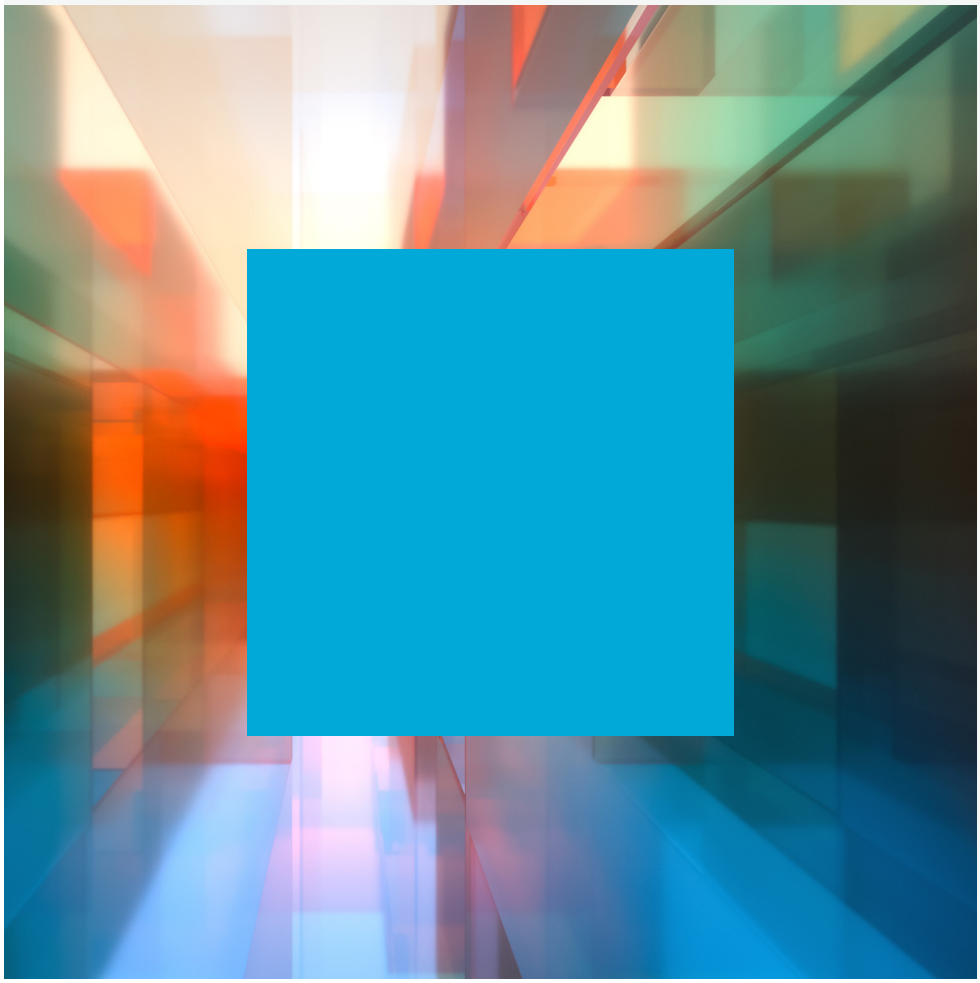
Think private real assets | January 2023

The power of private real assets



HIGHLIGHTS

- Private real assets are a powerful source of diversification for institutional investors. Private investments in the relatively illiquid categories of real assets — farmland, timberland, infrastructure and commercial real estate — have exhibited low or negative correlations to stocks and bonds. For the past three decades, real assets have generated higher returns than traditional investments, with significantly lower volatility.
- Portfolio optimization using 30 years of performance data demonstrates private real assets' potential to improve the risk-adjusted returns of traditional stock-bond portfolios, and to diversify risks associated with publicly traded commodities, infrastructure stocks and real estate investment trusts (REITs).
- Results supported combining multiple categories of real assets and constraining overall allocations within practical limits, such as 10% or 20%.
- Responsible investing within private real assets poses a different set of challenges and opportunities for investors.

Private real assets are a powerful tool for institutional investors.

Our latest research demonstrates private real assets' potential to deliver uncorrelated returns, making them a key element for diversifying portfolio risk.

Real assets can also play a role in tackling some of the big issues investors currently face, particularly the increasingly inflationary environment and the growing demand for sustainable investments.

Surging energy and food prices, coupled with labor shortages in many developed economies, are fueling inflation pressures, leaving investors grappling with higher rates and continued economic uncertainty. Real assets can help given they offer a combination of inflation-hedging and defensive properties. Our analysis shows how adding them to a traditional portfolio can reduce volatility while achieving compelling returns.

Our previous analysis recognized the growing use of real assets among institutional investors.[1] This updated paper now includes infrastructure alongside real estate, farmland and timberland, reflecting the increasing interest in this sub-asset class. Our findings demonstrate private infrastructure shares a similar capacity as the other private real asset classes to deliver uncorrelated returns and diversification benefits.

We also consider how real assets can incorporate responsible investing practices and help investors achieve their responsible investment goals on page 13. Marc deBree, head of real estate and alternative assets at TIAA, discusses this on page 11 and shares the TIAA General Account's experience of investing in private real assets.

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How real assets can improve traditional portfolios

Results of our analysis support the long-term investment thesis that real assets have potential to improve the performance 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 (Figure 1). 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.[2]

Inflation hedging: Real assets have provided a strong hedge against inflation as demonstrated by long-term returns that have far outpaced the inflation rate. Many commodities, such as foodstuffs and raw materials, are components of inflation measures, such as the Consumer Price Index (CPI), and as prices rise so do the revenues and cash yields for real assets producing these commodities. Over time, rising commodity prices increase the profitability of timberland and farmland, causing land values to rise and providing a long-term hedge against inflation. As Figure 2 shows, since 1991, timberland and farmland returns have average annualized returns of 9.2% and 10.9%, respectively — more than double the inflation rate of 2% to 4% during the same time period.[3] Similarly, real estate hedges inflation through annual lease escalations, and the rising value of buildings and land in desirable locations. While some infrastructure assets may also have payments linked to price levels, often the necessity-based nature of these assets means they have a defensive role in portfolios during challenging economic environments.

FIGURE 1: **Correlations of real assets, commodities and REITs (1991 – 2021)**

Real assets had low correlations to other asset classes — and to each other

	Stocks		Bonds		Private real assets					Public real estate, commodities and Infrastructure			
Market Indexes	U.S.	Non-U.S.	U.S.	Global	Real estate	Farmland	Timberland	Developed Infra	Global Infra	U.S. REITs	Agriculture	Timber proxy	Public Infra
U.S. stocks	1.00												
Non-U.S. stocks	0.78	1.00											
U.S. bonds	-0.10	-0.30	1.00										
Global bonds	0.05	0.04	0.71	1.00									
Private real estate	0.18	0.16	-0.25	-0.24	1.00								
Private farmland	-0.03	0.15	-0.27	-0.21	0.40	1.00							
Private timberland	0.13	0.14	0.19	0.17	-0.02	0.28	1.00						
Private Developed Infra	0.51	0.50	-0.37	-0.03	0.77	0.24	0.28	1.00					
Private Global Infra	0.28	0.45	-0.43	-0.24	0.31	0.24	0.00	0.84	1.00				
U.S. REITs	0.55	0.52	0.13	0.10	0.15	-0.01	0.02	0.44	0.30	1.00			
Agriculture commodities	0.30	0.34	0.04	0.32	0.14	-0.01	0.10	0.40	0.27	0.25	1.00		
Timber commodities proxy	0.67	0.75	-0.21	0.01	0.01	-0.15	-0.01	0.42	0.32	0.57	0.26	1.00	
Public Infra	0.76	0.90	-0.11	0.24	0.42	0.19	0.19	0.57	0.66	0.75	0.35	0.73	1.00

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Dec 1991 through 31 Dec 2021 unless otherwise stated. Asset classes reflect the following indexes: U.S. stocks – Russell 3000 Index; non-U.S. stocks – MSCI ACWI ex USA Index; U.S. bonds – Bloomberg Barclays U.S. Aggregate Index; global investment-grade bonds – Bloomberg Barclays Global Aggregate Index; privately held U.S. commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index; publicly traded U.S. real estate investment trusts (REITs) – FTSE Nareit U.S. Real Estate Index; public agricultural commodities – S&P GSCI Agriculture Index; public timber commodities – a Timber proxy index created by Nuveen that combines the S&P Global Timber and Forestry Index (2004 – 2019) with the returns of companies representing 4% or more of the index between 1992 and 2003; developed infrastructure – Cambridge Developed Markets Infrastructure Index (data from 30 June 2003); global infrastructure – Cambridge Global Infrastructure Index (data from 30 June 1994); public infrastructure – S&P Global Infrastructure Index (data from 31 March 2002).

Sources: NCREIF, FactSet, Nuveen, LLC.

Higher risk-adjusted returns: For the past 30 years, real assets have provided similar or higher returns than stocks with much lower volatility, resulting in higher risk-adjusted returns, or Sharpe Ratios (Figure 2). Despite higher volatility, real assets generally provided similar or higher risk-adjusted returns than U.S. and global bonds.

Liability-matching characteristics: Real assets have potential to provide bond-like current income from contractual lease obligations and revenues from selling commodities. Long-term capital appreciation from rising land values may also help meet future liabilities.

Important differences in the sizes of investable markets

Significant differences in the sizes of investable markets across real assets have important implications for investors. The NCREIF indexes used as proxies for U.S. markets represent only a fraction of the total investable markets for farmland and timberland, which are far less institutionalized than commercial real estate. (We relied on U.S. market indexes due to the absence of indexes representing markets for non-U.S. farmland, timberland and real estate.) Total assets included in the NCREIF indexes represent $13.8 billion for farmland, $24.0 billion for timberland and $834.2 billion for real estate, as of 31 Dec 2021.

In contrast, we estimate the overall size of the U.S. farmland market alone is about $2 trillion, with around $560 billion available to institutional investors. The NCREIF Farmland Index represents only the assets owned by institutions — the vast majority of the assets are held by individual farmers in a highly fragmented market with high barriers to entry. Differences in historical returns among real asset categories may partly reflect different levels of market development, contributing to higher returns for the less developed. The global opportunity set for real estate also exceeds its NCREIF index market capitalization, with MSCI estimating the value of professionally managed real estate at $11.4 trillion as at 31 December 2021.

Estimating the size of the investable infrastructure market is also difficult. The data set used in our analysis estimates the total market capitalization is $346 billion. However, this only reflects committed capital, which arguably underestimates the size of the investment opportunity. The World Bank, for example, calculated that the pipeline of projects in emerging and developing economies to be around $1.2 trillion in investable infrastructure projects across sustainable infrastructure. Additionally, historical risk-return data for infrastructure is less readily available than for other private real assets. We use time series data from Cambridge and S&P which begin in 1994, 2002 and 2003 (see notes for Figure 1). The data sets for the other asset classes in the analysis date back to 31 December 1991.

Due to the differences in the sizes of investable markets, we have therefore chosen to constrain allocations to real assets in several modeled scenarios to reflect real-world capacity constraints and liquidity concerns facing institutional investors.

FIGURE 2: **Performance of real assets, commodities and REITs (1991 – 2021)**

Real assets had higher risk-adjusted returns versus most other asset classes

	Stocks		Bonds		Private real assets					Public real estate, commodities and Infrastructure			
Market Indexes	U.S.	Non-U.S.	U.S.	Global	Real estate	Farmland	Timberland	Developed Infra	Global Infra	U.S. REITs	Agriculture	Timber proxy	Public Infra
Mean (%)	12.21	8.10	5.69	5.41	8.24	10.90	9.20	10.07	4.40	12.36	0.31	10.23	11.24
Standard Deviation (%)	17.24	18.95	4.45	5.83	7.89	6.73	9.53	9.49	14.63	19.70	20.00	22.83	18.72
Sharpe Ratio	0.56	0.29	0.69	0.48	0.71	1.23	0.69	0.79	0.12	0.49	-0.12	0.33	0.46

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1992 through 31 Dec 2021. See Figure 1 notes for the indexes representing asset classes.
Sources: NCREIF, FactSet, Nuveen, LLC.

Portfolios shown in this analysis are designed to provide an analytical framework and illustrations and should not be considered investment recommendations.

Structuring a portfolio of real assets

While the case for real assets is compelling, they raise difficult implementation questions: How should investors structure a portfolio of real assets? How might allocations change for different investor risk and return preferences?

No single optimal allocation fits all risk profiles. Allocations should reflect individual investment objectives, risk tolerance and liquidity needs. We used mean-variance optimization analysis to show the potential impact of real assets on a range of portfolios representing different risk profiles and constraints. Portfolios shown in this analysis are designed to provide an analytical framework and illustrations and should not be considered investment recommendations. The analysis is based on the following scenarios:

- Adding real assets individually — and as a group — to a portfolio of stocks and bonds
- Comparing real assets with publicly traded commodity stocks, infrastructure stocks and REITs when added to a portfolio of stocks and bonds
- Structuring a real assets portfolio for different investment objectives
- Constraining real assets allocations within practical limits in conservative and aggressive portfolios

Observations from mean-variance optimization analysis

Observation 1

Real assets improved the risk-adjusted returns of a portfolio of traditional stocks and bonds

Institutional investors are posing a basic question: How do private real assets impact the risk and return attributes of a portfolio of stocks and bonds? In Figure 3, efficient frontier charts show the impact of adding farmland, timberland, real estate and infrastructure individually to a stock/bond portfolio. In the table, we also show the impact of combining all four categories. In this example, we constrained real assets to 20%, divided evenly at 5% in each.

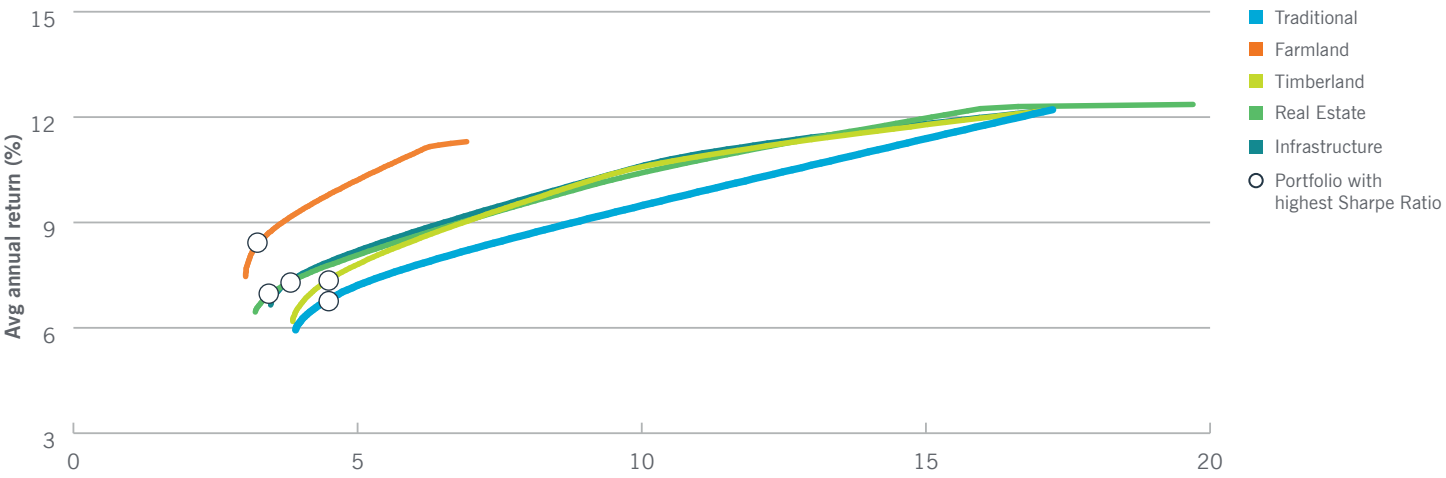
Results

- Each category of real assets increased returns, with similar or lower levels of risk, resulting in higher Sharpe Ratios.
- Farmland had the greatest impact on returns and received the largest allocation in an unconstrained portfolio at 49%. Real estate and infrastructure at 31% had the second-biggest impact on returns, followed by timberland at 26%.
- Diversifying a stock/bond portfolio with a 5% allocation to each of the four real assets increased annual returns by 25 basis points and reduced risk by 96 basis points, producing a higher Sharpe Ratio.

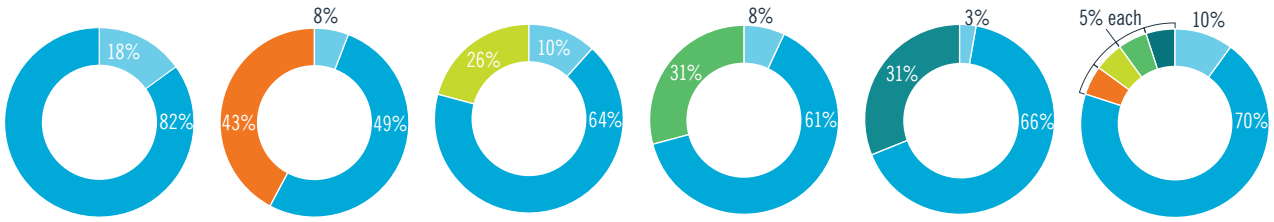
Overall, results support the case for diversifying traditional portfolios with multiple categories of real assets even when constrained within realistic limits. The constraints reflect supply limitations, the relative illiquidity of real assets, their relatively high transaction costs, and the limited history contained in the analysis.

FIGURE 3: **Real assets' performance impact — individually and combined (1991 – 2021)**

Real assets increased risk-adjusted returns of traditional portfolios



Comparing returns, standard deviations and Sharpe Ratios (1991 – 2021)



	100% Traditional portfolio*	Adding only farmland	Adding only timberland	Adding only commercial real estate	Adding only infrastructure	Adding four categories of real assets, fixed at 5% each (20% combined)
Allocation representing highest risk-adjusted return, based on Sharpe Ratio						
Average annual total returns (%)	6.80	8.45	7.31	6.94	7.24	7.05
Standard deviation (%)	4.48	3.28	4.43	3.45	3.73	3.52
Sharpe Ratio	0.94	1.78	1.06	1.26	1.24	1.27

*Allocations for the traditional stock/bond portfolio are a result of the mean variance optimization exercise.

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1991 through 31 Dec 2021. Asset classes represent the following indexes: stocks – Russell 3000 Index and MSCI ACWI ex USA Index; bonds – Bloomberg Barclays U.S. Aggregate Index and Bloomberg Barclays Global Aggregate Index; privately held U.S. commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index; developed infrastructure – Cambridge Developed Markets Infrastructure Index (data from 30 June 2003); global infrastructure – Cambridge Global Infrastructure Index (data from 30 June 1994); public infrastructure – S&P Global Infrastructure Index (data from 31 March 2002).

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.

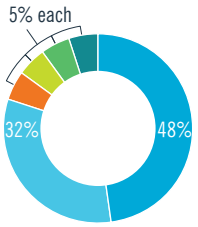
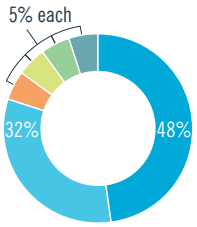
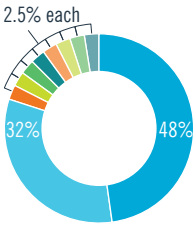
Observation 2

Private real assets provided higher returns with lower volatility than publicly traded commodities and real estate stocks

We compared private real assets with publicly traded commodity stocks and commercial REITs to assess diversification benefits against the illiquidity of private assets. Since many institutional investors already have exposure to REITs and commodities, such as metals or oil and gas, we also compared the impact of combining private real assets with public stocks. This analysis used fixed allocations and constrained alternatives to 20% of the portfolio, consistent with realistic limits.

Figure 4 compares three portfolios consisting of a fixed 80% in stocks and bonds in a 60/40 ratio, and 20% in alternative assets. Portfolio 1 adds four categories of private real assets, divided evenly at 5% each. Portfolio 2 adds four categories of publicly traded commodities, infrastructure and REITs, divided evenly at 5% each. Portfolio 3 combines private and public assets, split evenly at 2.5% each.

FIGURE 4: **Comparing real assets vs. public commodities, infrastructure and REITs in stock and bond portfolio (1991 – 2021)**

	Portfolio 1 Private real assets added to a 60% stock/40% bond portfolio	**Portfolio 2** Publicly traded commodities, infrastructure and REITs added to a 60% stock/ 40% bond portfolio	**Portfolio 3** Private real assets and publicly traded commodities, infrastructure and REITs added to a 60% stock/ 40% bond portfolio
Allocation representing highest risk-adjusted return, based on Sharpe Ratio			
Average annual total returns (%)	9.60	9.39	9.50
Standard deviation (%)	8.64	10.80	9.66
Sharpe Ratio	0.81	0.63	0.71

Stocks
Private timberland
Private farmland
Private real estate
Public infrastructure
Bonds
Public timber commodities
Public farm commodities
Public REITs
Private infrastructure

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1991 through 31 Dec 2021. Asset classes represent the following indexes: U.S. stocks – Russell 3000 Index; non-U.S. stocks – MSCI ACWI ex USA Index; U.S. investment-grade bonds – Bloomberg Barclays U.S. Aggregate Index; non-U.S. investment-grade bonds – Bloomberg Barclays Global Aggregate Index; privately held U.S. commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index; publicly traded U.S. real estate investment trusts (REITs) – FTSE Nareit U.S. Real Estate Index; public agricultural commodities – S&P GSCI Agriculture Index; public timber commodities – a Timber proxy index created by Nuveen that combines the S&P Global Timber and Forestry Index (2004 – 2020) with the returns of companies representing 4% or more of the index between 1987 and 2003; developed infrastructure – Cambridge Developed Markets Infrastructure Index (data from 30 June 2003); global infrastructure – Cambridge Global Infrastructure Index (data from 30 June 1994); public infrastructure – S&P Global Infrastructure Index (data from 31 March 2002).

Sources: NCREIF, FactSet, Nuveen, LLC.

Results

- Private real assets increased portfolio returns and reduced volatility, resulting in a higher Sharpe Ratio, versus publicly traded commodity and infrastructure stocks, and REITs. This can be seen by comparing the performance of Portfolio 1 and Portfolio 2 in Figure 4.
- Private real assets helped to diversify the volatility risk of publicly traded commodities, infrastructure and REITs. This can be seen by comparing the performance of Portfolio 2 and Portfolio 3 in Figure 4. The combination of private and public assets in Portfolio 3 increased returns by 11 basis points and reduced volatility by 114 basis points, resulting in a higher Sharpe Ratio, compared to Portfolio 2.

Observation 3

Constraining real assets within practical limits still improved performance

How much real assets exposure is reasonable for institutional investors? Real assets are expected to continue their recent steady growth, with current portfolio allocations generally estimated at 5% to 10%, and endowments ranging up to about 15%. Additionally, institutions are increasing their exposure to alternatives in efforts to increase current income and risk-adjusted returns, dampen volatility, and meet specific needs, such as inflation protection.

Mean-variance optimization outputs may suggest extreme allocations to individual asset classes based on returns for the time period used as inputs. For most institutions, allocations exceeding 25% to individual real assets categories would be unrealistic. Most portfolios would lack sufficient liquidity to meet near-term spending obligations, and investors would have difficulty accessing enough farmland and timberland. Moreover, questions about the limitations and relatively short history of index data would argue against such large holdings in real assets.

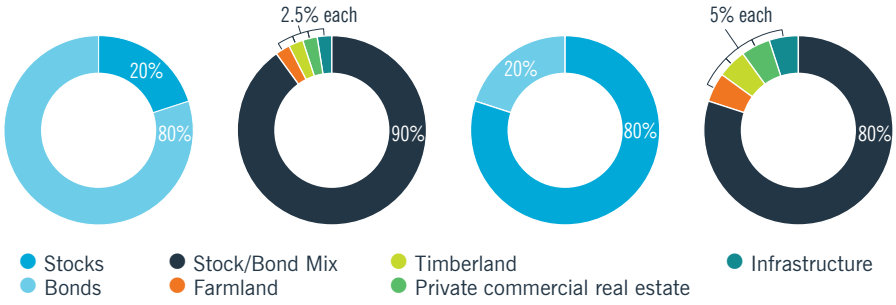
There is no single optimal allocation to real assets. It will differ based on the investor's specific risk profile. The next analysis considers two model portfolios representing a conservative allocation of 20% stock and 80% bonds and an aggressive allocation of 80% stock and 20% bonds. We limit the combined real asset allocation to 10% (2.5% per category) in the conservative portfolio and 20% (5% per category) in the aggressive portfolio.

Results

- Despite the allocation limits, real assets reduced volatility compared to only stock-bond portfolios — resulting in higher risk-adjusted returns (Figure 5).
- Overall, results show that, based on historical performance, investors could improve portfolio risk-adjusted returns with allocations that were fractions of the unconstrained allocations, but realistic for institutional investors.

FIGURE 5: **Limiting real assets exposure to 10% and 20% of traditional portfolios (1991 – 2021)**

Despite limits, real assets improved performance of conservative and aggressive portfolios

	Performance			
Portfolios	**Conservative portfolio (20% stock/80% bond)**	**Conservative portfolio + 10% real assets**	**Aggressive portfolio (80% stock/20% bond)**	**Aggressive portfolio + 20% real assets**
Allocations				
Average annual total returns (%)	6.94	7.18	10.91	10.65
Standard deviation (%)	4.65	4.24	13.72	11.38
Sharpe Ratio	0.93	1.08	0.61	0.71

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1991 through 31 Dec 2021. Asset classes represent the following indexes: stocks – Russell 3000 Index and MSCI ACWI ex USA Index; bonds – Bloomberg Barclays U.S. Aggregate Index and Bloomberg Barclays Global Aggregate Index; privately held U.S. commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index; developed infrastructure – Cambridge Developed Markets Infrastructure Index (data from 30 June 2003); global infrastructure – Cambridge Global Infrastructure Index (data from 30 June 1994); public infrastructure – S&P Global Infrastructure Index (data from 31 March 2002).

Sources: NCREIF, FactSet, Nuveen, LLC.

Observation 4

Positive role for all four asset classes in a private real asset-only portfolio constrained to reflect the real-world opportunity set

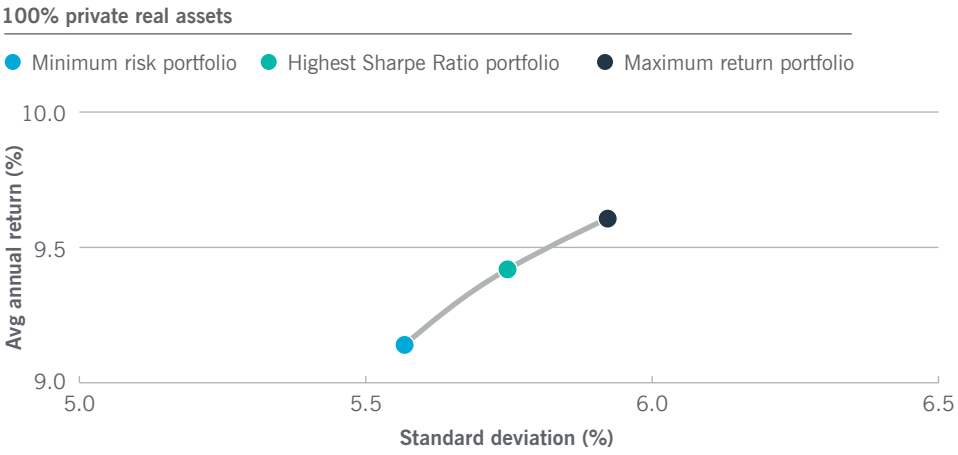
The next analysis shows how different asset categories work together in a portfolio consisting only of private real assets. We examined how the structure can change based on different investment objectives. An efficient frontier using farmland, timberland, real estate and infrastructure allowed comparison of three portfolios producing the highest efficiency, lowest risk and highest return (Figure 6).

Recognizing differences in the sizes of investable markets, we constrained allocations to farmland, timberland and infrastructure to better reflect the opportunity set, scale and liquidity concerns of institutional investors.

Results

- The Sharpe Ratio-maximizing, risk-efficient portfolio comprised real estate at 34% and farmland and timberland at 25%, and included 16% infrastructure.
- The lowest-risk portfolio increased real estate exposure to 50%, maintained farmland and timberland at 25% but had no exposure to infrastructure.
- The highest-return portfolio was the constrained portfolio with 25% exposure to each four real asset classes.
- All three real asset portfolios generated much higher risk-adjusted returns than the most efficient combination of traditional stocks and bonds. The most efficient real asset portfolio produced an additional 264 basis points of return and only increased standard deviation by 129 basis points.

FIGURE 6: **Structuring a portfolio of farmland, timberland, infrastructure and private real estate**



Portfolios on the efficient frontier	Performance (1991 – 2021) Minimum-risk portfolio	Highest Sharpe Ratio portfolio	Maximum-return portfolio
Allocations			
Farmland	25%	25%	25%
Timberland	25%	25%	25%
Private commercial real estate	50%	34%	25%
Infrastructure	0%	16%	25%
Average annual total returns (%)	9.14	9.44	9.60
Standard deviation (%)	5.57	5.77	5.92
Sharpe Ratio	1.17	1.19	1.18

Data are based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1991 through 31 Dec 2021. Asset classes represent the following indexes: privately held U.S. commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index; developed infrastructure – Cambridge Developed Markets Infrastructure Index (data from 30 June 2003); global infrastructure – Cambridge Global Infrastructure Index (data from 30 June 1994).

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

Source: NCREIF, Nuveen, LLC.

Investment implications — and conclusions

This analysis shows private real assets offer institutions compelling potential to enhance risk-adjusted returns. As long-term investments, their benefits provide some compensation for their relative illiquidity. They can combine bond-like income from asset leases or contracted cash flows, and equity-like returns from long-term appreciation in asset values. These features can support asset-liability matching, with potential for improved long-term portfolio returns to meet future obligations, and lower volatility of returns to meet current liabilities.

Our analysis provides directional guidance for incorporating private real assets in institutional portfolios:

Adding private exposure to any single category — farmland, timberland, infrastructure or commercial real estate — increased portfolio returns and reduced risk, resulting in higher Sharpe Ratios.

Private real assets offered superior risk-adjusted returns compared with publicly traded commodity and infrastructure stocks and REITs. In combination, private real assets helped to diversify the volatility of publicly traded commodities and infrastructure stocks and REITs, resulting in higher portfolio risk-adjusted returns.

Portfolios comprising only private real assets with allocations reflecting real-world constraints also produced better risk-adjusted returns than the traditional stock and bond portfolio.

Overall, results support the case for diversifying traditional portfolios with multiple categories of real assets within realistic limits. A combined allocation of only 10%, evenly divided among the four categories, significantly improved portfolio risk-adjusted returns compared with the conservative stock and bond portfolio.

These results should be considered broadly illustrative — not specific investment recommendations. As noted previously, data limitations — relatively short time series, self-reporting, and a "smoothing" effect from periodic appraisals — are likely to understate actual volatility of private real assets returns. 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. While these limitations are important to acknowledge, they do not undermine the potential for real assets benefits to persist in the future. First, long-term capital appreciation depends on inexorable global trends — population growth and urbanization — that drive steadily rising demand and diminishing supplies of food, wood products and high-quality commercial real estate. Second, real assets' low correlations and capacity to diversify risk are primarily a function of their being private, relatively illiquid, and not subject to public markets and speculative trading.

Challenges of investing in private real assets

High barriers to entry make it difficult for most institutional investors to undertake direct investments in private real assets, particularly farmland and timberland. Gaining access and managing complex risks require proven capabilities to address three major hurdles:

- **Lack of transparency.** Sophisticated due diligence capabilities are essential to analyze the potential profitability and cash-flow profile of assets in diverse regions around the globe.
- **Capital requirements.** Deep financial reserves are necessary to achieve scale economies, provide geographic diversification, and invest in technology and infrastructure.
- **Operational risks.** Investing in farmland and timberland involves a range of operational risks that include weather, pest damage, marketing perishable crops and complying with local regulations. Expertise in local markets and access to a network of local operators can allow investors to transfer operational risk and gain steady income through leasing contracts. Operating infrastructure assets also carries additional risks as highlighted in the Q&A on page 11. Commercial real estate requires investment scale for diversification and large staff to acquire and oversee holdings.

Addressing these challenges

Institutional investors seeking the potential benefits of these alternative asset classes should identify asset managers with specialized expertise, strategic partners, global scale and a track record of investment success.

Private real assets: an insurer's experience

Marc deBree, head of real estate and alternative assets at TIAA, discusses how and why the TIAA General Account invests in private real assets, and the challenges and solutions these assets pose in regards to portfolio construction, responsible investing and more.

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Why did the General Account begin investing in private real assets?

The General Account (GA) became a consistent equity holder of real estate assets in the 1990s, having been investing in commercial mortgages as far back as the 1930s. As we became more comfortable as a real estate equity investor, we looked for additional equity opportunities in other real assets.

Our first timberland investment was in 1998, driven by portfolio diversification goals, the promise of a good return and the opportunity to develop a business that could attract third-party capital. Our first farmland investment was in 2007, and our first infrastructure investment was the following year. At the end of the first half 2022, equity real assets including real estate were over 7% of the General Account portfolio.

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What are the benefits of adding real assets to an institutional portfolio?

We think of three primary features. The first two – income and capital appreciation – drive real asset returns and values. For core U.S. real estate, we expect long-term, unleveraged returns of around 6% to 7%. For non-core real estate, which the GA identifies as higher risk strategies, such as development and some alternative real estate sectors like life sciences, storage and single-family rentals, we expect about 8% to 10%, unleveraged over the long-term. Farmland and timberland offer a similar range of returns.

Infrastructure return expectations are a little higher but vary a lot depending on the type of asset. For U.S.-based core renewable energy assets, returns have been well less that 10%, but for international development infrastructure it can be in the mid-teens in some instances. However, current market conditions are resulting in evolving return expectations with overall return expectations increasing for new investments.

The third benefit is diversification from the lack of correlation that real asset ownership can bring to a large portfolio like the GA. Their low or negative correlations with traditional fixed income investments and their value as a diversified source of income and capital return are very important to us.

Q

What guidance can you give other institutional investors considering allocating to these private real assets?

The capital preservation and inflation-hedging components of real assets along with their ability to diversify your income streams are very real. And in a lot of cases, there are significant tailwinds behind these asset classes – a growing global population that consumes food and timber products, and the move toward a low-carbon economy supporting sustainable practices and renewable energy. These are important investment themes for many institutional investors.

But you really have to appreciate that these are complicated, illiquid investments, with return attributes that are very different from traditional stocks and bonds. Your success is highly dependent on the sophistication and skills of your advisor.

Q

How does the paper's analysis reflect the GA's thinking about its private real asset exposure?

The research supports our views that adding private real assets to our portfolio improves diversification, provides additional scope for income, and may help reduce overall portfolio volatility. We find this type of mean variance modeling to be useful when considering our allocations to alternatives, allowing us to understand the implications and quantify potential changes.

Q

How do you expect real assets to perform in the current environment of rising rates and inflation?

The cash generation aspects of real assets mean they are a stable source of income, often with revenues that adjust in some way for inflation. Short-term real estate leases, for example, can be marked to market and incorporate rising price levels when renewed. Others with a longer lease profile might have a fixed level of annual increase built in. And while some long-term leases may not reset for inflation, they still provide the benefit of an income stream in a challenging macro environment.

Farmland and timberland contracts are frequently tied to commodity prices. These assets have built-in hedging as they produce components of the basket of goods that make up consumer price indexes.

Inflation-related mechanisms can also be found in some infrastructure contracts, and those assets have the ability to perform well in a recession given their necessity-based nature, such as health services, power and transportation. Of course, it depends on what caused the downturn. Toll roads are usually resilient in a recession but COVID caused an unprecedented decline in road usage and revenues.

The lesson here is to expect pockets of underperformance in a downturn, but have a broadly diversified portfolio to ensure that weaker returns in one area are offset elsewhere. So while some infrastructure assets struggled in the pandemic, farmland and timberland values were stable, helping to preserve capital and avoid loss in the portfolio.

Q

What additional risks do you have with private real assets?

Think about owning a bridge or a power plant. Given how necessary they are to everyday life, if something goes wrong, you need asset managers that are able to resolve operational problems quickly. The critical nature of these services creates reputational risk if managed poorly. You also have legal and structuring risks, counterparty risk and concentration risks that you can more easily avoid or mitigate within a more traditional portfolio.

Partnering with an experienced asset manager makes a difference. They understand these challenges and how to solve for them. A robust and engaged risk team and a risk-oriented culture are important parts of our advisor relationships.

We rely on Nuveen as an advisor, but we also have a cross-functional group of experts at TIAA that provide an extra layer of risk management. It's a formal, consistent approach to appreciating and assessing the risks inherent in the specific assets which are then tracked as part of the asset's long-term management.

You also need to be comfortable with the illiquid aspects of private assets. These are long-term holdings that cannot be sold quickly on an exchange. So, having a long-term investment perspective and being able to stay invested through periods of underperformance are both important.

Q

How do you look at real assets from an ESG and responsible investment perspective?

For a long time, the GA has had a responsible investing policy. We apply ESG thinking to our investments across the board. Our real asset investments must fit in with our environmental. social and governance standards.

From an ESG perspective, especially on sustainability issues, that bar is getting higher each year. Some of our real asset investments go beyond baseline ESG expectations and target specific social and environment returns together with financial returns. Affordable housing is a good example of this.

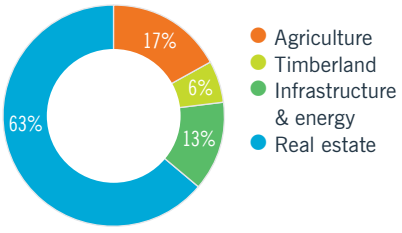
I'm proud to say TIAA has committed to making the General Account net zero carbon by 2050. Real assets have a role in helping to achieve this, for example, farmland's lower carbon intensity, timberland's ability to sequester carbon and the growing opportunities in renewable energy infrastructure.

FIGURE 7: **Allocations to real assets in the TIAA General Account (as of 30 June 2022)**

General Account total assets under management: $297.5 billion

Private real assets investments in the General Account: $21.2 billion

Allocations among real assets in the TIAA General Account



TIAA General Account
- Total assets: $297.5 billion
- Total statutory capital: $51.4 billion

Source: TIAA; figures may not sum to 100 due to rounding.

Past performance is no guarantee of future results.

How real assets play a role in responsible investing

As responsible investing becomes a priority for many institutional investors, understanding how environmental, social and governance (ESG) investment practices and outcomes can be incorporated into portfolios is increasingly important. We consider some of these issues as they relate to real assets and how real assets can move portfolios toward achieving ESG goals.

Environment: To align portfolios with effective environmental targets such as net zero carbon, a key consideration for any real asset is its carbon footprint and carbon intensity. The former reflects an absolute level of net greenhouse gas (GHG) emissions, while the latter is a metric used to show the CO2 emissions per U.S. dollar invested. The metrics offer some guidance into the state of an asset's environmental impact, and will vary widely among these assets.

For infrastructure and real estate assets, there is a distinction between the carbon emissions from materials and construction of the asset compared with those from operating it.

While building and operating properties will bring different footprints, there are ways to take an environmentally friendly route with both. These include incorporating sustainable material into construction. Other factors include fitting properties with high-efficiency lighting, and heating and cooling systems.

Carbon footprints from operating real estate can be reduced by features, such as renewable energy sources and employing green-lease clauses — which see tenants and owners agreeing to specific sustainability responsibilities during occupancy — into leases.

Real estate practices are actively seeking and delivering solutions, with several industry bodies setting standards for sustainable practices. And some infrastructure assets, such as wind farms, mass transport and recycling facilities, are a vital part of the transition to a low-carbon economy.

Currently, timberland is the only scalable technology available that can sequester and store carbon, resulting in its negative carbon footprint. Investments can generate verified carbon credits quantifying GHG emissions removals or avoided emissions, which could be traded or used as offsets for emissions in other areas of the portfolios. Farmland's carbon intensity is low, and is a natural home for sustainable land management practices.

Beyond carbon targets, other environmental factors to consider are the impact the assets will have on the surrounding area and wildlife, as well as water usage and waste management.

Social: Real assets can serve a range of social objectives but investing to create positive social impact requires a comprehensive understanding of how the assets affect the communities they are in.

Affordable housing provision is an obvious real estate example, but real estate also invests in communities providing building and spaces for a wide range of social and economic activities. Infrastructure, farmland and timberland can also serve community regeneration and job creation among other social objectives. And farmland is also able to target food security concerns.

Managing for social impact can suffer from a lack of universal standards that environmental metrics have garnered in recent years. Instead, social impact strategies rely on practical metrics for signs of progress. This includes the percentage of jobs created, the number of individuals trained, the diversity of employees by gender and or race, as well as the diversity of senior leadership and the direct company engagement with the wider community.

Governance: The private nature of real assets requires a different kind of engagement for investors, who are often closer to management than is the case for equity and bond investments. Exercising voting rights is a key part, but investors can use their influence to ensure the asset is managed in line with their ESG standards.

As ESG investing's importance has grown, so has the need to measure and report the difference that is makes. This is evolving with some sectors further ahead than others. Organizations like GRESB, an ESG-focused data provider, has helped in setting a universal standard for real estate and infrastructure, allowing investors to make informed decisions.

Real assets that take a proactive approach to deliver transparency will allow investors to judge long-term performance on both financial returns and ESG objectives.

Beyond the bottom line

Responsible investing within real assets poses a different set of challenges for the investment industry. Solving for those requires a constructive partnership between the investor and an asset manager who can leverage relationships, in-depth data and experience.

Real assets, arguably more than other asset classes, benefit from local knowledge. Investors should expect their managers to be expert on local areas, including the environmental, social and governmental implications, as well as on the global trends and regulations that affect the assets and investor portfolios.

Appendix

Data analysis methodology

Real assets categories

We selected four categories of real assets — farmland, timberland, infrastructure and commercial real estate — based on their history of superior risk-adjusted returns, compared to public investments. They have offered low or negative correlations with traditional assets in part because they are relatively illiquid, infrequently traded, or insulated from commodity speculation, such as options trading. In most cases, these real assets categories also have at least 25 years of index performance data as a reasonable foundation for analysis.

Methodology

The analysis used traditional mean-variance portfolio optimization (MVO), based on historical performance, standard deviation, and correlations of returns by asset class. Returns and standard deviation data represent eight indexes: four representing private real assets and four representing publicly traded commodities, infrastructure stocks and REITs (see Figure 8 for the list of indexes). Mean-variance optimization is a technique for determining the set of asset allocations providing the maximum return for a given level of risk. This set of portfolio allocations forms a curve known as the "efficient frontier." Our analysis is based on rolling one-year total returns, calculated on a quarterly basis. This approach maximizes the number of observations and avoids skewing caused by the seasonality of property appraisal data. Separately, we identified portfolios producing the highest risk-adjusted returns by comparing Sharpe Ratios. The latter reflect 1-year total return, minus 1-year Treasury bill rate, divided by the standard deviation of returns.

Data limitations

Data limitations require tempering conclusions. We relied on data representing U.S. markets for farmland, timberland and commercial real estate due to the absence of non-U.S. indexes. Indexes for private farmland, timberland and commercial real estate developed by the National Council of Real Estate Investment Fiduciaries (NCREIF) are the best available market proxies, but do not represent the total size of the investable markets. Nonetheless, we believe the results of our analysis are broadly applicable to non-U.S. real assets markets, excluding currency effects. NCREIF data for private real assets are based on periodic independent external appraisals and internal updates — not sales transactions. This methodology tends to smooth the volatility of returns. Finally, mean-variance optimization results may be highly sensitive to changes in input assumptions. As a result, our optimization results should be considered broadly illustrative and directional, rather than predictive or precise.

Time period dependency

The time period for our analysis, 1991 to 2021, or 30 years, represents the longest track record common to most of the asset classes. This period includes events with significant impact on financial markets and capital flows. The 1990s experienced the longest U.S. expansion (10 years) in the past 150 years, while the 2007–2009 recession was among the longest in the past 50 years. Changing economic conditions affected the performance of traditional and real assets alike. However, unlike traditional asset classes, real asset classes were relatively undiscovered by investors in the 1990s and early-2000s, and market inefficiencies allowed for higher returns in these early years. Additionally, there is evidence that the low and negative correlations between traditional and some real asset sectors observed in the 1990s and early-2000s are diminishing. To test the impact of time period dependency, we performed the same analysis for the most recent decade, 2012–2021. MVO modeling confirmed our results from the 30-year period that real assets improved risk-adjusted returns when added to traditional stock-bond portfolios.

FIGURE 8: **The analysis used eight indexes: four representing private real assets and four representing publicly traded commodities and REITs**

	Index	
Sub-asset class	**Private (direct exposure)**	**Public**
Real Estate	NCREIF Property Index	FTSE Nareit U.S. Real Estate Index
Farmland	NCREIF Farmland Index	S&P GSCI Agriculture Index
Timber	NCREIF Timberland Index	Proxy index based on a combination of S&P Global Timber and Forestry Index (2004 – 2020) and returns for companies representing 4% or more of the index between 1992 and 2003
Infrastructure	Cambridge Developed Markets Infrastructure Index	S&P Global Infrastructure Index

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

Sources

1 Think private real assets: Resiliency and diversification from uncorrelated returns, Nuveen, May 2021

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

3 Inflation data from U.S. Federal Reserve Bank of St Louis.

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A word on risk

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Economic and market forecasts are subject to uncertainty and may change based on varying market conditions, political and economic developments. As an asset class, real assets are less developed, more illiquid, and less transparent compared to traditional asset classes. Investments will be subject to risks generally associated with the ownership of real estate-related assets and foreign investing, including changes in economic conditions, currency values, environmental risks, the cost of and ability to obtain insurance, and risks related to leasing of properties.

Real Asset investments may be subject to environmental and political risks and currency volatility.

The TIAA General Account is an insurance company account and does not present an investment return, and is not available to investors.

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