

Green bonds: a portfolio perspective

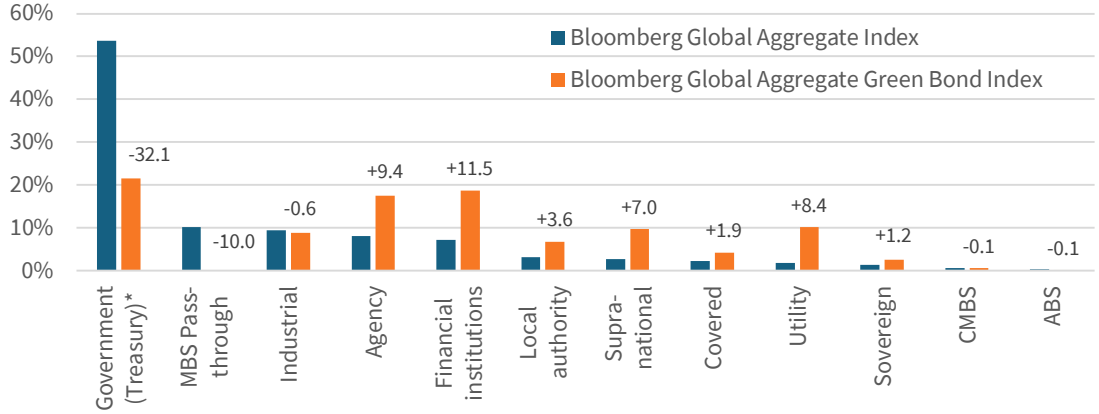
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The green bond market has seen substantial growth and is an important part of the opportunity set for investors. While these instruments offer a way to direct capital to green projects, asset allocators might be hesitant to increase their exposure due to the impact on portfolio metrics.

With the growth of the market, several dedicated indices have evolved.[1] This allows for an assessment of green bonds relative to the broader fixed income market. In this note, we analyse relevant considerations using the Bloomberg Global Aggregate, a widely used benchmark for global investment-grade bonds, and the related Green Bond Index.

In Section 1, we assess the relevance of currencies, duration, interest rates, and sector weights for risk exposure and performance. Green bonds have a higher share of EUR-denominated bonds which can result in meaningful performance differences on an unhedged basis, but foreign exchange (FX) hedging can mitigate this risk factor. Meanwhile, duration has converged at index level, reducing the duration gap and the likelihood of related risks. However, there remain fundamental differences in sector composition, as shown in Figure 1.

Figure 1. Sector weights of Bloomberg Global Aggregate Index (ticker: LEGATRUU) and Bloomberg Global Aggregate Green Bond Index (ticker: I37364US), including differences. Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



**) This refers to local-currency government bonds (e.g. US treasuries, UK gilts) based on Bloomberg sector classification Treasury.*

In Section 2, we outline several methods for incorporating a more meaningful green bond allocation to fixed income portfolios than the 2.7% weighting in the Bloomberg Global Aggregate, while offering investors flexibility to tailor their approach to individual objectives.

A lower implicit tracking error of a green bond allocation relative to the broader market could help to further boost the appeal of the asset class. There are several ways to achieve this goal, enabling investors to better support the climate transition and signal demand for green bonds to issuers.

[1] These are usually subsets of broader market indices, or derived from other proxies for the investable bond universe. Examples include Bloomberg Global Aggregate Green Bond Index / MSCI Global Green Bond Index, FTSE Global Green Impact Bond Index, iBoxx® Global Green Bonds Select Index, S&P Green Bond Index.

Not investment advice. First published 26 Nov 2025. Important disclaimers at end of the document.
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Introduction

Green bonds are the most prominent form of use-of-proceeds instruments. Guidelines, like the ICMA Green Bond Principles, have been established to support market transparency and to give confidence about how money is allocated to eligible green projects. Such bonds provide an opportunity to support the climate transition.

From a performance and risk perspective, what does green bond investing mean in practice? At the instrument level, it can be useful to investigate the pricing of labelled bonds relative to conventional bonds by comparing yields or spreads.[2] While extensive research has been conducted on this front,[3] the significance of the so-called 'greenium' remains subject to debate. Meanwhile, a portfolio perspective provides relevant insights as it captures the overall characteristics of the asset class.

In practice, green bonds are a subset of the overall market, derived according to specific criteria, and several indices allow for a comparison of asset class performance and risks. At the index level, green bond returns are influenced by the limited pool of eligible securities, which are not necessarily representative of the broader market.

Indices matter for investors as they act as benchmarks for funds, both active and passive, and reference points for asset allocation decisions. Many strategic asset allocation decisions are based on broad benchmark indices. Incorporating green bonds into traditional fixed income portfolios can introduce unwanted risks, which may deter benchmarked investors.

In Section 1, we assess the relevance of currencies, duration, interest rates, and sector weights for risk exposure and performance. In Section 2, we explore ways to increase allocations to green bonds, while being mindful of tracking error.[4]

Section 1: An index perspective

In this section, we explore the composition of the Bloomberg Global Aggregate Index and the related Green Bond Index, and unpack their long-term performance to identify relevant return drivers.[5]

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[2] The yield/spread difference can be used to derive the greenium. A positive greenium, meaning the yield/spread of a green bond is lower than for conventional bond, would imply lower return for investors.

[3] For example: "Searching for 'Greenium'", IHS Markit, 2020; "Allocating to Green Bonds", The Journal of Alternative Investments (Vol 24 No1), Summer 2022; "Pricing of green bonds: drivers and dynamics of the greenium", ECB, Working Paper No. 2728, Sep 2022; "The greenium in high-rated euro bonds", Robeco, White Paper, Mar 2024; "Pricing of Green Bonds: Greenium Dynamics and the Role of Retail Investors", Banque de France, Working Paper No. 1010, 17 Sep 2025, "Twin bonds: recap ahead of Denmark's EuGB issuance", AFII, 19 Sep 2025.

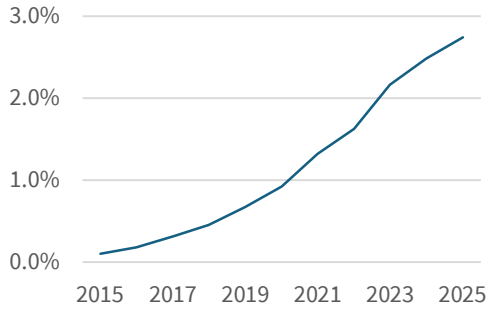
[4] From the perspective of a global investor with Global Aggregate as a benchmark, exposure to the Green Bond Index can be considered active risk (i.e. tracking error), quantifiable as the standard deviation of the return differences between the two indices.

[5] The Bloomberg Global Aggregate Index is a broad index that comprises global investment-grade debt from 27 local currency markets, including treasury, government-related, corporate, and securitised fixed-rate bonds from both developed and emerging markets issuers. Minimum par amount outstanding depends on currency (e.g. USD 300mn for non-securitised bonds, EUR 300mn, CNY 5bn, JPY 35bn and GBP 200mn). Included bonds have at least one year until final maturity. The related Bloomberg Global Aggregate Green Bond Index is a subset of the main index and includes bonds which are classified as green as well as adhering to the ICMA Green Bond Principles and Guidelines.

First, we compare their size. The Global Aggregate comprises more than 31,000 securities with a total market value of USD 74tn, while the Green Bond Index is made up of around 2,000 securities with a USD 2tn total market value. The index covers about two-thirds of the total green bond market, which recently exceeded USD 3tn.[6]

While the Green Bond Index accounts for only 2.7% of the Global Aggregate's market value, this share has quadrupled since 2020, as shown in Figure 2. Amongst EUR-denominated corporate bonds, the share is now 16% and growing.[7]

Figure 2. Size of Green Bond Index relative to Global Aggregate based on market value. Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



Green bonds form a meaningful, and growing, part of the fixed income market. However, as their issuance profile is not necessarily reflective of the broader market, increasing an allocation to green bonds may introduce portfolio changes which can impact risk metrics and returns.

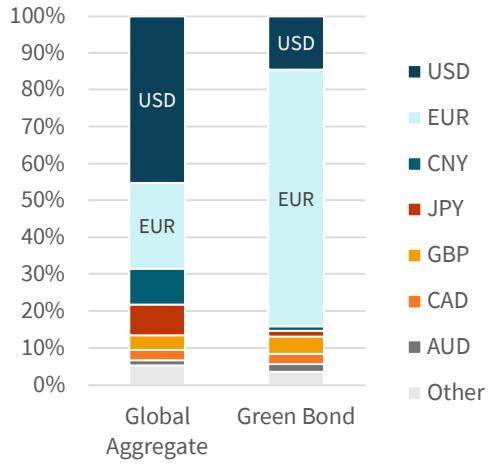
Currency exposure and risk

A sometimes-overlooked issue when investing in global markets is the currency of the assets, relative to the investor's reference currency. This is an important driver of FX risk.

As illustrated in Figure 3, 45% of the Global Aggregate Index is denominated in USD, 23% in EUR, and 10% in CNY. In contrast, almost 70% of the Green Bond Index is denominated in EUR, followed by almost 15% in USD and 5% in GBP.

This means that on an unhedged basis, green bonds can impose significant FX exposure on investors with reference currencies other than EUR. Typically, fixed income investors would hedge their FX exposure,[8] thereby lowering volatility.

Figure 3. Currency composition of select bond indices based on market value. Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



As illustrated in Figure 4 and Figure 5, the reference currency and hedging of FX exposure is essential when assessing performance. Since 2015, cumulative returns in USD have been significantly higher on an FX-hedged basis. This has not been the case for returns in EUR. Importantly, in both cases, the return differences between the Global Aggregate and Green Bond Index are considerably lower on an FX-hedged basis. This suggests that a substantial part of the differences in returns between the indices stem from their contrasting currency compositions rather than underlying bond performance.

[6] "Green debt market passes $3 trillion milestone", LSEG Insights, 19 Nov 2025.
[7] Based on market value of Bloomberg Global Corporate EUR Green Bond Index relative to Bloomberg Euro Aggregate Corporate Index.
[8] "How do Global Portfolio Investors Hedge Currency Risk?", State Street Research Paper, Aug 2024.

Figure 4. Relative performance of selected indices in USD (rebased to 1 Jan 2015). Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.

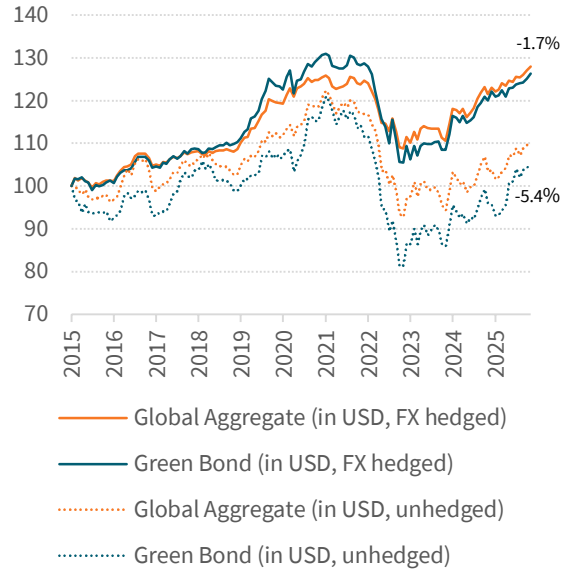
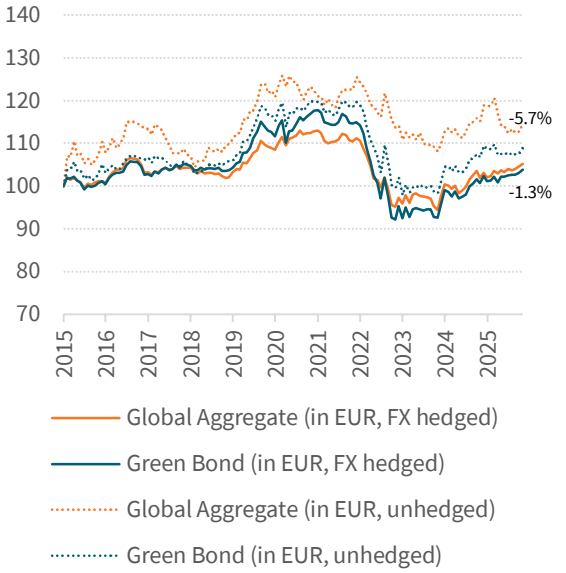


Figure 5. Relative performance of selected indices in EUR (rebased to 1 Jan 2015). Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



Looking at monthly returns, there is a generally high correlation between the Green Bond Index and the Global Aggregate.[9] However, at times there have been meaningful performance deviations. Since 2015, using FX-hedged versions of the indices has reduced active risk by about one-third. Still, with a tracking error of roughly 200bps, investors benchmarked to the broad index faced a "tracking error dilemma."[10]

Put simply, the currency exposure differences between the two indices means an unhedged allocation to green bond comes with higher FX risks — although these can be mitigated through currency hedging.

Looking at FX-hedged annual returns (see Figure 13 and Figure 14 in the Appendix), the Green Bond Index has performed broadly in line with the Global Aggregate, and even outperformed in certain periods. However, 2022 was a notable exception due to another important risk metric: duration.

Interest rate risk

Interest rate risk is a core concern of fixed income investors. Bond prices are sensitive to changes in interest rates, and markets come under pressure as yields increase. There is also a fundamental link between interest rate risk and FX risk that should be considered when assessing portfolios.

In early 2022, EUR-denominated bonds accounted for 65% of the Green Bond Index, which had relatively lower yields than bonds in other currencies (e.g. USD). A key driver of this underperformance was the higher duration (the sensitivity of prices to interest rate changes) of the Green Bond Index compared to the Global Aggregate (8.6 vs 7.5) in combination with a more meaningful yield increase (~320bps vs ~240bps).

In 2015/16 the duration of the Green Bond Index was considerably lower, implying a lower sensitivity to interest rate changes. But in this period, yields didn't move much, and the index was small, consisting of less than 110 bonds.

[9] In USD terms: 0.95 (unhedged), 0.94 (FX hedged); in EUR terms: 0.85 (unhedged), 0.94 (FX hedged).
[10] "How to integrate Green Bonds in a Global Allocation", AXA Investment Managers, 26 Sep 2023.

As shown in Figure 6 and Figure 7, the yield difference between the two indices is smaller today. In addition, duration has converged to similar levels at index level. This means there is a lower likelihood of a similar performance difference as in 2022. Still, it remains important for investors to monitor duration as a risk factor.

Figure 6. Yield to maturity of selected indices, including difference. Source: AFII, Bloomberg Finance L.P., data as of 17 Nov 2025.

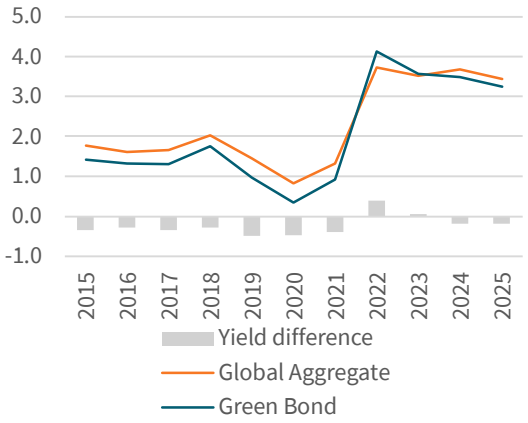
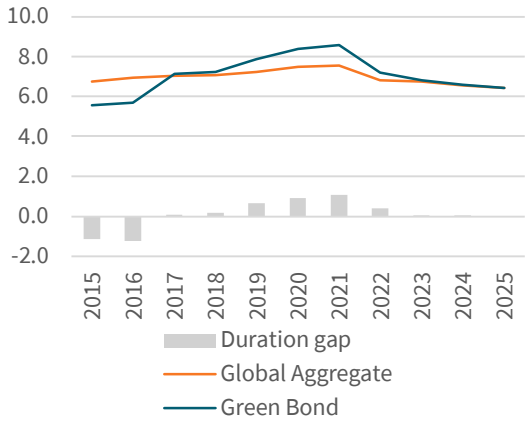


Figure 7. Modified duration of selected indices, including gap. Source: AFII, Bloomberg Finance L.P., data as of 17 Nov 2025.



Sector composition

The sector weights of the two indices are another potential driver of performance differences. Issuing entities can be broadly categorised as follows:

1) Corporate issuers: Financial institutions, utilities, and industrials.
2) Government (i.e. Treasury) and government-related issuers: Treasuries (local-currency bonds issued by governments, including US treasuries, UK gilts, etc.), agencies (e.g. KfW), supranationals (e.g. EU, EIB), local authorities and sovereigns (Eurobonds[11]).
3) Securitised: Mortgage-backed securities (MBS) passthrough, covered bonds, commercial mortgage-backed securities (CMBS), and asset-backed securities (ABS).

We present a comparison of the sector breakdown for the Global Aggregate and Green Bond indices in Figure 1, which shows substantial differences.

While government bonds account for more than half of the Global Aggregate, they make up just over 20% of the Green Bonds Index. The latter has a higher weighting to financial institutions, agencies and supranationals, and to the utility sector.

All corporate issuers combined account for 37.5% of the Green Bond Index, twice the share of the Global Aggregate. Most of this difference is attributable to higher exposure to financial institutions and utilities. The significantly lower exposure to government bonds in the Green Bond Index is partially offset by higher exposure to agencies and supranationals.

Figure 8 shows the performance of the two main categories, illustrating how sector composition can drive return variations at index level. For instance, government and government-related issuers saw meaningful performance differences, particularly in 2022, meaning that different allocation to this category would have impacted overall performance.

[11] A Eurobond is a debt instrument that is denominated in another currency than the currency of the issuing country (e.g. Chile issuing a bond denominated in EUR or USD).

Figure 8. Annual performance of selected sub-indices in EUR (FX hedged).
Source: AFII, Bloomberg Finance L.P., data as of 18 Nov 2025.



Section 2: Rethinking portfolio construction

As we have shown, the current green bond market does not necessarily match the broader market across a number of risk factors. This may present challenges for investors looking to increase allocations to this asset class.

Different investors may take varied approaches to asset allocation, but it usually involves making strategic decisions about how to distribute investments across asset classes. Regardless of whether it's a multi-asset portfolio or a fixed income-focused one, exposure to bond markets is a crucial component.

In practice, a fixed income allocation can be achieved by investing according to a broad index like the Global Aggregate, or by taking a more granular approach based on subsets of the overall market (e.g. government debt, corporate credit, high yield, emerging markets). For sustainability-oriented investors, green bonds are an important part of the opportunity set due to the size of this market. But the question remains: how can they be incorporated effectively in portfolios?

At a high level, this can be viewed through the lens of 'green bond integration'. This concept gives investors the flexibility to tailor their approach to specific sustainability and investment goals.

In order to support investors in making allocations to green bonds, we provide an array of portfolio construction approaches and ways to manage the associated tracking error. By calculating the standard deviation of the return differences between the Global Aggregate and these portfolios, we offer investors a measure of the active risks they take.

The methods are listed in order of increasing green bond allocation.

Benchmark allocation

As green bonds are now an established part of fixed income markets, investors could obtain exposure simply by allocating to global bond benchmarks. An investor using the Global Aggregate, for example, would have a 2.7% allocation to green bonds. For active investors, the exposure might be higher or lower, depending on tactical positioning.

Note, if green bond issuance grows as share of the broader market, this allocation would increase accordingly.

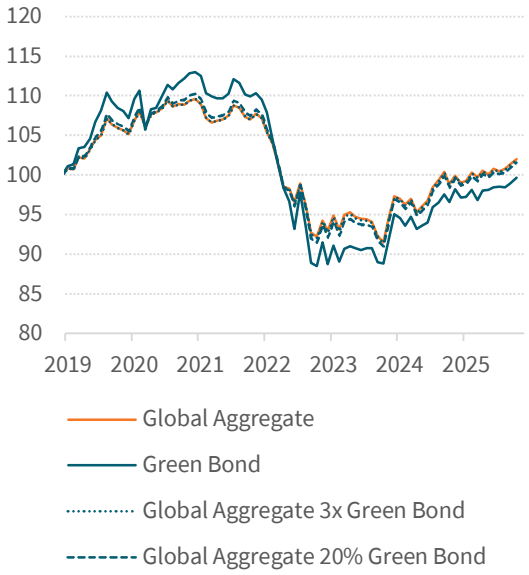
Tilting towards green bonds at the issuer level

An alternative approach would be for investors to allocate to each issuer's green bonds in proportion to that issuer's weight in the benchmark. However, this could lead to problems — such as excessive concentration in individual bonds or unintended duration biases — depending on the mix of bonds the issuer has outstanding.[12]

Bloomberg, the index provider behind the Global Aggregate, has created a set of green-tilted indices designed to increase exposure to green bonds while keeping key characteristics in line with the benchmark.[13] The 3x Green Bond Index applies a multiplier to the index weight of green bonds, while the 20% version increases green bond exposure to this higher level.[14]

Looking at these indices' FX-hedged performance in EUR since inception in 2019 (see Figure 9), it can be seen that they closely track the Global Aggregate. Monthly returns had a correlation very close to 1, while the tracking error to the Global Aggregate was small (6bps for the 3x index and 45bps for the 20% index) compared to 250bps for the Green Bond Index.

Figure 9. Performance of selected indices in EUR, FX hedged (rebased to 1 Jan 2019). Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



[12] For example, there are over 60 UK gilts in the Global Aggregate Index, two of which are green bonds (2033s and 2053s). Investing only in these two bonds would make it difficult to capture the risk exposure (e.g. duration, yields) of the total UK gilt market.

[13] "Bloomberg Expands Sustainable Index Offering with New Green-Tilted Fixed Income Indices", Bloomberg, 6 Dec 2023.

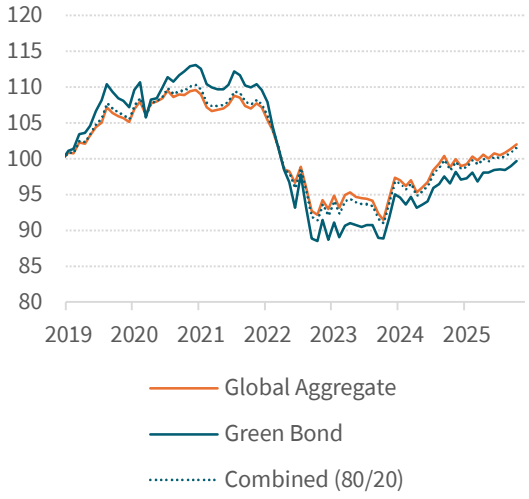
[14] "Bloomberg Global Aggregate 3x Green Bond", Bloomberg, 12 Apr 2024; "Bloomberg Global Aggregate 20% Green", Bloomberg, 28 Nov 2023.

Using a core-satellite framework

Investors may also opt for a flexible, blended approach, combining a core allocation — based on the Global Aggregate, for example — with a satellite exposure to green bonds.[15] At a global portfolio level, a recent analysis shows that a 20% standalone green bond allocation can deliver important diversification benefits.[16]

Figure 10 shows the historical performance of a combined portfolio with 80% allocated to the Global Aggregate and 20% to the Green Bond Index, rebalanced monthly. As expected, the performance is highly correlated with the Global Aggregate, with a tracking error of 50bps compared to the 250bps associated with a full allocation to the Green Bond Index.

Figure 10. Performance of selected indices in EUR, FX hedged (rebased to 1 Jan 2019). Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



This approach is a simple way to allocate to green bonds, and allows investors to construct portfolios that achieve their own target balance between allocation level and tracking error.

Augmenting the green bond index

The Green Bond Index has a significantly lower exposure to government bonds than the Global Aggregate. One way to adjust for this is to increase this exposure through government bonds included in the Global Aggregate, and re-weight the other sectors proportionally.

Figure 11. Sector weights of selected indices, plus re-weighted green bond portfolio with increased weight in government bonds. Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.

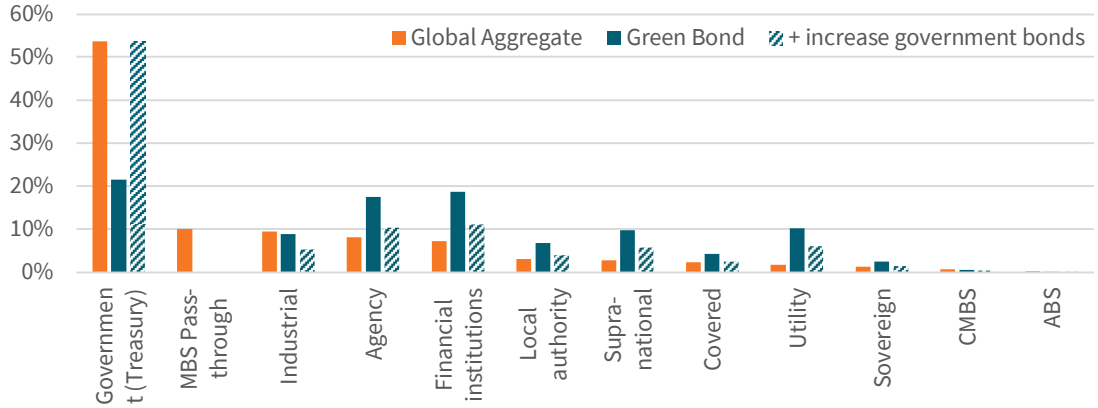


Figure 11 shows how this could look: increasing the government bond exposure by 32%pts to bring it in line with the Global Aggregate. The related re-weighting of the other sectors brings them closer to the Global Aggregate composition in most cases, with industrials being an exception.

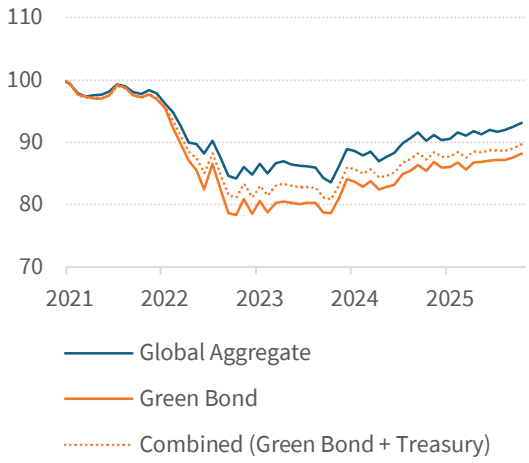
[15] "The rise of the Core-Satellite approach in fixed income portfolio construction", State Street Investment Management, 6 Nov 2025.
[16] "How Green Bonds Can Strengthen Fixed Income Portfolio Diversification", Goldman Sachs Asset Management, 25 Sep 2025.

In order to assess the historical performance of this strategy, we start with the share of government bonds in the relevant indices since 2021.

Using the share in the Global Aggregate as a reference point (which ranged between 52-54%), we combine the Green Bond Index with the Global Aggregate Treasuries Index to achieve a government bond allocation that is in line with the Global Aggregate.

We apply monthly rebalancing based on the weights from the previous month.[17] The standalone Treasuries allocation was in a range of 41-45%, implying Green Bond Index exposure of 55-59%.

Figure 12. Performance of selected indices in EUR, FX hedged (rebased to 1 Jan 2021). Source: AFII, Bloomberg Finance L.P., data as of 31 Oct 2025.



Historical returns for the combined portfolio are highly correlated to the Global Aggregate (0.975) with a tracking error of 137bps, compared to ~250bps for a standalone Green Bond Index allocation. Another side effect of the Treasuries allocation is the impact on the currency composition.[18] In the combined portfolio, the EUR share would currently be close to 50%, compared to almost 70% in the Green Bond Index. Meanwhile, duration would be higher by around 0.2 as the Treasuries index has a higher duration than the Global Aggregate.

Allocating only to the green bond index

Instead of allocating to the Global Aggregate, investors could simply use the related Green Bond Index alone. This would produce the highest allocation to green bonds. However, it comes with potential issues (e.g. different sector weights, performance deviations) as discussed earlier. Accordingly, some investors might not feel comfortable with such an approach.

In this case, the tracking error would be 250bps, based on monthly returns since 2019.

[17] Given that the share of government bonds is relatively slow-moving, a lower rebalancing (e.g. quarterly) can be considered.
[18] The Global Aggregate Treasuries Index exposure is ~35% in USD and ~23% in EUR.

Summary

Table 1 illustrates key characteristics of the allocation approaches described above.

Table 1. Overview of different approaches for embedding green bonds in a broader fixed income portfolio. Based on selected indices in EUR, FX hedged (monthly returns since 2019, unless stated otherwise). Source: AFII, Bloomberg Finance L.P, data as of 31 Oct 2025.

	Share of green bonds	Return correlation	Standard deviation	Tracking error
Benchmark allocation	2.7% (current)	/	4.5%	/
Tilting towards green bonds	Flexible depending on index (e.g. 3x, 20%)	Close to 1	3x: 4.6% 20%: 4.8%	3x: 6bps 20%: 45bps
Using a core-satellite framework	Flexible (e.g. 20% for illustration)	Close to 1	4.8%	50bps
Augmenting the green bond index*	55-59%	0.975	5.6%	137bps
Allocating only to the green bond index	100%	0.938	6.3%	250bps

*) Data since 2021 due to limited data availability.

Conclusions

Green bonds, where proceeds are allocated towards eligible sustainable projects, have seen substantial growth in demand, suggesting that investors assign value to the transparency and investment profile they offer.

However, because green bond issuance does not exactly mirror the broader fixed income market, adding them to traditional portfolios can introduce tracking error. This mismatch may discourage some benchmark-driven investors. In this paper, we have explored how the composition of the investment-grade green bond market differs from the Global Aggregate, and outlined strategies for increasing green bond allocations while managing tracking risk.

We can conclude that simply following benchmark indices, while convenient, may not produce desired outcomes for investors.

The relatively small amount outstanding of green bonds in broad benchmark indices like the Global Aggregate suggests potential to increase this allocation, particularly for sustainability-oriented investors. However, switching a fixed income allocation that would usually follow the Global Aggregate into a related Green Bond Index comes with trade-offs (e.g. currency and sector exposure) and requires careful consideration.

A lower implicit tracking error for green bond allocations compared to the broader market could further boost the appeal of the asset class. As this note outlines, investors have several effective options to increase their allocation to green bonds — supporting the climate transition while sending a strong demand signal to issuers.

In conclusion, by analysing the green bond market and understanding individual investment objectives, it is possible to increase allocations in more measured ways than simply switching entirely to the Green Bond Index, meaning there are multiple options for investors to increase allocations.

Appendix

Figure 13. Annual performance of selected indices in USD. Source: AFII, Bloomberg Finance L.P., data as of 17 Nov 2025.

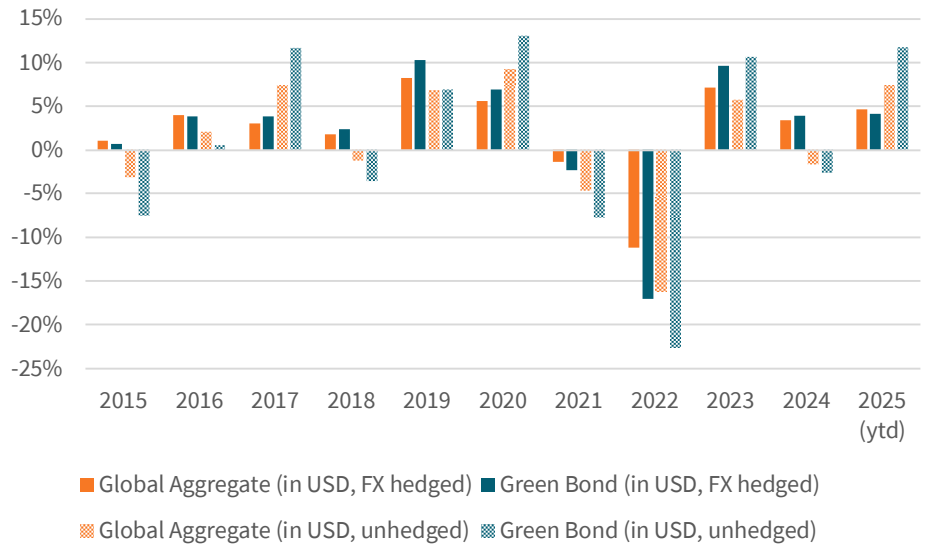
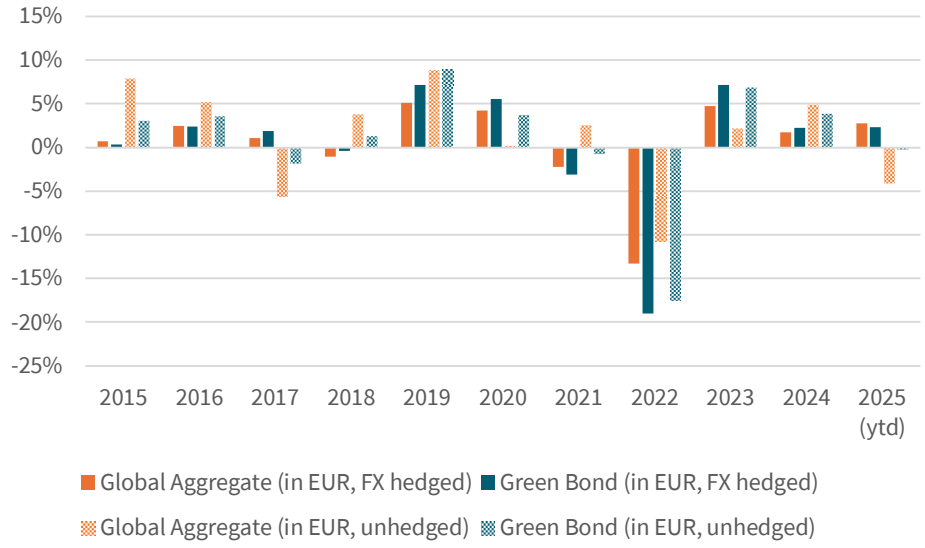


Figure 14. Annual performance of selected indices in EUR. Source: AFII, Bloomberg Finance L.P., data as of 17 Nov 2025.



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