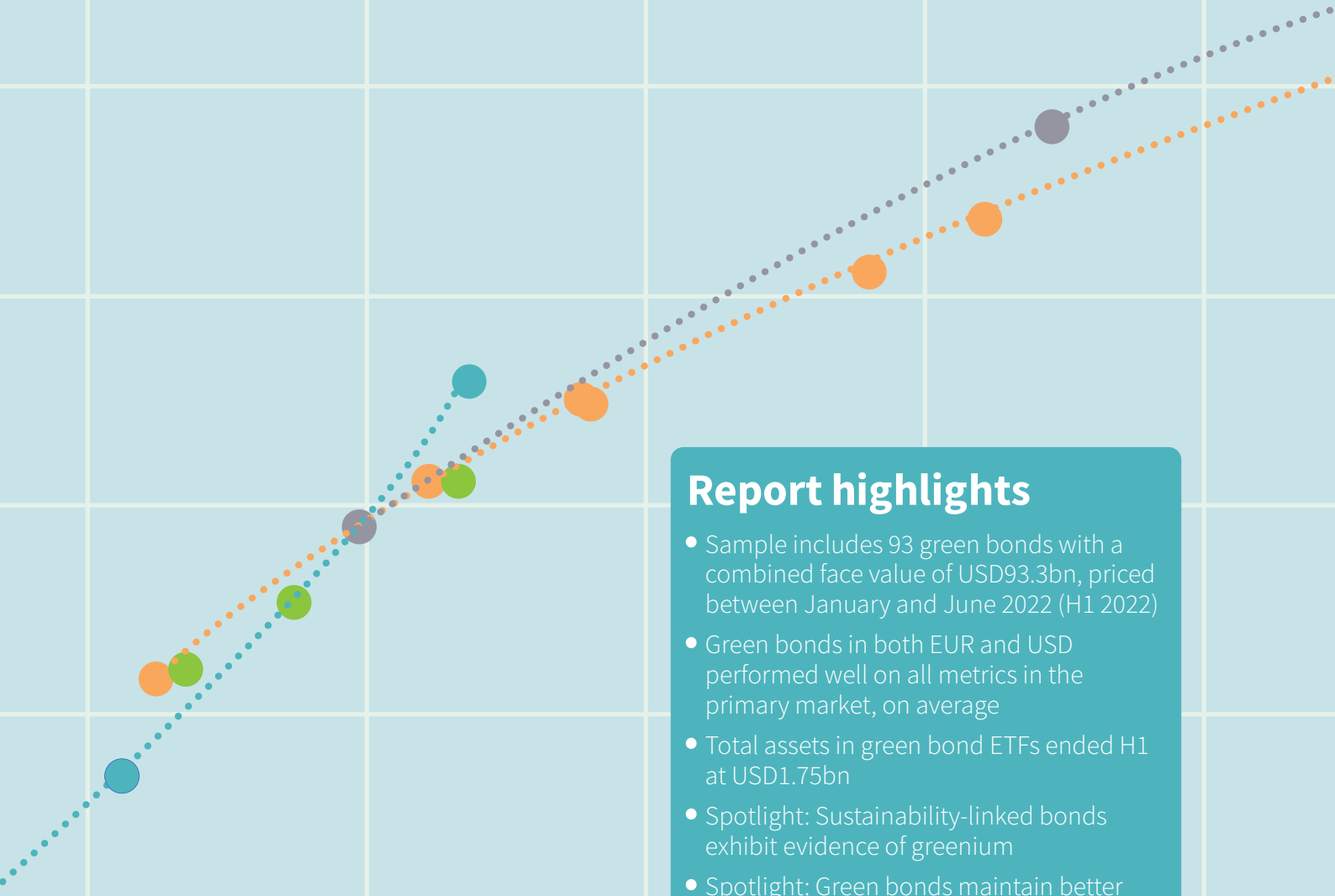
GREEN BOND PRICING IN THE PRIMARY MARKET:

January-June 2022

H1 (Q1-Q2) 2022



Report highlights

- Sample includes 93 green bonds with a combined face value of USD93.3bn, priced between January and June 2022 (H1 2022)
- Green bonds in both EUR and USD performed well on all metrics in the primary market, on average
- Total assets in green bond ETFs ended H1 at USD1.75bn
- Spotlight: Sustainability-linked bonds exhibit evidence of greenium
- Spotlight: Green bonds maintain better liquidity in secondary market

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1. Introduction

This is the 14th report in our pricing series, in which we observe how green bonds perform in the primary markets. This report includes green bonds issued in the first six months of 2022 (H1 2022).

Our methodology is designed to capture the most liquid portion of the green bond market and is thus limited to USD and EUR bonds with a minimum original issue size of USD500m. Developed market (DM), emerging market (EM) and supranational issuers (SNAT) are included.[1] The full methodology is explained on page 23.

As of 1 August 2022, USD236bn worth of green bonds priced in H1 2022 had been added to the Climate Bonds Green Bond Database (GBDB), a 1% decline from H2 2021 (USD240bn), which had been a record period. This analysis includes 40% of the amount issued in H1 2022 that met the above requirements: USD93.3bn split between 93 green bonds from 76 issuers. EUR was the dominant currency with 68 bonds amounting to EUR69bn (USD75.8bn), while 25 qualifying USD denominated bonds had a combined issue size of USD18.5bn. This is the largest sample in any period to date.

Sovereign bonds are subject to different market dynamics than bonds from other issuer types hence we address them separately in the Sovereign Green Bonds Club section. The European Union (EU), a supranational issuer, is also subject to peculiar pricing dynamics and is again discussed separately.

Report highlights:

- **Green bonds achieved higher book cover and spread compression than vanilla equivalents, on average.** **See more on page 4**
- **Overall, 65% of green bonds were allocated to investors describing themselves as having green or responsible investment mandates.** **See more on page 7**
- **Yield curves could be built for 50 bonds in our non-sovereign sample. Ten priced inside their issuer's yield curves, achieving a greenium.** **See more on page 9**
- **After 7 and 28 days, green bonds had tightened by more than comparable vanilla baskets and corresponding indices, on average.** **See more on page 11**
- **Green bond ETFs: total fund assets in EUR and USD green bond ETFs ended the period at USD1.75bn, a decline of 3% on the prior period.** **See more on page 14**
- **Sovereign Green Bond Club: three sovereign issuers added one new bond each while the EU (supranational) priced two green bonds with a greenium.** **See more on page 15**
- **Spotlight: Sustainability-linked bond pricing in the primary market: A first look at pricing reveals evidence of a greenium.** **See more on page 18**
- **An analysis of bonds in the real estate and utility sectors confirms that green bonds maintain better liquidity in the secondary market.** **See more on page 21**

Market developments

The Russian invasion of Ukraine in February and subsequent European energy crisis exacerbated post COVID-19 inflation, impacting bond market dynamics. Rising rates and high volatility resulted in decreased bond issuance, and the market was thick with anecdotes of issuers pulling deals at the last minute. The USA faced demand-driven inflation post COVID-19, which was expected to react to monetary policy measures, while in Europe the inflation was largely supply-led and harder to address. The ECB has been the largest buyer in the European bond market for several years and is in the process of withdrawing that support, clearing the way for interest rate increases.

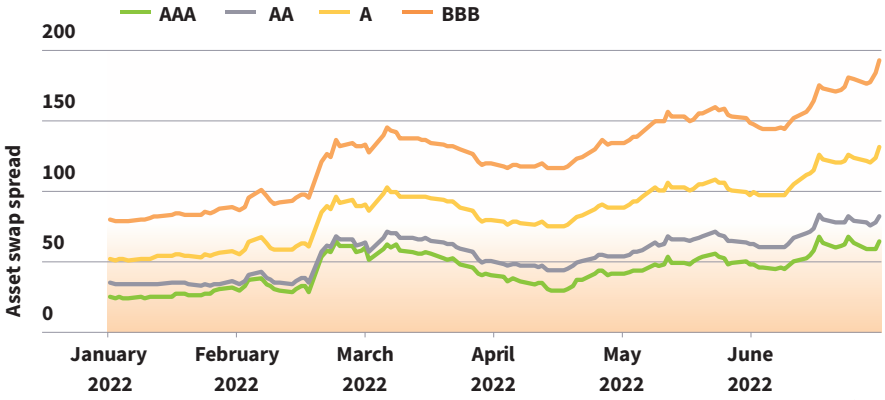
In EUR, corporate bond spreads at least doubled in H1: 177% for AAA, 153% for AA, 163% for A, and 149% for BBB. Widening of USD spreads was significant, but less pronounced at 33% for AAA, 46% for AA, and 62% for A and BBB.[2]

The supply of benchmark green bonds remained steady, but given the economic backdrop, investors had limits about overpaying for anything and there were reports of both vanilla and green bond issuers offering larger new issue premiums to attract investors to new deals.

During H1, green bonds amounting to USD236bn were added to the Climate Bonds GBDB as Q2 issuance (USD133bn) picked up slightly compared to Q1 (USD103bn). May was the busiest month (USD50m) helped by several large deals from Austria, which priced its first sovereign green bond, a 2049 maturity (EUR4bn/USD4.2bn), TenneT (a four tranche deal worth EUR3.85bn/USD4.1bn), and EIB (EUR4bn/USD4.3bn).

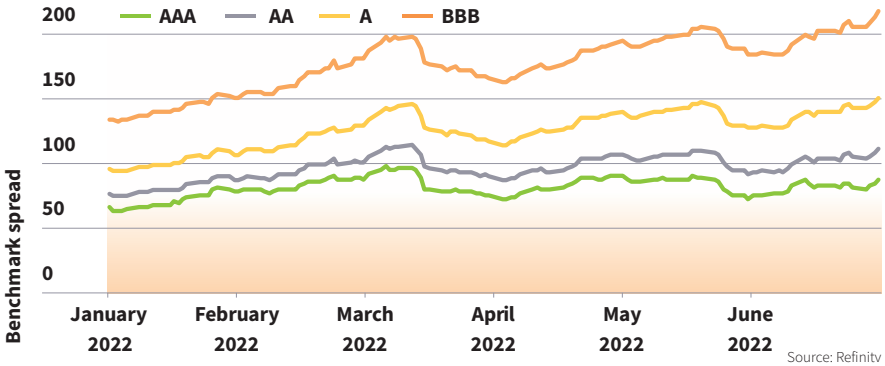
Almost 70% of the H1 green bond volume was denominated in EUR (USD115bn) and USD (USD47bn), with 58% of that amount (USD93.3bn) qualifying for this analysis. Most of the qualifying issuers (65 out of 76) had already issued green bonds, while 11 new issuers came to the market in H1.

EUR Corporate Credit Spreads



Source: Refinitv

USD Corporate Credit Spreads



Source: Refinitv

Real estate and utilities get the green light

In some sectors it can be challenging to find non-labelled bonds with which to compare green bond performance. This paper includes 17 green bonds from the real estate sector and 19 from the utility sector. Most of those bonds came from repeat issuers. European real estate company **P3 Group** was the only debut issuer from the sector, raising EUR1bn (USD1.1bn) split evenly between 2025 and 2029 maturities. **Public Service Electric and Gas co (PSEG)** priced a USD500m 2032 bond and was the only first-time issuer from the utility sector.

The table to the right illustrates the composition of H1 2022 issuance from utilities and real estate by thematic label. More than half of EUR bonds issued in the real estate and utility sectors bore a thematic label, while in the USD market, only a fifth of real estate bonds and a quarter of utilities did. Among the USD bonds issued with a green label, two real estate and three utility bonds were not added to the Climate Bonds GBDB either because the Use of Proceeds (UoP) was not aligned, or because there was inadequate clarity on the UoP.

This highlights two points:

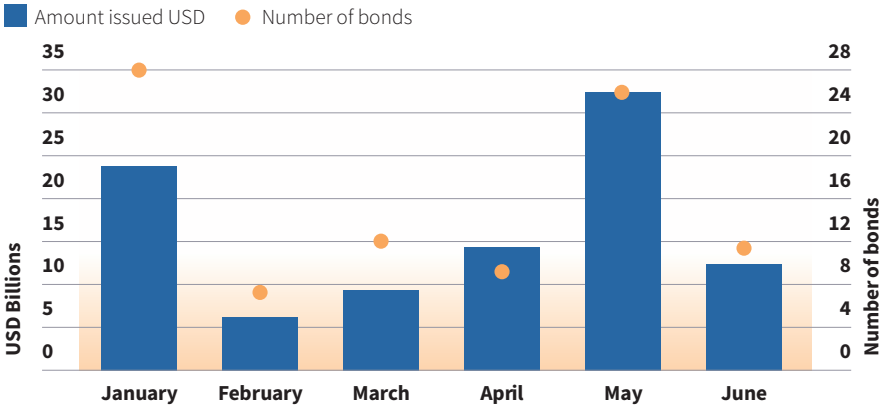
1. The greenback must back green. Issuers are still coming to the USD market to fund non-green utility and real estate assets, projects, and expenditures, even though there are clearly defined green alternatives available. Culture and policy in the US must catch up to ensure that green capital expenditure is preferenced. The amount of non-green debt coming from utilities and real estate in the EUR marketd emonstrates that there is low hanging fruit.

2. The stealth greening of the EUR bond market. It would be increasingly difficult for any type of investor to construct a broad market bond portfolio without including green bonds in at least the utility and real estate sectors. Broad market indices do not exclude green bonds, hence qualifying green bonds will automatically be included, and passive investors will be looking for them in the secondary market. Active managers could choose to avoid green bonds, but this would limit their choice of bonds in the primary market. This means that non-dedicated investors are looking for green bonds in both the primary and immediate secondary market, putting even more pressure on pricing dynamics.

Real Estate

As noted above, there were not many EUR vanilla real estate bonds available for comparison. However, for each pricing metric that we looked at, EUR real estate bonds were among the strongest performers outright. Issuers are encouraged to issue green bonds from multiple sources. Brokers are advising real estate issuers to apply thematic labelling where possible to achieve better pricing outcomes, and corporate rental clients are prioritising landlords with green liabilities to comply with their own CSR requirements.

One third of the eligible volume was priced in May



Source: Climate Bonds Initiative

Composition of H1 2022 issuance from real estate and utilities

	Real Estate		Utilities	
	H1 volume USD	Number of bonds	H1 volume USD	Number of bonds
EUR				
Green	**9.5**	**15**	**20.1**	**23**
Qualifies for Climate Bonds GBDB	9.0	14	15.0	17
Doesn't qualify for Climate Bonds GBDB	0.5	1	5.1	6
SLB	**1.4**	**2**	**7.2**	**9**
Social	**2.6**	**3**	**n/a**	**n/a**
Sustainabilty	**0.6**	**1**	**n/a**	**n/a**
Vanilla	**10.3**	**16**	**7.6**	**12**
Total	**24.4**	**37**	**34.9**	**44**
USD				
Green	**3.6**	**5**	**4.3**	**8**
Qualifies for Climate Bonds GBDB	2.6	3	2.3	4
Doesn't qualify for Climate Bonds GBDB	1.0	2	2.1	4
SLB	**0.5**	**1**	**4.0**	**5**
Sustainabilty	**n/a**	**n/a**	**5.4**	**8**
Vanilla	**15.4**	**20**	**42.9**	**59**
Total	**19.5**	**26**	**56.7**	**80**

Bonds priced between 01 January and 30 June 2022 with a minimum original size of USD500m. BICS classification Real Estate or Utility.

Utilities

Most European utility companies have well-defined transition strategies in place backed by green bonds. 24 EUR utility green bonds were priced in H1 2022 (18 qualified for the Climate Bonds GBDB, 17 for this paper), which is twice the number of vanilla bonds (12). In USD, green bonds are the minority at eight out of 80, with only half of those qualifying for the Climate Bonds GBDB (three for this paper). At least 59 utility USD vanilla bonds with a combined volume of USD43bn were priced in H1 2022.

Remarks:

- Seniority rankings of financial corporate bonds are denoted using the following abbreviations: Senior Preferred (SP), Senior Non-Preferred (SNP) and Covered (CO). As per our standard methodology, the payment rank of the green bond is matched when selecting vanilla bonds with which to compare the performance.
- The methodology for the selection of the bonds used as comparators is given on page 23.

2. Spread compression and book size: green bonds in both EUR and USD attracted larger book cover and exhibited larger spread compression than vanilla equivalents, on average

• **EUR:** Average oversubscription was 3.1 times for green bonds versus 2.4 times for vanilla equivalents. Spread compression averaged 18.2bps for green bonds and 16.4bps for vanilla bonds.

• **USD:** Average oversubscription was 3.8 times for green bonds and 2.7 times for vanilla equivalents. Spread compression averaged 29.3bps for green bonds and 22.5bps for vanilla bonds.

EUR Book cover

Category	Green bond sample	Number of green bonds beating vanilla basket	Green average book cover	Vanilla basket average book cover
SSA	11	9	4.4	2.3
Covered	6	5	2.4	1.7
AA	3	2	1.9	1.4
A	17	10	2.9	2.3
BBB	24	12	3.0	2.8
Total	61	38.0	3.1	2.4

USD Book cover

Category	Green bond sample	Number of green bonds beating vanilla basket	Green average book cover	Vanilla basket average book cover
SSA	2	1	5.8	4.7
Covered	1	1	2.1	1.2
AA	1	1	6.0	1.9
A	4	2	4.2	3.6
BBB	8	5	3.2	2.2
Total	16	10.0	3.8	2.7

Five EUR green bonds achieving largest book cover

Category	Short Name	Deal size EURbn	Reported order book EURbn	Book cover	Vanilla basket book cover
SSA	KfW 2032	3.00	34.00	11.30	1.4
SSA	EIB 2029	1.00	8.25	8.25	4.3
A	Segro 2030	0.50	4.00	8.00	1.9
BBB	E.ON 2031	0.75	5.00	6.70	1.8
BBB	Vonovia 2032	0.85	5.00	5.90	2.5

Five USD green bonds achieving largest book cover

Category	Short Name	Deal size EURbn	Reported order book EURbn	Book cover	Vanilla basket book cover
SSA	KEPCO 2025	0.50	4.1	8.2	5.8
AA	Korea East-West Power 2025	0.50	3.0	6.0	1.9
A	PSEG 2032	0.50	3.0	6.0	1.5
BBB	Welltower 2032	0.55	2.9	5.3	1.2
A	Bank of China (Ffurt) 2025	0.50	2.2	4.4	5.1

Green bonds are oversubscribed and experience spread tightening during the pricing process, just like vanilla bonds. To help determine whether investors attach any value to the green label, green bonds are compared to carefully selected vanilla equivalents (baskets).

EUR green bond pricing

EUR green bonds obtained slightly more subdued order books in H1 2022 (3.1x) compared to the prior half year (3.4x), as did vanilla equivalents (2.4x in H1 2022 against 2.7x in H2 2021). Spread tightening was also lower, with an average of 18.2bps compared to 19.3bps for green bonds, and 16.4bps compared to 17bps for vanilla bonds. Green bonds maintained better performance than vanilla equivalents on both metrics (on average).

Individually, 62% of green bonds (38 out of 61) experienced greater oversubscription compared to vanilla equivalents, similar to the 61% in the prior period.

53% of green bonds (32 out of 60) achieved larger spread compression that their vanilla equivalents, the same share as in H2 2021.

Bonds in the sample excluded from this analysis:

Caja R. de Navarra 2029 (CO) and ICADE 2030 achieved the same book cover as their vanilla baskets at 1.4 and 1.9 times respectively, while UPM achieved book cover of 2.5 times, but its vanilla basket did not have any information on that data point.

Four bonds achieved the same amount of tightening as their respective vanilla counterparts: BPI 2027, RWE 2026, ABN Amro 2032 (SNP), and Prologis 2034.

Book cover

Two sovereign, supranational, and agency (SSA) issuers were top among the five EUR deals achieving the largest book cover.

KFW 2032 attracted an order book of EUR34bn, 11.3 times the size of the transaction (EUR3bn/USD3.1bn), the largest for a green KFW EUR transaction so far. It was also the fifth largest book cover recorded by Climate Bonds for a green bond since 2016 (the record is held by Prologis 2032 with a book cover of 14 times deal size in June 2020) and recorded a negligible new issue premium going on to tighten in the immediate secondary market.

Meanwhile, **EIB 2029**, priced in January, was the first Climate Awareness Bond (CAB) of 2022. The EUR1bn (USD1.1bn) deal was covered 8.25 times and priced inside both the EIB green and vanilla curves.

UK Real Estate Investment Trust (REIT) **Segro** covered its EUR500m (USD550m) 2030 deal eight times with a book that reached EUR4bn. Investors were attracted by the A credit rating, combined with logistics real estate exposure and the green label. German real estate company **Vonovia** priced its second EUR green bond, a 2032 maturity, in March. The EUR850m (USD930m) deal was almost six times covered.

European electric utility **E.ON** priced three green bonds in H1 with proceeds earmarked to refinance sustainable projects with a focus on the energy transition. **E.ON 2031** was part of dual tranche deal priced in March, and received indications of interest amounting to 6.7 times the EUR750m (USD830m) deal size.

Spread compression

The five bonds achieving the largest absolute spread compressions were all non-financial corporates and were led by **VW 2027**. The German auto manufacturer returned to the market in June with a two-tranche EUR1.5bn (USD1.58bn) deal split evenly between 2025 and 2027 maturities. The 2027 tranche achieved massive tightening of 42.5bps. For context, only eight EUR green bonds have achieved spread compression of 40bps or more since 2016. Daimler holds the record of 57bps for its 2030 bond priced in September 2020, while the sixth largest recorded spread compression for a EUR bond was for the VW 2032 also priced in September 2020, at 42.5bps like the recent deal. Green deals from relatable names outside the bank, real estate, or utility sectors remain appealing for thematic investors who are keen to add sector diversity.

Three of the top five tighteners were from the real estate sector: **Vonovia 2032** narrowed by 40bps, **Prologis 2031** managed 39.5bps, and **Segro 2026** contracted by 35bps. The other spot was filled by **E.ON 2025**, which moved 40bps during book building.

Segro did not have a yield curve, hence the presence of a greenium could not be determined. The other four bonds achieving the most aggressive spread compression priced outside their yield curves, exhibiting normal new issue premia.

USD green bond pricing

The USD market experienced opposite trends. The H1 2022 USD green bond sample achieved an average book cover of 3.8 times, higher than the threetimes recorded for H2 2021; the vanilla equivalents saw an average book cover of 2.7 times in H1, identical to the previous period. Likewise, the average spread compressions of 29.5bps for green bonds and 22.5bps for vanilla baskets were larger than the 25.9bps and 21.7bps seen in the prior half year.

Nine out of 15 green bonds (60%) achieved larger book cover than vanilla counterparts. 14 out of 20 green bonds (70%) experienced larger spread compression compared to equivalents.

Bonds in the sample excluded from this analysis:

Packaging company Sonoco's 2032 bond achieved the same book cover as its vanilla basket (2x). EIB Korea 2032 attracted book cover of two times, but there was no data for its corresponding basket. Six bonds lacked data for book size: JBIC 2027, JFM 2025, Agri Bank of China 2025, Bank of China (Sing) 2025, CCB 2025, and Industrial Bank 2025.

Three bonds in the USD sample achieved the same spread compression as their vanilla baskets: SMFG 2029, INRCIN 2032, and Alexandria RE 2034. All tightened by 25bps in the primary market.

Book cover

Korea's largest electric power supplier and distributor, Korean Electric Power Co (**KEPCO 2025**), achieved the highest book cover recorded for a USD green bond since 2016, at 8.2 times.[3] The prior record of eight times was reached by both Mitsubishi UFJ 2023 in 2020 and Verizon 2029 in 2019. Repeat green bond issuer KEPCO priced its USD500m green bond in June (together with a USD300m 2027 bond), and the combination of the shorter tenor, AA credit rating, state ownership, USD denomination, and green label created massive investor interest. The proceeds from the deal were earmarked to finance or refinance the development and operations of projects consistent with KEPCO's sustainable finance framework, which highlights solar and wind, increasing stability in the power supply, clean transportation, and energy efficiency as eligible green project categories.

Korea East-West Power (**Korea East-West Power 2025**) published an updated sustainable finance framework in April 2022, outlining its roadmap to transition to renewable energy, and naming renewable energy and energy efficiency as eligible green project categories. Its first USD green bond was priced in May, a USD500m three-year bond which attracted book cover of six times. Again, the stronger credit rating, state support, short tenor, choice of currency, and transition strategy will all have helped to attract investors.

New Jersey-based Public Service Electric and Gas co (**PSEG 2032**) priced its debut green bond in March, receiving an order book six times greater than the USD500m deal size. The proceeds of the deal were earmarked to support the company's transition to cleaner energy.

REIT Welltower Inc (**Welltower 2032**) invests in healthcare infrastructure and priced its second green bond in March to support its commitment to green buildings, energy efficiency, and water efficiency. The USD550m bond covered its book 5.3 times.

Bank of China Frankfurt (**Bank of China Ffurt 2025**) priced a USD500m 2025 green bond attracting a book of 4.4 times the deal size. Screening for eligible projects was done according to the Common Ground Taxonomy (CGT) and the Green Bond Principles, and 14 projects were nominated, falling into renewable energy, energy storage, low carbon transport, electric buses, and the manufacture of energy saving equipment.

Spread compression

Spread compression data was available for all bonds in the USD sample.

The USD bonds experiencing the largest spread compressions were from offshore branches of Chinese financial institutions – this is the same as what we observed in H2 2021. In H1 2022, eight bonds achieved spread tightening of at least 40bps, all of which from offshore Chinese banks except KEPCO 2025. For context, Climate Bonds' pricing research had included 161 USD bonds at the end of 2021. Among those, just 11 individual bonds had achieved spread compression of at least 40bps (five priced in 2020, and six in 2021).

EUR Spread compression (swap spreads)

Category	Green bond sample	Number of green bonds beating vanilla equivalent	Green average spread compression	Vanilla basket average spread compression
SSA	10	8	-5.2	-3.6
Covered	7	2	-3.3	-3.4
AA	3	1	-16.0	-19.5
A	16	10	-23.8	-20.1
BBB	24	11	-24.5	-22.7
Total	**60**	**32**	**-18.2**	**-16.4**

USD spread compression (treasury spreads)

Category	Green bond sample	Number of green bonds beating vanilla equivalent	Green average spread compression	Vanilla basket average spread compression
SSA	5	3	-23.8	-23.8
Covered	1	1	-3.0	-1.6
AA	1	1	-35.0	-20.0
A	6	5	-40.5	-21.2
BBB	8	4	-26.8	-25.5
Total	**21**	**14**	**-29.1**	**-22.6**

The ceiling was set by a green bond from US energy and utility company, Avangrid with a 2025 deal priced in 2020, which demonstrated spread compression of 50bps.[4]

Another commonality of the USD bonds with the largest spread compression in H1 2022 was the maturity. All were short dated with a maturity of 2025. The results of this analysis suggest that investors liked short-dated USD paper from offshore branches of Chinese banks. The short tenor (given interest rate risk) combined with exposure to China without the risk of onshore investing is evidently something investors value, and the green label is the cherry on the cake.

Industrial & Commercial Bank of China (Hong Kong) priced a USD1.2bn green bond in May (**ICBAS (HK) 2025**). The bond was 5.1 times oversubscribed and the spread tightened by 47bps during book building, the largest of any USD deal in H1 2022. The bond was one of just a handful to achieve a greenium, pricing just inside both the green and vanilla curves of the issuer and going on to tighten aggressively in the immediate secondary market. The issuer's 2021 Green Bond Framework lists eligible project categories as renewable energy, clean transport, energy efficiency, and sustainable water and wastewater management.

Methodology notes: Baskets comprise bonds that most closely match the green bonds and are issued during the same quarter. The baskets in this publication include between one and ten bonds. For an explanation of the methodology, see page 23.

Five EUR green bonds achieving largest spread compression (swap spreads)

			bps			
Category	**Bond**	**Pricing date**	**IPT**	**Primary Spread**	**Compression green bond**	**Compression vanilla basket**
BBB	**VW 2027**	21/06/2022	198.0	155.0	-42.5	-30.00
BBB	**Vonovia 2032**	21/03/2022	180.0	140.0	-40.0	-22.00
BBB	**EON 2025**	23/03/2022	75.0	35.0	-40.0	-23.75
A	**Prologis 2031**	18/05/2022	187.5	148.0	-39.5	0.00
A	**Segro 2026**	16/03/2022	105.0	70.0	-35.0	-32.50

Five USD green bonds achieving largest spread compression (treasury spreads)

			bps			
Category	**Bond**	**Pricing date**	**IPT**	**Primary Spread**	**Compression green bond**	**Compression vanilla basket**
A	**ICBCAS 2025**	24/05/2022	85	38	-47	-32.5
A	**Bank of China (Ffurt) 2025**	09/06/2022	65	20	-45	-32.5
A	**CCB 2025**	10/05/2022	90	47	-43	-32.5
BBB	**Industrial Bank 2025**	11/05/2022	95	52	-43	-32.5
A	**Agri Bank of China 2025**	22/02/2022	75	35	-40	35.0

3. Green allocations: 65% allocated to investors describing themselves as green

The 73 non-sovereign issuers included in this analysis were invited to disclose what percentage of their deal was allocated to investors describing themselves as green or socially responsible (green investors). The results of this outreach were as follows:

- 31 issuers representing 41 bonds shared the data
- Three issuers representing four bonds replied without disclosing the data
- 39 issuers representing 45 bonds did not reply

Based on these responses, the average allocation to investors describing themselves as green was 65% (1% lower than in the prior observation period). Allocations ranged from 35% (**Munhyp 2030 (CO)** and **DZ Hyp 2029 (CO)**) to 90% (**Gecina 2033**).

Just three out of 24 issuers in our USD sample acknowledged the request for data which means that we cannot monitor changes in investor demand in this market. From the responses received, the green label appears to have been helpful in attracting high-quality order books during turbulent times.

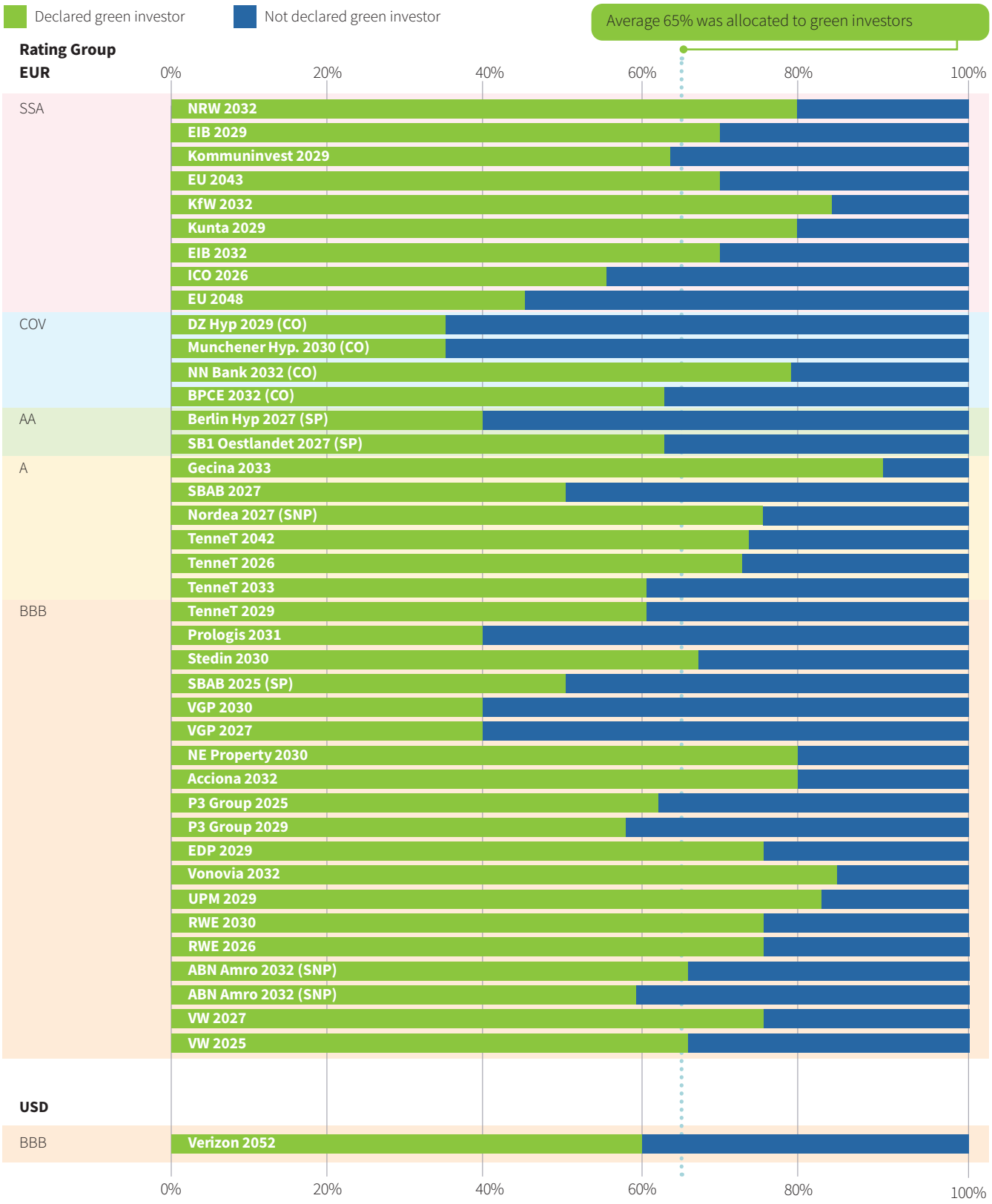
During H1 2022 the markets were very volatile and there were reports of numerous transactions being withdrawn from the market. In the US, there were periods of as long as seven days with no new issuance at all. Some issuers noted that the green label had been what had enabled them to issue in these challenging times. As always, issuers noted that the green label helped to attract a more diversified order book and subsequent better pricing outcome than may have been possible otherwise.

Nordea priced a EUR1bn senior non-preferred 2027 bond (**Nordea 2027 (SNP)**) during a relatively quiet period in February. It was the bank's fourth EUR green transaction. Around 75% of the deal was allocated to investors describing themselves as green, reflecting the benefits of a strong sustainability policy and the green label.

European logistics real estate investor and developer P3 Group Srl priced its first green deal in January. The EUR1bn transaction was split evenly between 2026 and 2029 tenors (**P3 Group 2026** and **P3 Group 2029**). The company was pleased with the deal, which attracted a high-quality order book. The roadshow gave P3 Group the opportunity to respond to investor questions on post-issuance reporting commitments, and green lease terms and approach. Investors describing themselves as green were allocated 62% of the 2026 and 57% of the 2029 deals. Three-quarters of the top twenty investors, who collectively bought 81%, described themselves as green.

Methodology notes: Green investor participation is provided by issuers. Where the allocation is split between dark, medium, and light green investors, percentages for dark and medium green are included in this analysis. There is no standard methodology for defining a green investor and we acknowledge that this is subject to interpretation. There is no way to monitor how investors split their allocations of green bonds among their different portfolios.

65% of green bonds were allocated to green investors



4. The greenium: ten out of 50 green bonds priced on their yield curves

The new issue premium is the extra yield that a buyer receives, and a seller pays for a new bond, compared to where seasoned bonds from the same issuer are trading in the secondary market at the time of issuance. A new issue premium is a standard feature of the bond market.

Sometimes, a bond may be issued with a higher price, and thus have a lower yield compared to outstanding debt. The bond will price inside its own yield curve. This is known as a new issue concession; when present in a green bond, we have termed it **greenium**. This is an excellent outcome for any issuer because it means that it pays less to fund its green bond compared to its vanilla debt.

There is no reason why a bond being green should impact its price, since green bonds rank pari-passu (on equal footing) with bonds of the same payment rank and issuer. There is no credit enhancement to explain pricing differences and issuers of green bonds often incur costs such as Second Party Opinions and Certification, although these are typically negligible. Green bonds and vanilla equivalents are subject to the same market dynamics such as supply, rate expectations and geopolitical crises.

Investors more discerning in 2022

In H1 2022, Climate Bonds built yield curves for 50 of the 87 non-sovereign bonds in the sample. This is the largest number of yield curves available in any observation period so far.

Within the sample of 50 green bonds, 12 priced inside on or inside their own yield curves.

This is expected given prevailing market conditions. 20% of bonds in the sample received a pricing benefit, but investors are being more cautious and are happy to sit on cash, and in some cases, issuers are offering investors larger new issue premiums on their new bonds to gain access to capital.

The relatively low incidence of greenium in H1 2022 is not bad news for the green bond market specifically, and rather reflects investors exercising extreme caution due to the uncertain geopolitical and macroeconomic conditions. In the introduction to this paper, we highlighted the change in approach to financing in the EUR real estate sector, where labelled green bonds now dominate. We expect investor demand to continue to increase particularly in the US, where regulatory changes will introduce more green projects in the real economy.

Within our sample of 50 green bonds:

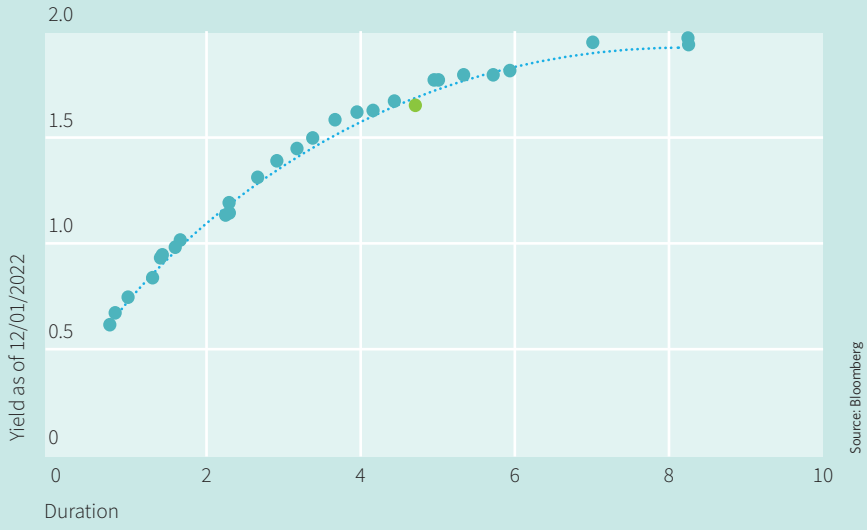
Pricing outcomes	EUR		USD		Total
	Q1	Q2	Q1	Q2	
Greenium	4	1	4	1	10
On the curve	2	0	0	0	2
New issue premium	11	21	6	0	38
Sum	17	22	10	1	50

Green bonds exhibiting a greenium in H1 2021	
EUR	NRW 2032
EUR	RTE 2034
EUR	NE Property 2030
EUR	EIB 2029
EUR	EIB 2032
USD	HK Airport 2027
USD	JBIC 2027
USD	JFM 2025
USD	Sonoco 2032
USD	ICBCAS 2025

Japan Bank for International Cooperation (JBIC 2027)

Government-owned JBIC priced its first green bond in January, a USD500m maturing in 2025. Climate Bonds could not obtain data on the book size, but the bond achieved spread compression of 3.3bps, which did not beat the vanilla basket. The bond priced inside its own yield curve and tightened by a greater magnitude than both its vanilla basket and corresponding index after both 7 and 28 days.

JBIC published its Green Bond Framework in October 2021 and obtained an SPO from Sustainalytics. The framework describes three eligible project categories: clean transport, green buildings, and renewable energy.



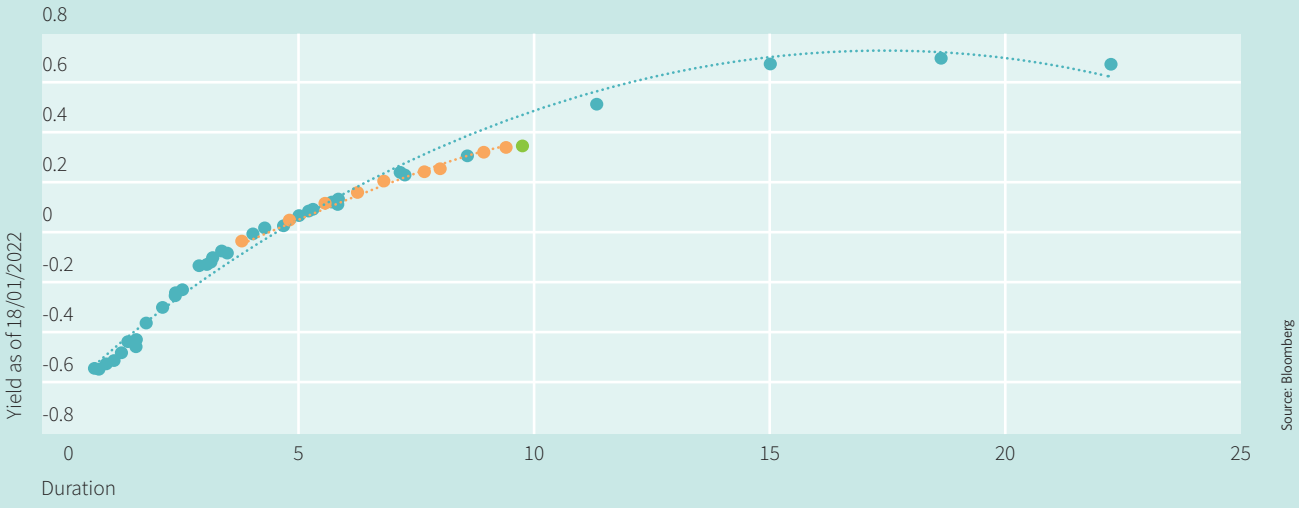
NRW Bank (NRW 2032)

NRW is the state development bank of Germany's North Rhine-Westphalia region and priced its first green bond in 2013.

In January, it returned to the market with its 12th green bond, a EUR500m (USD563m) ten-year. The bond accumulated EUR2.1bn of orders, covering the deal by 4.2 times and shaved3 bps off initial price thoughts, beating its vanilla basket on both metrics. The bond priced inside its own vanilla yield curve and achieved a greenium. The order book was well diversified, and more than 80% was allocated to investors describing themselves as green. The spread widened on the break but 28 days after pricing was 10% tighter, beating both the corresponding index and vanilla basket.

The proceeds of the bond were earmarked for categories aligned with the draft EU Green Bond Standard (GBS) and the EU Taxonomy. Two-thirds of the proceeds were reserved for river renaturation projects (adaptation), the rest to mitigation projects in several categories. Climate Bonds expects bonds that are aligned with the EU GBS and EU Taxonomy to attract more attention from investors in the primary market.

NRWBK 2032 EUR - greenium



What's in a greenium?

Climate Bonds uses the term greenium when a bond is sold in the primary market with a higher price, and corresponding lower yield, compared to where existing debt of the same issuer is trading in the secondary market. This is similar to a new issue concession. Climate Bonds uses this data to determine whether the green label can achieve cheaper funding for the issuer.

There is nuance to this: for example, even if a green bond does not price through its own yield curve and delivers a traditional new issue premium, the issuer could still have achieved cheaper funding that it would have had it issued a vanilla bond. Climate Bonds does not remark on this for now.

Since Climate Bonds introduced the term greenium in 2017, it has been incorporated into the financial vernacular, used to describe a multitude of calculations related to green bond pricing. These include secondary market performance, or comparisons of new issue spreads of green bonds and other bonds issued in different years from the green bond for example, which would naturally result in vastly different conclusions.

Even when the greenium is used synonymously with new issue concession by others, there are some details which may give different results from those achieved by Climate Bonds.

- Climate Bonds uses Bloomberg closing prices.
- For large government bonds, Climate Bonds confers with the issuer to determine the precise timing of the deal to ensure that a yield curve is built using data from the exact same time. Where possible, official pricing sources are used.
- Climate Bonds plots the duration on the x-axis, not the term to maturity. Using the duration accounts for differences in coupon and pricing dates across the yield curve.
- Climate Bonds uses a homogenous set of bonds. Only bonds sharing the same characteristics as the green bond are included in the construction of the yield curve (for example, minimum size of USD500m, bonds of the same seniority, etc.). Bonds bearing other thematic labels are excluded or plotted as a separate curve.
- Climate Bonds does not account for a vanilla bond new issue premium equivalent in its greenium calculations. The greenium is determined by eye, or through linear interpolation according to the position of the bonds on either side of the green bond's duration.

Methodology notes: *We use yield-on-issue-date, which reflects the price that the green bond offered on the pricing date. For comparable bonds, we use the yield-to-convention-mid.*

For all bonds, we use modified duration to mid, and all the data is as of the pricing date of the green bond. The modified duration is the percentage price change of a security for a given change in yield. The modified duration increases with risk.

First, we plot seasoned vanilla bonds (blue dots) and fit a 2nd order polynomial yield curve. Next, we overlay any seasoned green bonds (orange), and finally we add our subject bonds (green). Vanilla bonds issued on the same day as the subject green bond are also included (grey). We include the yield curves of bonds in our sample with a minimum of two comparable bonds (one with a shorter duration, and one with a longer duration than the green bond).

Comparable bonds used for this exercise must fit the specification for green bond selection outlined on page 23, except that they are not labelled and the use of proceeds is not limited. Bonds must share the same credit rating and payment rank as the green bond and have been issued on or after 1 January 2014.

5. Performance in the immediate secondary market

• **Seven days after pricing,** 51% of green bonds had tightened more than comparable vanilla baskets; 80% had tightened more than their corresponding index.

• **28 days after pricing,** 48% of green bonds had tightened more than comparable vanilla baskets; 77% had tightened more than their corresponding index.

In H1 2022, 64% of individual green bonds in our sample had tightened 7 days after pricing; this dropped to 49% after 28 days. In H2 2021, 75% had tightened after 7 days, and 76% after 28 days. These differences are unsurprising given the prevailing volatility in H1.

			1 week change			28 day change		
	Rating Group	Bond	Green Bond	Vanilla Basket	Corresponding iBoxx index	Green Bond	Vanilla Basket	Corresponding iBoxx index
EUR	SSA	RTE 2034	-8%	-14%	2%	2%	-22%	3%
	SSA	NRW 2032	10%	5%	5%	-6%	-3%	17%
	SSA	EIB 2029	5%	-5%	-35%	-3%	-1%	373%
	SSA	NIB 2029	2.72%	-5%	2.73%	2%	-1%	-7%
	SSA	Kommuninvest 2029	-1%	1%	-2%	25%	-1%	-12%
	SSA	KfW 2032	-27%	-359%	4%	-6%	-801%	-4%
	SSA	Kunta 2029	8%	10%	-22%	6%	4%	-16%
	SSA	EIB 2032	-9%	-359%	10%	-89%	-801%	18%
	SSA	ICO 2026	47%	-9%	-17%	841%	-62%	36%
	SSA	BPI 2027	-111%	-15%	-15%	-118%	26%	20%
	SSA	SEK 2027 (SP)	76%	-15%	-5%	71%	26%	1%
	Covered	Caja R. de Navarra 2029 (CO)	5%	42%	70%	10%	42%	1591%
	Covered	DZ Hyp 2029 (CO)	40%	-51%	773%	135%	-39%	874%
	Covered	Muenchener Hyp. 2030 (CO)	-117%	10%	-4%	-231%	17%	13%
	Covered	NN Bank 2032 (CO)	30%	18%	-17%	11%	23%	-16%
	Covered	BACA 2028 (CO)	23%	-100%	0%	14%	-33%	-1%
	Covered	BPCE 2032 (CO)	6%	12%	4%	21%	32%	5%
	Covered	BYLAN 2032 (CO)	27%	18%	0%	24%	23%	16%
	AA	Berlin Hyp 2027 (SP)	-19%	-35%	-15%	-25%	-40%	-10%
	AA	SB1 Oestlandet 2027 (SP)	9%	-9%	30%	24%	12%	62%
	AA	NAB 2028	-1%	17%	5%	18%	17%	12%
	A	Areal Bank 2028 (SP)	4%	8%	9%	18%	-9%	29%
	A	ESB 2034	-12%	-14%	6%	-10%	-22%	15%
	A	Gecina 2033	-19%	-2%	0%	-6%	16%	8%
	A	Prologis 2034	6%	-2%	9%	-6%	16%	33%
	A	SBAB 2027	4%	0%	34%	5%	0%	120%
	A	Nordea 2027 (SNP)	-7%	2%	8%	7%	26%	124%
	A	Segro 2026	-17%	-9%	-9%	-33%	14%	-37%
	A	Segro 2030	-13%	-4%	-3%	-4%	0%	-18%
	A	Bank of China 2025	9%	-8%	16%	20%	31%	37%
	A	TenneT 2026	-11%	-9%	15%	6%	4%	10%
	A	TenneT 2029	-8%	-10%	12%	-4%	3%	8%
	A	TenneT 2033	-5%	28%	7%	0%	19%	9%
	A	TenneT 2042	-6%	-5%	7%	-10%	-3%	9%
	A	ASML 2032	11%	15%	-1%	5%	4%	-4%
	A	Prologis 2031	0%	1%	3%	2%	6%	9%
	A	Stedin 2030	-3%	-9%	-7%	13%	6%	10%
	A	SBAB 2025 (SP)	-14%	2%	-4%	44%	30%	54%
	BBB	VGP 2027	-3%	-2%	5%	2%	-1%	31%
	BBB	VGP 2030	-1%	-4%	6%	3%	0%	30%
	BBB	E.ON 2034	1%	-16%	7%	11%	-29%	20%

	Continued		1 week change			28 day change		
	Rating Group	Bond	Green Bond	Vanilla Basket	Corresponding iBoxx index	Green Bond	Vanilla Basket	Corresponding iBoxx index
EUR	BBB	Logicor 2034	0%	-2%	7%	7%	16%	20%
	BBB	ICADE 2030	-3.8%	-3.5%	6%	3%	0%	19%
	BBB	CTP 2026	-3%	-9%	3%	-3%	14%	9%
	BBB	NE Property 2030	-3.54%	-3.53%	3%	-3%	0%	16%
	BBB	Acciona 2032	-10%	-14%	1%	-12%	-15%	18%
	BBB	P3 Group 2025	-5%	-9%	-1%	-3%	14%	17%
	BBB	P3 Group 2029	-1%	2%	0%	5%	10%	19%
	BBB	Thames 2028 (SS)	-7%	-14%	6%	-9%	-15%	55%
	BBB	Thames 2032 (SS)	-1%	-14%	7%	-6%	-15%	47%
	BBB	Iberdrola 2032	-23%	-14%	-3%	-61%	-15%	-17%
	BBB	EDP 2029	-16%	1%	-3%	-28%	7%	-13%
	BBB	Vonovia 2032	-14%	3%	-4%	-36%	9%	-13%
	BBB	E.ON 2025	-33%	-8%	-12%	-37%	-10%	-5%
	BBB	E.ON 2031	-23%	-8%	-9%	-20%	-4%	-9%
	BBB	UPM 2029	3%	-1%	5%	23%	-4%	4%
	BBB	RWE 2026	-1%	-12%	5%	-6%	15%	9%
	BBB	RWE 2030	-1%	-6%	5%	-8%	2%	5%
	BBB	ABN Amro 2032 (SNP)	-12%	-4%	-5%	4%	9%	6%
	BBB	ABN Amro 2032 (SNP)	-9%	-5%	-6%	16%	8%	13%
	BBB	Orsted 2028	-1%	0%	10%	4%	5%	30%
	BBB	Orsted 2033	-2%	-4%	6%	3%	-8%	13%
	BBB	VW 2025	3%	-8%	8%	-5%	-17%	11%
	BBB	VW 2027	1%	-3%	6%	-4%	-20%	9%
USD	A	SMFG 2029	0%	6%	6%	2%	9%	21%
	A	Agri Bank of China (HK) 2025	-1%	14%	10%	31%	53%	19%
	A	PSEG 2032	-5%	6%	-2%	-25%	-18%	-12%
	A	Bank of China (Sing) 2025	-31%	40%	4%	-27%	58%	17%
	A	CCB (London) 2025	-32%	40%	1%	-23%	58%	-10%
	A	ICBCAS (HK) 2025	-26%	40%	-14%	-55%	58%	-2%
	A	Bank of China (Ffurt) 2025	15%	40%	13%	14%	58%	21%
	AA	Korea East-West Power 2025	-18%	1%	-5%	-7%	-24%	-6%
	BBB	Sonoco 2032	5%	-3%	3%	15%	-3%	14%
	BBB	INRCIN 2032	-1%	-5%	2%	-1%	6%	10%
	BBB	Alexandria RE 2034	2.4%	10%	2.2%	18%	22%	16%
	BBB	Verizon 2052	2%	-2%	5%	1%	-2%	10%
	BBB	Welltower 2032	-2%	10%	-5%	2%	22%	16%
	BBB	Equinix 2032	-2%	10%	-1%	11%	22%	18%
	BBB	Shinhan Bank 2032	-5%	40%	9%	-7%	58%	22%
	BBB	Jabil 2027	6.4%	6.3%	7%	7.8%	8.2%	21%
	BBB	Industrial Bank (HK) 2025	-35%	40%	4%	-21%	58%	-3%
	BBB	NXP 2033	3%	0%	5%	-6%	-7%	-3%
	Covered	LBBW 2025 (CO)	14%	10%	N.A	-2%	10%	N.A
	SSA	HK Airport 2027	-15%	0%	13%	-15%	16%	22%
	SSA	EIB Korea 2032	8%	-11%	9%	22%	6%	18%
	SSA	JBIC 2027	-8%	0%	2%	-7%	16%	-2%
	SSA	JFM 2025	7%	-84%	-2%	-1%	-25%	3%
	SSA	KEPCO 2025	-15%	-16%	1%	-9%	-35%	18%

Bonds generally often deliver price tightening in the immediate secondary market since investors may want to increase their position or open a position in a bond they did not get allocated. Timing is an important factor, because bond indices rebalance at each month end. Therefore, if bonds are issued early in the month, there could be an opportunity for managers to add some off-benchmark performance before bonds are added to indices. Once bonds enter indices, except for credit events, liquidity can quickly evaporate, and accurate spreads are quoted on a bilateral basis. Our consideration of the secondary market consequently only extends to one month after the pricing date of each bond.

To contextualise spread movements, we compare each green bond to two alternatives. Firstly, we match each green bond to a vanilla bond or a basket of vanilla bonds sharing similar characteristics, issued in the same quarter as the green bond. This comparison is a proxy for the opportunity cost to the investor. Secondly, we compare each green bond to a corresponding index to monitor their performance against the market.

It is always tricky to find bonds sharing similar characteristics to green bonds priced in the same quarter, and this process presented additional challenges as vanilla issuance in H1 declined in some sectors. In the vanilla baskets, the performance of individual bonds is measured from the issue date of each bond. Since it is unlikely that the vanilla bonds are priced on the same day as the green bond, this could be expected to impact comparisons in the secondary market particularly when markets are volatile. This exercise is designed to illustrate what an investor could have otherwise done with their money in the vanilla bond market during the same period. In H1, volatility sometimes benefited the green bond, sometimes it did not.

After seven days

- 51% of green bonds had tightened by more than their vanilla baskets: 47% of EUR and 61% of USD green bonds.
- 81% of green bonds had tightened by more than their corresponding index: 80% of EUR and 77% of USD green bonds.

Compared to H2 2021, a lower percentage of green bonds tightened more than their vanilla baskets (53% in H2) and a higher percentage tightened more than corresponding indices (70% in H2). Fewer individual green bonds tightened on the break (64% compared to 75% in H2). This is expected given the volatility seen in H1.

26 out of 64 EUR green bonds had tightened against both their vanilla basket and corresponding index after a week. Among them were nine of the 14 EUR real estate deals: **Gecina 2033, Segro 2026, Segro 2030, Prologis 2031, VGP 2027, Icade 2030, NE Property 2030, P3 Group 2029**, and **Vonovia 2032.**

Vonovia 2032 tightened by 20bps (14%) a week after pricing. The bond experienced higher book cover and spread compression during book building compared to its vanilla basket but priced with a normal new issue premium.

Seasoned green bond issuer Iberdrola priced a EUR1bn USD1.1bn ten-year green bond in March (**Iberdrola 2032**). The bond did not beat its vanilla basket on spread compression and book size and priced with a normal new issue premium. However, the bond tightened by 14bps (-23%) seven days after pricing, more than both its vanilla basket (-14%) and corresponding index (-3%).

In USD, 12 out of 24 green bonds had tightened against both their vanilla basket and corresponding index after a week (see NB1). These included seven of the eight bank issuers: **Agri Bank of China (HK) 2025, ICBCAS (HK) 2025, Industrial Bank (HK) 2025, Bank of China (Sing) 2025**, and **CCB (London) 2025.** China Construction Bank Corp (CCB (London) 2025) priced a (USD1bn) three-year bond in May. Climate Bonds could not obtain book size data for this bond, but it tightened 43bps in the primary market. There were not enough bonds to build a yield curve, so a greenium could not be determined. The bond tightened by 15bps (-32%) seven days after pricing, beating both its vanilla basket (40%) and corresponding index (1%).

NB1: *Climate Bonds could not obtain data for the corresponding index of LBBW 2025 (CO).*

After 28 days

- 48% of green bonds had tightened by more than their vanilla baskets: 47% of EUR and 57% of USD green bonds.
- 77% of green bonds had tightened by more than corresponding indices: 75% of EUR and 86% of USD green bonds

The 28-day metrics for H1 2022 were similar to those of H2 2021 (which in turn were not vastly different from H1 2021): 48% of bonds tightened more than their vanilla baskets against 52% in H2, while 77% tightened more than corresponding indices in H1 against 73% in H2. 35 green bonds tightened more than both vanilla baskets and corresponding indices.

In EUR, several utilities performed very well 28 days post pricing. Iberdrola, already mentioned above, had tightened by 61% after 28 days. **E.ON** priced a EUR1.5bn (USD1.7bn) dual tranche deal split equally between 2026 and 2031 maturities. Both bonds accumulated larger book cover than vanilla baskets, but only the 2026 achieved larger spread compression. The bonds priced with a new issue premium but had tightened by 33% and 23% seven days after pricing. After 28 days, the 2026 had extended that tightening to 36% while the 2031 had retraced slightly to 20%. Both bonds performed better than their vanilla baskets and corresponding indices in the secondary market.

In USD, 13 out of 24 green bonds achieved greater spread tightening compared to equivalents in the first month. Indian Railway Finance (**INRCIN 2032**) priced its first green bond, a USD500m, in January. The bond was Certified under the Climate Bonds Low Carbon Transport Standard and attracted a book cover of 2.6 times deal size (the vanilla basket was 3.5 times) while the spread tightened by 25bps in primary (same as the basket). The bond had tightened by 1% after a month, beating its basket (6%) and corresponding index (10%).

In H1 2022, secondary market performance depended greatly on timing. Some bonds had performed well after seven days but reversed those gains 21 days later, and the opposite was also true. The vanilla baskets remain a good proxy to demonstrate what else an investor could have bought in the same quarter, but the index comparisons are probably a better illustration of relative performance when markets are volatile, because the timing is precisely matched.

Methodology notes: 1. *Vanilla baskets comprise the closest possible matches based on the considerations highlighted on page 23 We have created this proxy to illustrate what else an investor could have done with their money during the same quarter. 2. Indices. We compare each bond to a standard iBoxx index. The indices are granulated by currency, asset class, tenor, and credit rating, all of which can influence the behaviour of a bond. Each bond is therefore compared to an index sharing similar characteristics; for example, VW 2025 was matched with the iBoxx EUR Corporates BBB 1-3 index.*

Seven calendar days include five data observations. 28 calendar days include 20 data observations.

6. Green bond ETFs

At the end of H1 2022, there were 13 EUR or USD green bond ETFs with combined fund assets of USD1.7bn, a slight decline of 3% on the prior period. The prior observation period was the first time we had seen any net outflows from the individual funds in our sample, and in H1 2022 ten out of 13 funds suffered from net redemptions, while the remaining three demonstrated growth. The strongest growth came from the Lyxor Green Bond ESG Screened Fund, which expanded its total fund assets by 339%. This ETF is based on the Solactive Green Bond ESG EUR USD IG TR Index, which in turn is informed by the composition of Climate Bonds' GBDB. Intuitively, one would expect fixed income to be out of favour in a rising rate environment, hence the additional capital that some of the green bond ETFs have attracted is a positive outcome.

Inclusion in the Climate Bonds GBDB is determined according to the Climate Bonds Green Bond Methodology. This was updated in July 2022, and can be dowloaded at www.climatebonds.net/market/green-bond-database-methodology .

Currency	Index	Launch date	Size at launch	Local 31 Dec 2021	USD 31 Dec 2021	Local 30 June 2022	USD 30 June 2022	Change on period
EUR	**Solactive Green Bond Index**	01/02/2017	EUR5m	654.1	744.8	533.9	558.5	-25.0%
USD	**S&P Green Bond Select Index**	01/03/2017	USD5m	103.7	103.7	82.6	82.6	-20.4%
USD	**Bloomberg Barclays MSCI Global Green Bond Select Index**	01/11/2018	USD25m	273.1	273.1	269.1	269.1	-1.5%
EUR	**Bloomberg Barclays MSCI European GB Issuer Capped EUR Index**	01/11/2018	EUR20m	19.3	22.0	17.3	18.1	-17.4%
EUR	**Bloomberg Barclays MSCI Euro Green Bond Index**	01/04/2019	EUR10m	131.7	150.0	81.3	85.1	-43.3%
EUR	**Solactive Green ESG Bond EUR USD IG TR Index**	01/10/2019	EUR4m	33.3	37.9	158.6	166.3	339.0%
EUR	**JP Morgan ESG Green Bond Focus Index**	01/02/2021	EUR23m	23.3	26.5	8.1	8.5	-67.8%
EUR	**Bloomberg MSCI Euro Green Bond SRI including Nuclear Power Index**	25/03/2021	EUR30m	45.4	51.3	48.4	50.7	-1.1%
CAD	**S&P Green Bond U.S. Dollar Select Index**	01/06/2021	CAD6m	6.2	4.9	5.5	4.3	-12.2%
EUR	**Bloomberg MSCI EUR Corporate and Agency Green Bond Index**	24/06/2021	EUR20m	143.7	162.8	148.1	155.3	-4.6%
USD	**Bloomberg MSCI USD Corporate and Agency Green Bond Index**	24/06/2021	USD17m	106.4	106.4	233.4	233.4	119.4%
EUR	**Solactive Euro Government Green Bond Index**	01/07/2021	EUR48m	52.1	59.3	63.9	66.9	12.8%
EUR	**Solactive EUR USD IG Corporate Green Bond TR Index**	24/08/2021	EUR50m	51.6	58.8	46.2	48.4	-17.6%
Total					**1801.3**		**1747.4**	**-3.0%**

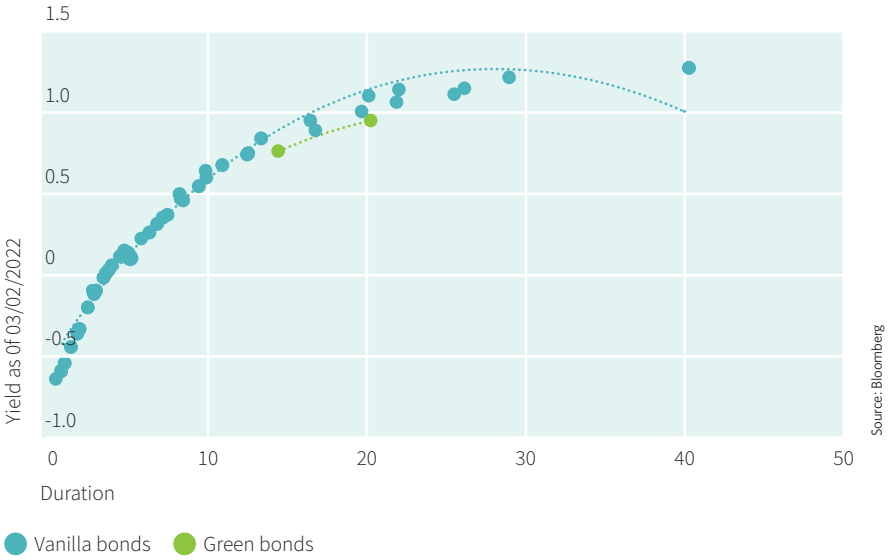
7. Spotlight: Sovereign Green Bond Club

At the end of H1 2022, the Climate Bonds GBDB included sovereign green bonds from 24 issuers with a combined volume of USD212bn. This figure includes USD34.4bn added in H1 2022, of which USD26.3bn was either USD- or EUR- denominated. USD16bn of that amount came from taps, while USD10.3bn was from three new green bonds.

Five sovereign green bonds were reopened in H1 2022. The French and German green bonds were trading inside their conventional curves in the secondary market and hence achieved a greenium.

New sovereign green bonds came from debut green bond issuer Austria (EUR4bn/USD4.3bn), France which priced its first inflation-linked green bond (EUR4bn/USD4.3bn), and Indonesia which issued its fifth USD green bond (USD1.5bn) in May.

When France reopened the 2044 green bond in Feb it was inside the vanilla curve



Five green bonds were reopened in H1 2022

Issuer	Maturity	Date of tap	Size of tap (local)	Size of tap (USD)	Size as of 30/06/2022 (EUR)	Size as of 30/06/2022 (USD)
Dutch State Treasury Agency	15/01/2040	14/06/2022	EUR5bn	USD5.2bn	EUR15.7bn	USD17.3bn
Federal Republic of Germany	15/08/2030	22/02/2022	EUR1.5bn	USD1.7bn	EUR8.0bn	USD9.3bn
	15/08/2031	04/05/2022	EUR1.5bn	USD1.6bn	EUR8.0bn	USD9.1bn
	15/08/2050	01/06/2022	EUR4bn	USD4.5bn	EUR10.0bn	USD11.9bn
Republic of France	25/06/2044	03/02/2022	EUR2.8bn	USD3.18bn	EUR14.2bn	USD16.8bn
Total			**EUR15bn**	**USD16.2bn**		

Sovereign Scorecard H2 2021

	Austria	France	Indonesia
H1 2022	1.85% 23/05/2049	0.1% 25/07/2038	4.7% 06/06/2032
Pricing date	24/05/2022	25/05/2022	24/05/2022
Tenor	27 Years	16 Years	10 Years
Amount issued	EUR4bn/USD4.3bn	EUR4bn/USD4.3bn	USD1.5bn
Total green bonds			
Number of bonds	1	3	5
Total size of green bonds	EUR4bn/USD4.3bn	EUR49bn/USD56bn	USD3.75bn
% of total sovereign debt *	1.6%	2.6%	0.8%

*Market data from Bloomberg based on BICS Level 1 = sovereigns, residual maturity of at least one year as of August 2022

Austria

Austria became the 13th member of the EU27 to join the Sovereign Green Bond Club when it priced its first green bond in May 2022. The EUR4bn (USD4.3bn) deal had a tenor of 27 years.

The bond attracted bids reaching EUR25bn, covering the transaction by 6.25 times. The spread tightened by 3bps in the primary market, and the Austrian Debt Management Office noted a greenium of 2.5bps. Green investor participation was strong with 70% of allocations going to investors describing themselves as green or socially responsible.

Austria has identified over EUR5bn of green expenditures per year, so it can reasonably be expected to return to the market. Its green financing framework was published in April 2022 and included eight eligible project categories consistent with the six environmental objectives of the EU Taxonomy.

France

France added an inflation-linked green bond in May 2022, the first sovereign issuer to do so. The EUR4bn (USD4.3bn) deal attracted an order book of EUR27.5bn thanks to growing investor concerns over green transition and rising inflation. The bond is indexed to the European consumer price index, such that coupon payments offer investors protection from rising inflation.

The bond priced slightly outside the FRTR inflation-linked curve, but after a month had moved inside. The order book included around 230 names, and more than half of the bond was allocated to green investors.

France was the largest sovereign green bond issuer at the end of June 2022 with EUR49.4bn (USD56bn) outstanding, spread over two bullet bonds and the new inflation-linked deal.

Indonesia

Indonesia priced its largest global Sukuk in May 2022, comprising a vanilla five-year tranche worth USD1.75bn and a USD1.5bn green ten-year. The USD deal attracted huge investor interest and the green tranche accumulated bids from 225 investors, amounting to USD5.1bn and covering the book 3.4 times. The spread tightened by 40bps during book building and priced with a normal new issue premium. In the secondary market, the bond had tightened 13% after 7 days, and 17% after 28 days.

Indonesia has now priced five USD sovereign green Sukuk with a total volume of USD5bn.

The EU prices EUR11bn of green bonds

In 2020, the EU announced its EUR750bn NextGenerationEU development programme to combat the medium-term impacts of the COVID-19 pandemic. Up to EUR250bn of this amount will be sought from the green bond market, which will make the EU the largest green bond issuer globally. At present, Fannie Mae is the largest individual issuer with a cumulative volume of USD101bn by end of H1 2022.

The European Commission has stated that it expects its green bond programme to bring advantages for the EU and support the development of the sustainable finance market from several angles:[5]

- Confirm the European Commission's commitment to sustainable finance;
- Help the European Commission access a wider range of investors;
- Bring new highly rated and liquid green assets to the market, giving access to green investments for a wide range of investors;
- Allow investors to diversify their portfolio of green investments with a highly rated liquid asset, thereby potentially accelerating a virtuous circle of sustainable investments;
- Further boost the green bond market and serve as an inspiration to other issuers;
- Strengthen the role of the European Union and of the Euro in sustainable finance markets.

Under the NextGenerationEU green bond framework, the funds will be used for nine broad categories of expenditure, including energy efficiency, clean energy, and climate change adaptation, among others.

EU benchmarks are large, liquid transactions included in relevant broad market bond indices and typically attract broad investor interest. Among the 14 benchmarks priced in 2021, book cover ranged from 3.3 times to 13.8, with an average of 8.7 times. A 15-year EUR2.17bn EU SURE (Support to mitigate Unemployment Risks in an Emergency) social transaction attracted 16.1 times book cover in March 2022.

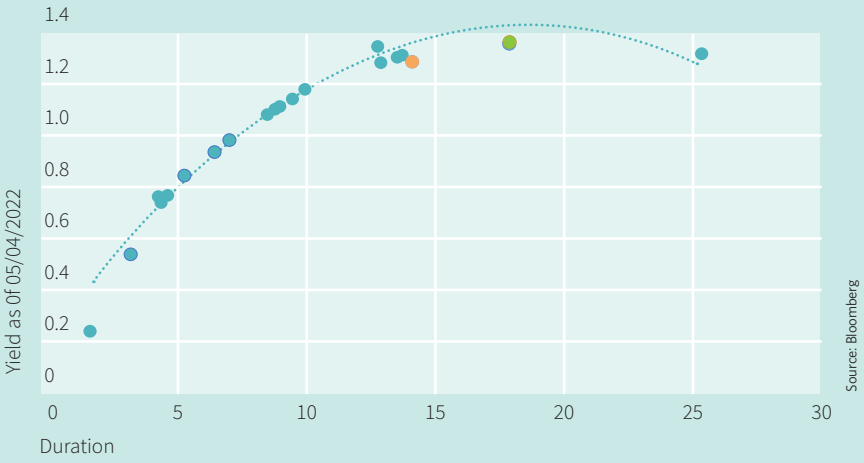
The EU priced its first green bond in October 2021. The 2037 maturity was issued with an initial size of EUR12bn, and by the end of H1 had been tapped twice to reach EUR17bn (USD19.8bn). During H1 2022 the EU issued two more deals.

In May 2022, a EUR6bn 2043 was priced. The bond attracted bids of EUR78.25bn, covering the transaction by 13 times. This is the second highest book cover recorded by Climate Bonds (Prologis 2032 attracted a book cover of 14 times in June 2020). The spread tightened by 2bps and the bond priced on the yield curve; after one month, the bond had moved inside the curve.

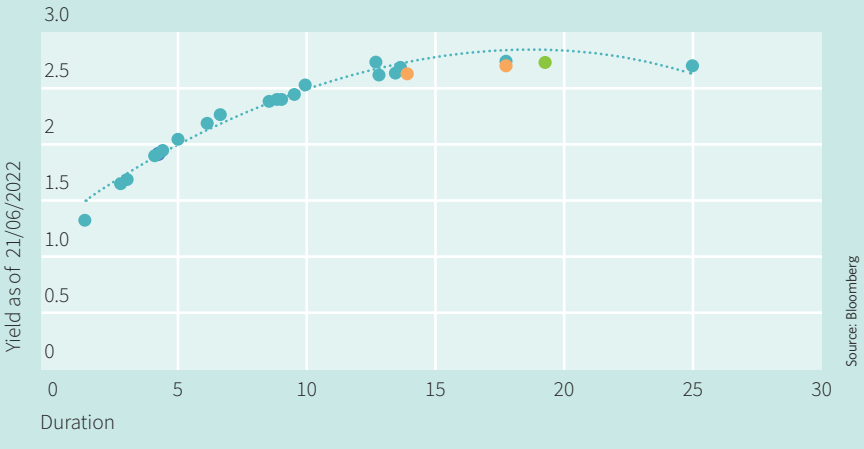
Around 70% of the bond was allocated to investors describing themselves as green or socially responsible.

In late June, a third EU green bond was priced, a EUR5bn 2048. Market conditions were a little more volatile, but the bond attracted book cover of 6.4 times and tightened by 2bps during book building. The bond priced inside its own yield curve, achieving a greenium, and remained inside the vanilla curve in the secondary market. 30% of the transaction was allocated to investors describing themselves as green or socially responsible.

EU 2043 EUR - on the curve



EU 2048 EUR -greenium



Vanilla bonds Seasoned green bonds New issue green bond

8. Spotlight: Sustainability-linked bond pricing in the primary market.

Summary of findings

Climate Bonds examined qualifying sustainability-linked bonds (SLBs) issued in 2021 and H1 2022 to determine whether there was evidence of a greenium. Within the sample of 37 SLBs, 14 achieved a greenium comprising 11 USD denominated, and three EUR. Eleven of the SLBs obtaining a greenium were priced in 2021, and three in 2022.

Rapid growth for SLBs

The SLB market has grown rapidly since Chinese infrastructure company Beijing Infrastructure Investment Co priced the first instrument in 2018 with a coupon step-up linked to the achievement of social key performance indicators (KPI's). By the end of H1 2022, Climate Bonds had recorded SLB volumes of USD176.6bn.

Methodology

Climate Bonds analysed SLBs to determine whether they could help issuers achieve better pricing outcomes in the primary market. For want of better ideas, Climate Bonds applied the same methodology as it uses for regular green bond pricing analysis.

Parameters for consideration were:

- Original amount sold: at least USD500m
- Currency: EUR or USD
- Thematic label: SLB label
- Maturity type: fixed
- Pricing date: 01 January 2021 – 30 June 2022

53 USD bonds and 88 EUR bonds met these requirements.

Climate Bonds constructed a yield curve for each SLB using vanilla bonds of the same issuer sharing similar characteristics (minimum size, same seniority, no other thematic label, same country of risk etc.), issued no earlier than 2014. The analysis could only happen if there was one vanilla bond with a shorter duration, and one with a longer duration than the SLB.

Climate Bonds was able to construct yield curves for 37 SLBs.

One exception to this methodology was the Tesco 2029, where the bond with longer duration had EUR235m (USD315m) outstanding at the time of the analysis.

Hallmark alignment

SLBs are general purpose debt instruments tied to improved sustainability performance at the entity level.

They typically include a financial mechanism to incentivise the achievement of objectives, such as a coupon step-up activated after a stated period if the objectives are not met.

When sustainability targets are calibrated appropriately, SLBs can be helpful in mobilising capital for entity transitions. Entities can issue both SLBs and UoP instruments. If issuers intend to use SLBs as transition finance instruments, they should demonstrate alignment with **Climate Bonds Five Hallmarks for Credible Transition**, listed below.[6]

Hallmark 1

- Credible Sustainability Performance Targets (SPTs) tied to all greenhouse gas (GHG) emissions (Scope 1, 2, & 3)
- Be calibrated ambitiously in line with sector-focused Paris aligned targets

Hallmark 2 & 3

- Clear plans to achieve targets, especially regarding operational changes, financing plans, and governance structures

Hallmark 5

- Annual independently verified external reporting regarding actions taken and performance against SPTs

Can SLBs help issuers achieve a greenium?

The sample is described below along with the outcomes.

	EUR		USD	
Pricing period	**Greenium**	**NIP**	**Greenium**	**NIP**
H1 2021	1	3	4	0
H2 2021	0	5	6	2
H1 2022	2	8	1	5

The SLBs found to have achieved a greenium were as follows

Pricing date	Currency	Original amount (local)	Issuer Name	Maturity
20/01/2021	EUR	0.75	**Tesco**	2029
15/04/2021	USD	0.60	**China Construction Bank (HK)**	2024
06/05/2021	USD	0.50	**Orbia Advance Corp**	2031
24/06/2021	USD	1.00	**Enbridge**	2033
28/06/2021	USD	1.00	**Suzano (Austria)**	2032
07/07/2021	USD	1.25	**Enel**	2026
07/07/2021	USD	1.00	**Enel**	2028
07/07/2021	USD	1.00	**Enel**	2031
08/09/2021	USD	0.50	**Suzano (Austria)**	2028
28/09/2021	USD	0.75	**Analog Devices Inc**	2028
06/12/2021	USD	1.00	**Newmont Corporation**	2032
10/01/2022	EUR	1.25	**Enel**	2025
09/03/2022	EUR	0.50	**A2A SPA**	2028
12/04/2022	USD	0.60	**John Deere**	2029

An initial analysis of EUR SLBs priced in 2021 revealed only one greenium, which was for the Tesco 2029 priced in January of that year. Tesco achieved the largest outright greenium in the sample (-42bps) Tesco set a KPI to reduce Scope 1 and 2 GHG emissions. Stated sustainability performance targets (SPTs) were to reduce Scope 1 and 2 emissions by 60% by 2025 and 85% by 2030 against a 2015 baseline, which were consistent with a trajectory to 100% by 2050. When the SLB was priced, Tesco had already achieved a 50% reduction towards its target, so Climate Bonds was sceptical.

Beyond this, two factors may have contributed to Tesco's SLB greenium:

1. Tesco is a very relatable name and prior to its SLB, the only other supermarket to price a EUR benchmark with a thematic label was Dutch multinational Ahold Delhaize with a EUR600m 6-year sustainability bond in issued in 2019.

2. The SLB was the largest bond on Tesco's yield curve at EUR750m (USD908m) when it as priced. The longest bond (2047) on the curve had been partially redeemed and did not reach benchmark size (EUR235m/USD315m).

More USD SLBs achieved a greenium

Extending the analysis to include USD denominated SLBs and into 2022, broadened the picture considerably. Climate Bonds determined that ten out of 12 USD SLBs priced in 2021 achieved a greenium ranging from -4bps to -34bps. This reversed in 2022 as only one out of six USD SLBs achieved a greenium, which is expected in an economic environment which does not favour fixed income investments Among the EUR bonds, two out of ten achieved a greenium in 2022.

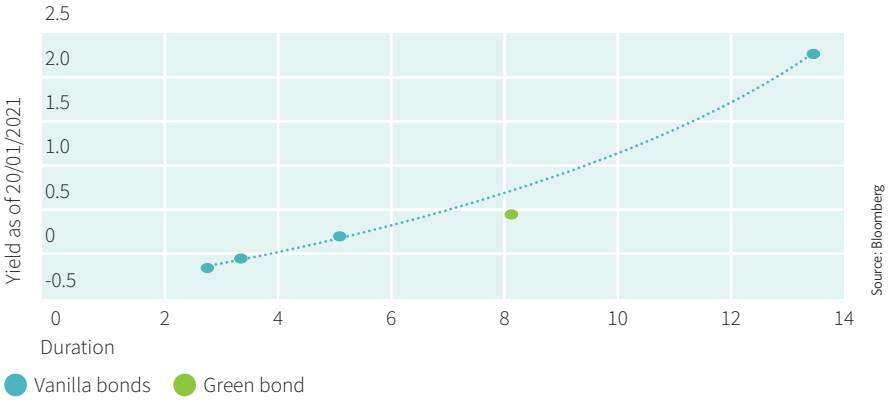
This analysis is based on a small sample, but the results are consistent with Climate Bonds understanding of the sustainable debt market and investor appetite.

Credible SLBs present opportunities for investors to allocate capital to meet their sustainable investment targets and include a broader range of issuers, but the supply of large benchmark UoP green bonds with adequate clarity and transparency is consistently increasing in EUR. EUR investors are comfortable with UoP green bonds and prefer them where available, though opportunities for sector diversification remain scant.

The structure of an SLB would present a conundrum for a dark green investor. While the buyer may benefit from a coupon step up if the KPIs were not achieved, a dark green investor would become a forced seller, and this could impact the price of the bond for all types of investors. Dark green EUR investors appear to be exercising extreme caution around SLBs with some avoiding them completely.

In USD however, there have been fewer investors with dedicated green bond mandates so far. Among the relatively low number of USD UoP green bonds with adequate transparency, most originate from non-US financial corporates. US investors like familiar, relatable names from a broad range of sectors, and the USD SLB market has contributed to that.

Tesco 2029 EUR SLB - greenium



Outlook

The results of this analysis suggest that SLBs can help issuers to achieve pricing benefits in the primary markets. For now, this seems to be more prevalent among USD denominated instruments from issuers which cannot easily access the UoP market because they do not have the appropriate expenditures or assets. It is a very positive sign that investors are willing to support the transition strategies from a broad range of sectors. To grow the market credibly, SLBs should always have ambitious KPIs and SPTs calibrated in line with sector-specific pathways. Where a financial incentive mechanism is included, it should be meaningful. The current macroeconomic and geopolitical issues have impacted all types of debt instruments, and Climate Bonds will continue to monitor SLB pricing as the market develops.

Newmont Corporation

Newmont Corporation is the world's largest gold mining company, with global operations extending to the production of copper, silver, lead, and zinc. The American company started its sustainability journey in 2001 as a founding member of the International Council on Metals and Mining and is developing a roadmap to achieve its goal of reaching net zero by 2050.

In December 2021, Newmont became the first mining company to price an SLB, with a USD1bn deal maturing in 2032. Newmont achieved one of the single largest pricing benefits in our sample, exhibiting a greenium of -31bps.

Three factors may have contributed Newmont's SLB greenium

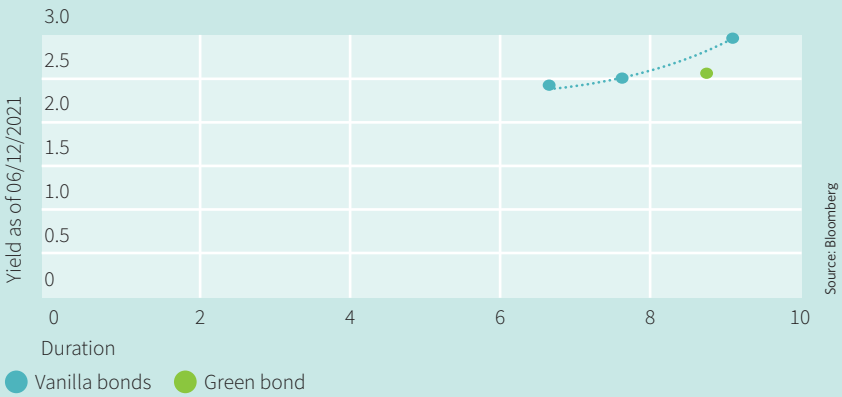
1. The step-up penalty is 50bps. While this is still quite low, it is double that of all except three other SLBs in our sample

2. Prior to December 2021, Newmont had a relatively low USD4.6bn of outstanding vanilla bonds, and its previous vanilla bond was priced in March 2020

3. Newmont is a relatable name and the only gold producing member of S&P500

Further, when assessed against Hallmark 1 of Climate Bonds Five Hallmarks for Credible Transition, Newmont's SLB is among the most credible in our sample. Its SLB targets cover all three scopes and are in line with TPI's 1.5-degree pathway for Diversified Mining. Newmont is the only SLB in our sample to address Scope 3 emissions, and it is particularly pertinent as they comprise 60% of the company's total emissions.

Newmont 2032 USD SLB - greenium



USD investors liked Enel SLBs

Enel is the largest issuer in the SLB market and Climate Bonds was able to plot at total of ten Enel SLBs priced in 2021 and H1 2022 in EUR or USD.

In July 2021, Enel priced four SLBs in USD. These bonds priced with a greenium to the vanilla curve. Enel has no green bonds outstanding in USD.

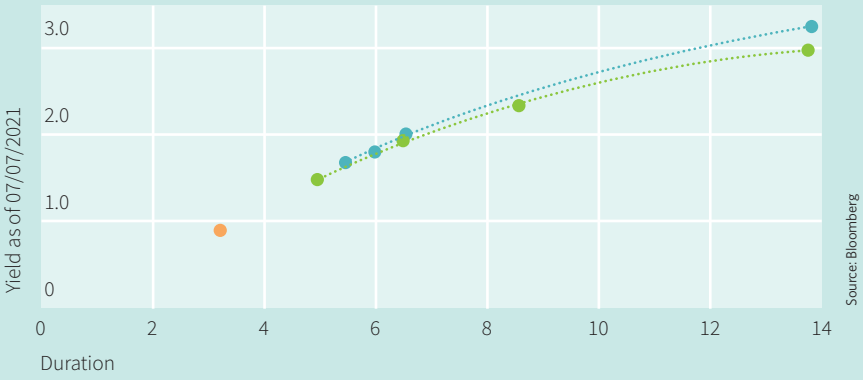
In September 2021, Enel priced three EUR SLBs, they priced outside the existing SLB curve, the green curve, and the vanilla curve, exhibiting normal new issue premia. We also observe that Enel's green curve was inside the existing SLB curve. This suggests that at this time, EUR investors preferred the use of proceeds format. In January 2022, Enel retuned to the market with a trio of EUR SLBs maturing in 2025, 2031, and 2035. Only the 2025 could be plotted on the vanilla curve, and achieved a greenium, but exhibited a new issue premium when compared to the green and SLB curves. The longer dated bonds could only be compared to the existing SLB curve, and both priced outside it.

Enel has not priced any new green EUR bonds in the current decade. The green curve comprises bonds issued in 2017 (EUR1.25bn/USD1.3bn), 2018 (EUR1.25bn/USD1.5bn), and 2019 (EUR1bn/USD1.1bn) which is not recent, but the benchmark sizes should help them to retain a degree of liquidity.

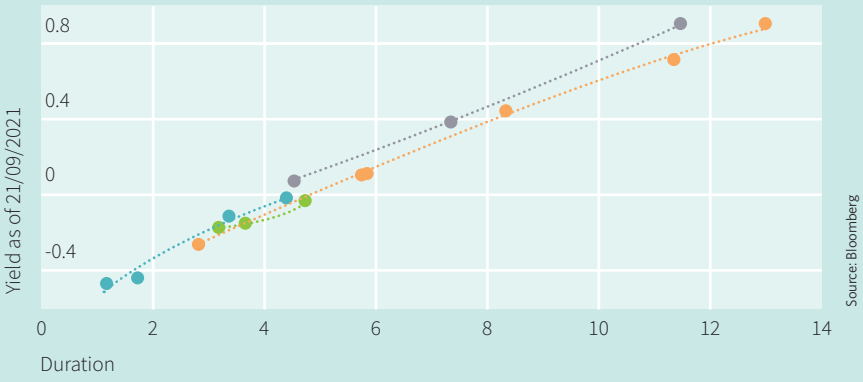
While Enel's Scope 1 targets (used in this set of SLBs) are very ambitious and in line with both Science Based Target Initiative's (SBTI) Absolute Contraction Approach and Transition Pathway Initiative's (TPI) 1.5-degree pathway for electric utilities, Scope 3 emissions comprise 55% of total emissions and are not included. Of its Scope 3 emissions, 32% come from the sale and distribution of fossil gaswhich Climate Bonds does not endorse. Climate Bonds applauds Enel's consistent use of the SLB structure instead of vanilla debt but encourages it to be more material with its KPIs.

Pricing date	Currency	Original size (local)	Maturity	Outcome
08/06/2021	EUR	1.00	2027	**New issue premium**
08/06/2021	EUR	1.25	2030	**New issue premium**
07/07/2021	USD	1.25	2026	**Greenium**
07/07/2021	USD	1.00	2028	**Greenium**
07/07/2021	USD	1.00	2031	**Greenium**
21/09/2021	EUR	1.25	2026	**New issue premium**
21/09/2021	EUR	1.00	2029	**New issue premium**
21/09/2021	EUR	1.25	2034	**New issue premium**
10/01/2022	EUR	1.25	2025	**Greenium**
08/06/2022	USD	1.00	2032	**New issue premium**

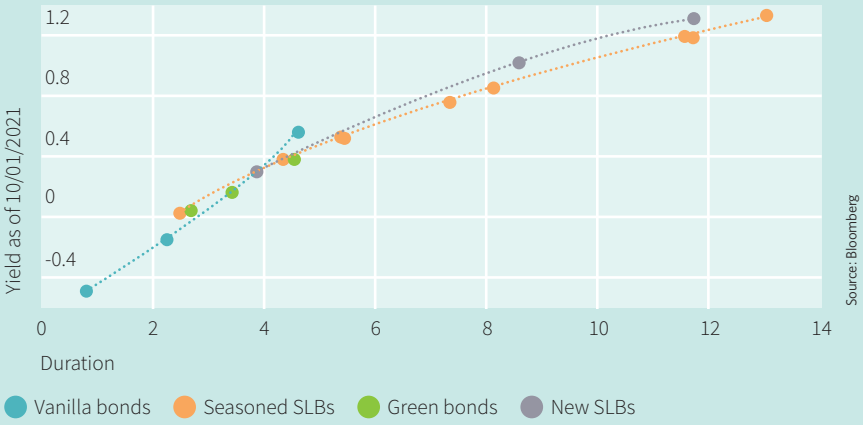
ENEL 2026, 2028, 2031, and 2041 SLBs USD - greenium



Enel 2026, 2029, and 2034 SLBs EUR - new issue premium



ENEL 25, 31, & 35 SLBs EUR- new issue premium to existing SLB curve + green curve



9. Spotlight: Green bonds exhibit better pricing dynamics in the secondary market

The purpose of this spotlight is to determine whether green bonds offered investors a different liquidity profile in the secondary market, compared to vanilla equivalents in H1 2022. The data used in this analysis was provided by Climate Bonds' partner Tradeweb. Tradeweb monitors trading activity of all types of bonds including those bearing thematic labels. Climate Bonds conducted analysis of secondary market trading of green bonds in H1 2021 and concluded that a limited supply of green bonds compared to vanilla ones facilitated better pricing dynamics.[7]

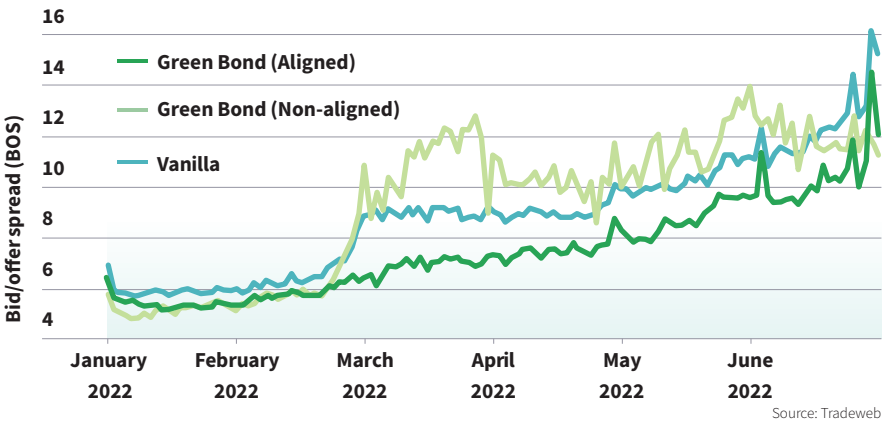
For this spotlight, Climate Bonds analysis was limited to bonds sharing the following characteristics.

- **Sector classification**: utilities, real estate
- **Pricing date**: between 01/01/2021 and 31/12/2021
- **Currency**: EUR
- **Original size**: at least EUR500m
- **Credit quality**: lowest credit rating from Moody's, S&P, or Fitch must be investment grade
- **Seniority rank**: senior unsecured
- **Coupon**: fixed
- **No thematic label except green**. Social, sustainability, and sustainability-linked bonds were excluded from this analysis.

The resulting sample was split into three categories: green (aligned), green (non-aligned), and vanilla. Those in the green (aligned) category are bonds labelled green by the issuer and included in the Climate Bonds GBDB. The green (non-aligned) category includes bonds labelled green by the issuer but not included in the Climate Bonds GBDB. The sample is described below

While vanilla is is the biggest category, the green (aligned) category is sufficiently large for the data to be meaningful.

Bid/offer spreads are narrower for green bonds



Source: Tradeweb

Turnover and execution quality

Turnover is the volume traded in each period divided by the outstanding amount of each bond.

Overall, the sample of green bonds (aligned) exhibited the largest turnover during the first six months of 2022. This confirms that green bonds can, and do trade actively in the secondary market, offering flexibility to investors. The sample of green bonds (non-aligned) exhibited the lowest turnover during the period. The sample includes just four bonds, but the difference between the two numbers points to the importance of selecting appropriate activities for inclusion in the eligible use of proceeds and disclosing them with adequate clarity.

Category	Turnover
Green (aligned)	0.057
Green (non-aligned)	0.031
Vanilla	0.042

Bid/offer spreads are narrower for green bonds.

The bid/offer spread (BOS) is the difference between the composite dealer bid price and the composite dealer ask price, as calculated by Tradeweb. A narrower BOS suggests there is an easier ability to trade in or out of the bond.

The average BOS was narrower for green (aligned) bonds than vanilla on every single day in H1 2022. The difference was negligible for the first two months of the year, but from March onwards, the BOS widened for all categories of bonds. The widening was less aggressive for green (aligned). This confirms that on average, the market for green bonds is more liquid compared to that of vanilla counterparts offering buyers more flexibility to sell in the secondary market.

Liquidity quality score

The liquidity quality score (LQS) is a dual-sided indicator of the liquidity of a bond leveraging proprietary Tradeweb information and machine learning techniques. It indicates the potential ease of trading the bond and cost of liquidity.

Overall, the LQS of green bonds (aligned) did not exhibit large differences compared to vanilla bonds.

However, the ask liquidity was lower for green bonds compared to the vanilla sample which suggests that green bonds were more difficult to buy. This is expected given there are fewer green bonds compared to vanilla, and buyers of green bonds tend to be stickier, wanting to hold the bonds until maturity.

Summary

The evidence presented above suggests that EUR utility and real estate bonds priced during 2021 in the green (aligned) category offered better liquidity compared to those in the green (non-aligned), and vanilla categories in H1 2022. It seems that on average, green bond positions can be liquidated more easily, offering investors flexibility where it is needed.

These conclusions are broadly similar to those reached last time Climate Bonds conducted analysis along these lines and appear to confirm that there is still a shortage of large green bonds with adequate transparency over the UoP. While supply of such bonds has increased, demand has increased by a greater magnitude.

Sample categories

Category	Number of bonds	Volume EUR bn*	Average size EUR bn*	Years to maturity at issue
Green (aligned)	41	24.1	0.6	9.2
Green (non-aligned)	4	3.3	0.8	9.1
Vanilla	70	45.6	0.7	9.0

Liquidity quality score

Category	Average of score	Average of bid-score	Average of ask-score
Green (aligned)	4.3	4.8	4.3
Green (non-aligned)	7.3	5.0	7.0
Vanilla	4.7	4.8	5.1

10. Outlook

In H1 2022, macroeconomic and geopolitical issues overwhelmed financial markets but must not distract from the ongoing and longer-term climate crisis. Bonds of all types have suffered during the period, and this is the first time that the green bond market has experienced the impacts of rising interest rates. The green bond market is a well-developed source of capital and Climate Bonds expects it to support the prioritising of sustainable development, facilitating debt financing for climate mitigation and adaptation and resilience assets, projects, and expenditures.

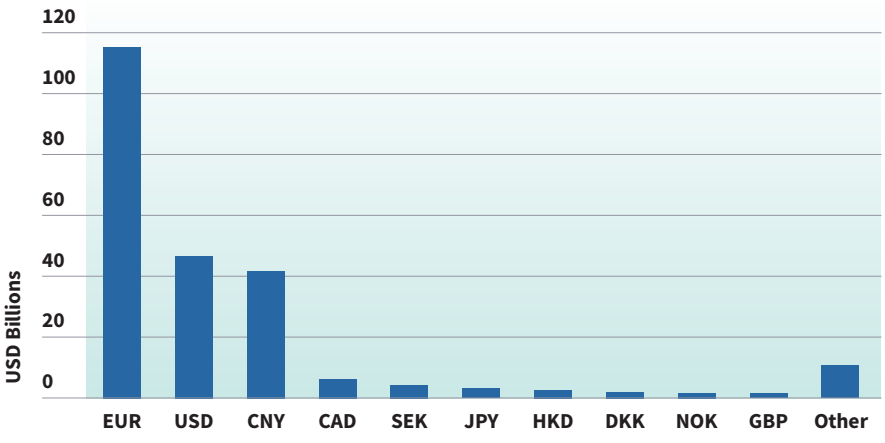
Bonds and interest rate rises are not friends, but during H1 the supply of green bonds declined just 1% on the prior period and USD236bn of green bonds were added to the Climate Bonds GBDB. Green bonds were issued in 30 currencies, with 68% coming from deals issued in USD (USD47.4bn) and EUR (USD114.6bn).

This analysis is based on a sample of 93 bonds, the most in any observation period so far, and included deals from three sovereign issuers. 80% of the volumes were EUR denominated with the remaining share in USD. Green bonds in both currencies continue to perform better than baskets of vanilla peers and corresponding indices, on average.

Most of the USD bonds that qualified for inclusion in this paper originated from non-US domiciled issuers (18 out of 25), highlighting the lack of robust supply from US issuers. In August 2022, the Inflation Reduction Act (IRA) was signed into law by President Biden. While some provisions do not contribute to climate change, others create potential opportunities for entities to issue green bonds. The IRA outlines a spending plan of USD369bn on renewable energy and electric vehicles, hydrogen hubs, energy efficient buildings, and nuclear. The green bond market can support this development and definitions of appropriate assets are already in place or are being designed for all these activities. The results of this research series have demonstrated that green bonds priced in USD have historically performed well on all metrics and the market is ripe for scaling.

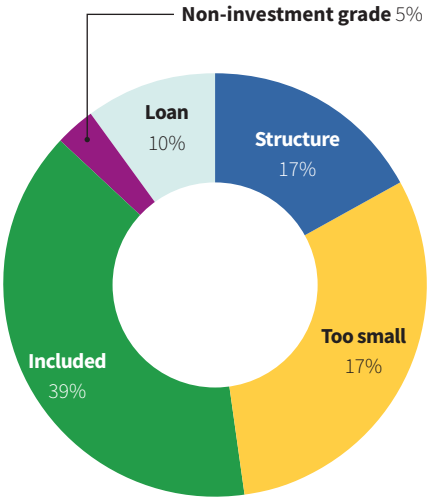
Sovereign green bonds deliver a very clear signal of commitment to climate ambitions and bring myriad benefits including local market developments. Austria became the 13th member of the EU27 to join the Sovereign Green Bond Club. The Netherlands, Germany, and France, all reopened existing positions in green bonds, extending their access to cheaper financing. The remaining 14 members of the EU must start actively preferencing green expenditures and fund them through thematic debt to send a signal to the market and attract investment from the private sector.

H1 2022: 70% of green bonds were EUR or USD



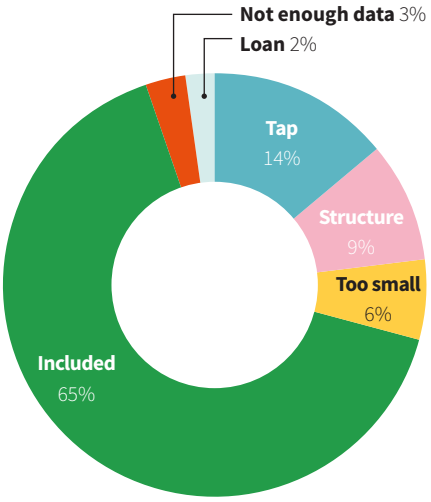
Source: Climate Bonds Initiative

Two fifths of USD green bonds qualified for analysis



Source: Climate Bonds Initiative

Two thirds of EUR green bonds qualified for analysis



Source: Climate Bonds Initiative

The analysis of SLB pricing in the primary market suggests that the bond market is rewarding entities able to demonstrate robust transition plans with better pricing. SLBs can offer sustainable fixed income investors access to a more diverse set of issuers. Climate Bonds emphasises the need for a complete and inclusive transition, and issuers must play their part by ensuring that SLBs are supported by credible transition plans and backed by ambitious targets.

Climate Bonds analysis in partnership with Tradeweb confirms that green bonds maintain better liquidity in the secondary market compared to vanilla equivalents. Considering the volatility seen in H1 2022, this could be a very useful aspect for investors, and may help to justify the presence of a greenium in the primary market.

More large green bonds with adequate transparency were eligible for inclusion in this paper than ever before, and Climate Bonds' analysis indicates that this was well absorbed by the market. This is a sign of a more marked shift in investor preferences towards green bonds. The geopolitical and macroeconomic tensions that emerged in H1 are expected to extend into H2 and beyond and may reasonably be expected to make capital-raising more difficult. The green label offers special appeal to investors, and the growing dedicated investor base continues to offer a unique source of support.

This analysis is based on a limited number of green bonds, chosen according to the parameters outlined on page 23. Green bonds issued in other currencies, structures, formats, and sizes may perform differently from those discussed in this paper.

Methodology

This paper includes labelled green bonds issued during H1 2022. Labelled green bonds meeting the following specifications are included:

- Announcement date between 1 January 2022 and 30 June 2022
- Currency: EUR or USD
- Benchmark size i.e., >= USD500m
- Investment grade rated
- Minimum term to maturity of three years at issue
- Consistent with the Climate Bonds Taxonomy and included in the Climate Bonds GBDB

Amortising, perpetual, floating rate, and other non-vanilla structures were excluded. These parameters are designed to capture the most liquid portion of the market while not limiting the diversity of data.

All historical data is based on asset swap spreads for EUR denominated bonds. USD bonds are compared to a US treasury curve. All historical data is from Refinitiv EIKON.

Comparable baskets include bonds issued in the same quarter as the subject green bond. Comparable bonds must fit the parameters described above except that they are not labelled and the UoP is not explicitly green, and they must not have been priced prior to 2014. Baskets comprise the closest possible matches based on the following considerations in order of priority: a) currency, b) market type (EM/DM/SNAT/Sukuk), c) no other thematic label, d) seniority, e) maturity, f) credit rating and g) sector. If corresponding bonds cannot be found, best efforts are made to find suitable alternatives from the available sample. The resulting baskets are a proxy for how the money could have been invested in the same quarter in which the green bond was issued. The number of bonds in each basket ranges from one to ten bonds. Bonds behave differently depending on when they are issued and that geopolitical events can affect bond prices from one day to the next. This proxy was designed to circumvent the fact that vanilla bonds and green bonds with similar characteristics are rarely issued on the same day.

Endnotes

1. MSCI https://www.msci.com/market-classification
2. Based on benchmark spreads of iBoxx indices: USD IBoxx Corporate AAA, AA, A, and BBB.
3. Mexico City Airport 2026 achieved a book cover of 10 times the deals size in 2016, but was later removed from the Climate Bonds GBDB.
4. Mexico City Airport 2046 exhibited spread compression of 55bps in 2016 but was later removed from the Climate Bonds GBDB.
5. https://ec.europa.eu/info/strategy/eu-budget/eu-borrower-investor-relations/nextgenerationeu-green-bonds_en
6. Transition Finance for Transforming Companies | Climate Bonds Initiative
7. Harrison, C., Green Bond Pricing in the Primary Market H1 2021, Climate Bonds Initiative, September 2021 https://www.climatebonds.net/files/reports/cbi_pricing_h1_2021_03b.pdf

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