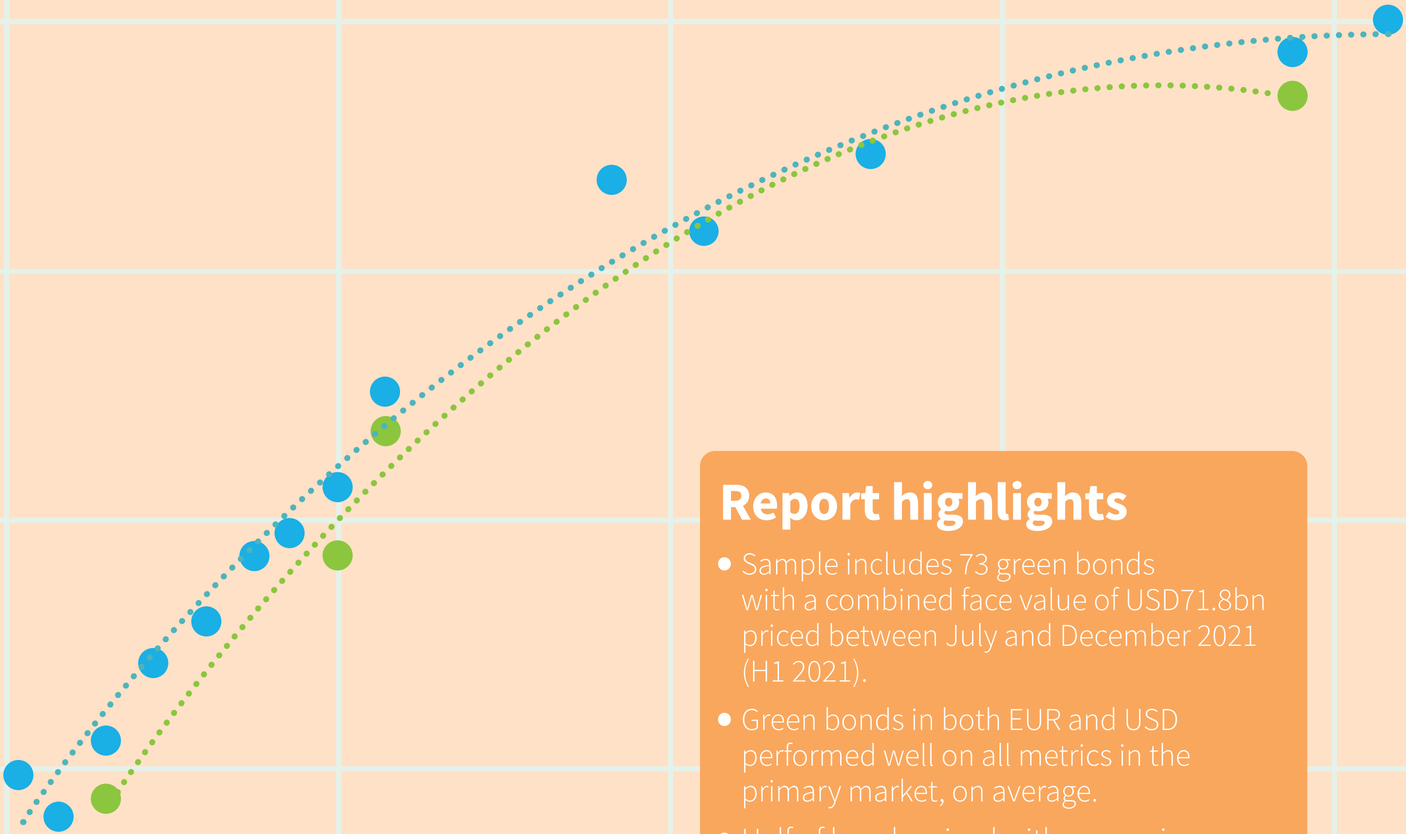
GREEN BOND PRICING IN THE PRIMARY MARKET:

July - December 2021

H2 (Q3-Q4) 2021



Report highlights

- Sample includes 73 green bonds with a combined face value of USD71.8bn priced between July and December 2021 (H1 2021).
- Green bonds in both EUR and USD performed well on all metrics in the primary market, on average.
- Half of bonds priced with a greenium or on their yield curves.
- Allocations to green investors remain stable at 66%.
- The Sovereign Green Bond Club: four issuers added six new bonds.
- Green Bond ETFs – Total assets in green bond ETFs reaches USD1.4bn as ninth fund is launched.

Climate Bonds Initiative

Amundi Asset Management ETF

State Street Global Advisors

GB-TAP Green Bond Technical Assistance Program

IFC International Finance Corporation World Bank Group
Creating Markets, Creating Opportunities

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Introduction

This is the thirteenth report in our pricing series, in which we observe how green bonds perform in the primary markets. This report includes bonds issued in the final six months of 2021 (H2 2021).

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 25.

During this period, USD240bn worth of green bonds was added to the Climate Bonds Green Bonds Database, the most in any half year. At the end of January, Climate Bonds confirmed that USD517.4bn of green bonds had been added in 2021, breaking the half trillion mark for the first time, and marking the tenth consecutive year of growth. This paper includes 30 percent of the amount issued in H2 2021, that met the above requirements (USD71.8bn), split between 73 green bonds from 61 issuers. EUR was the dominant currency with 53 bonds totalling EUR46.2bn (USD53.4bn), while 20 qualifying USD denominated bonds had a combined issue size of USD18.35bn.

Report highlights

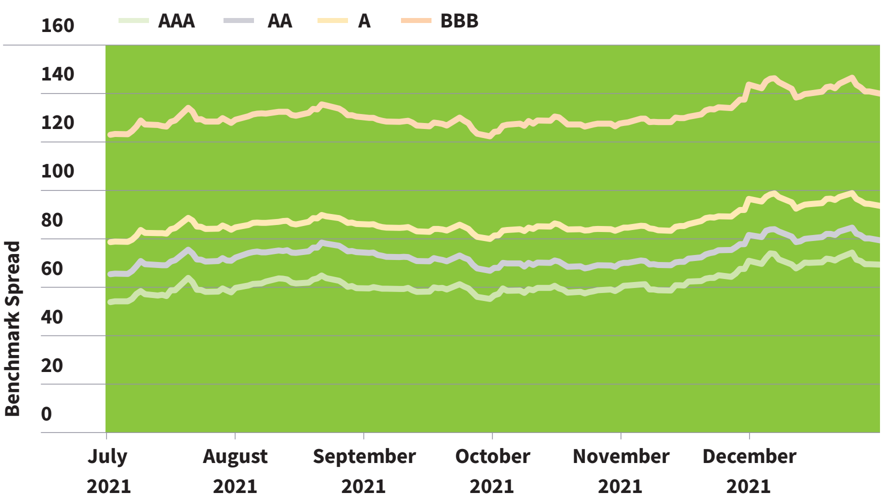
- **Green bonds achieved higher book cover and spread compression than vanilla equivalents, on average.**
  See more on page 4
- **Overall, 66% of green bonds were allocated to investors describing themselves as having green or responsible investment mandates.**
  See more on page 7
- **Yield curves could be built for 34 bonds in our non-sovereign sample. 17 priced on or inside their issuer's yield curves.**
  See more on page 10
- **After 7 and 28 days, green bonds had, on average, tightened by more than comparable vanilla baskets and corresponding indices.**
  See more on page 12
- **Green bond ETFs – Total fund assets in green bond ETFs reached USD1.4bn, as Lyxor added the first sovereign green bond ETF.**
  See more on page 16
- **Sovereign Green Bond Club: Four issuers added six new bonds worth a combined total of USD13.8bn. Two of the sovereign issuers with yield curves achieved a greenium.**
  See more on page 20

1. Market developments

Rising inflation persisted during H2 2021, led by the post-COVID economic recovery and higher energy prices. The FED signalled it could raise rates three times in 2022 and there were expectations that it could accelerate the tapering of its pandemic induced asset purchase programme. Likewise, there was talk that the ECB could reconsider its negative interest rate policy which has been in place since 2014. Towards the end of the year, the Omicron variant of COVID-19 hit, which changed the tone of the market while the nature and extent of the disease could be determined. In mid-December, the ECB described its plan to stop net bond buying under its Pandemic Emergency Purchase Programme (PEPP) at the end of March 2022, with maturing principal payments rolled into new purchases until at least the end of 2024. To soften the blow, the ECB will combine this with an increase in Q1 2022 purchases under its Asset Purchase Programme (APP), but those purchases will be gradually reduced thereafter.

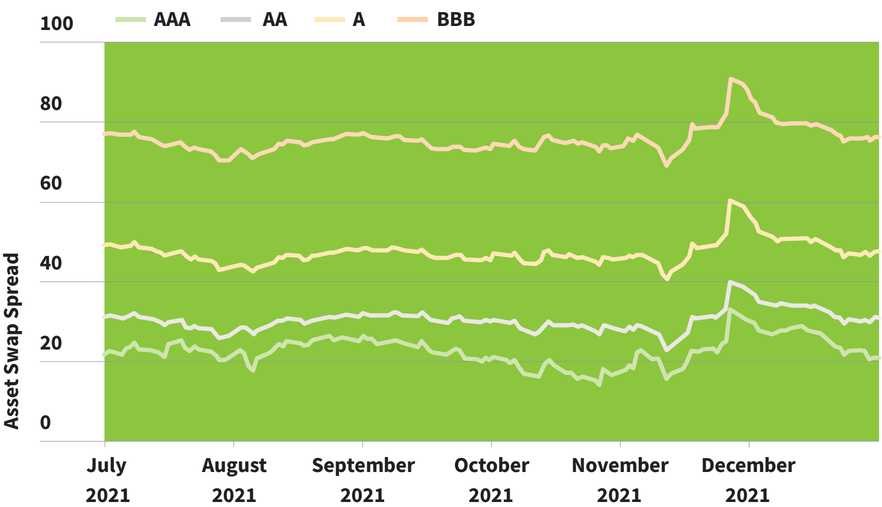
In EUR, corporate credit spreads ended H2 unchanged. There was a temporary blowout towards the end of November in reaction to Omicron containment measures, but that had settled down by the end of December. Meanwhile, USD spreads ended the period wider: 22% for AAA, 19% for AA, 17% for A, and 12% for BBB.[2] By the end of the year, the FED had already started to reduce its support for credit markets.

USD Corporate Credit Spreads



Source: Refinitv

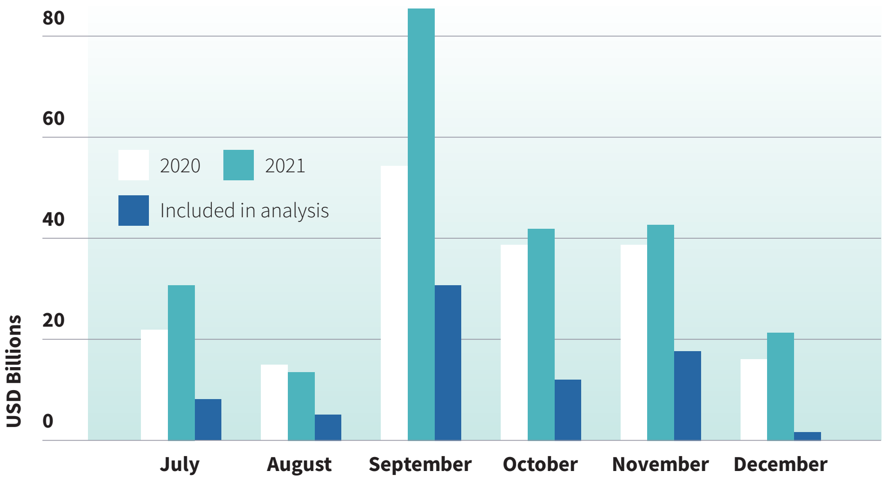
EUR Corporate Credit Spreads



Source: Refinitv

Issuers were keen to fund or refund for as long as rates remained low, while investors cautious about overpaying for anything that could be hurt by rising rates. During H2, green bonds amounting to USD240bn were added to the Climate Bonds Green Bond Database with record issuance in each month, except August, and September being the busiest month ever for green bond volumes (USD86bn). Close to two-thirds (63%) of the H2 issuance comprised EUR (USD87bn) and USD (USD63bn) denominated bonds. 30% of the H2 volumes qualified for this analysis, amounting to USD73bn, 44% of which was priced in September. Among the 61 issuers, 11 brought more than one green bond.

Record volumes of green bonds priced in September



Source: Climate Bonds Initiative

Green bond issuers in H2 2021

This report includes 23 debut green deals from 19 issuers. Among them, the **Kingdom of Spain** (Spain) and the **Republic of Korea** (Korea), who came to the market with EUR5bn (USD5.9bn) and EUR750m (USD812m), respectively. These issuers are discussed in greater depth in our Sovereign Green Bond Club section beginning on page 20.

Relatable names who are regular visitors to the global debt markets can help to raise the visibility of green bonds and increase diversification opportunities for investors. One such example is consumer staple **Mondelez International** (Mondelez) which priced its USD2bn debut green deal in September. Mondelez, formerly Kraft Foods, owns a global portfolio of household snacking brands including Cadbury, Milka, Oreo, Ritz, and Toblerone. The entity has an established presence in the debt market, with USD19bn of bonds outstanding in five currencies at the end of January 2022.[3] The debut green deal was split between a EUR650m (USD769m) 8-year, a EUR650m (USD769m) 11-year, and a EUR700m (USD829m) 20-year. The proceeds were earmarked for six eligible project categories: Land Use, Energy Efficiency, Renewable Energy, Low Carbon Buildings, Waste and Pollution and Low Carbon Transport; and the framework clearly described how Mondelez is using green bonds to fund its sustainability ambitions.

Norinchukin Bank (Norinchukin) entered the green bond market in mid-September. The USD1bn dual tranche deal was split equally between 5- and 10-year maturities. The Japanese bank serves more than 5,600 agricultural, fishing, and forestry cooperatives from its headquarters in Tokyo. Norinchukin's green bond framework reflects its core business strategy, and lists Renewable Energy, Clean Transportation, and Clean Buildings as eligible Use of Proceeds (UoP) categories.

42 repeat issuers brought 50 green bonds in H2 2021, the largest of this was German state-owned investment and development bank, **KfW**. In September, KfW printed a EUR3bn (USD3.5bn) 10-year, (tapped for an additional EUR1bn (USD1.2bn) in November) and in October, priced a USD3bn 5-year.

KfW has built an extraordinary record of consistent issuance since it entered the green bond market in 2014. By the end of January 2022, Climate Bonds Green Bond Database had captured 65 bonds from KfW in 13 currencies with a combined volume of USD48.5bn, and it is the second largest individual issuer therein (after Fannie Mae). In 2021 issuance volume reached EUR16.2bn, 20% of the funding mix. Both data points represent new records for KfW which channels the proceeds into lending programmes for Renewable Energy and Energy Efficiency.

ABN Amro issued its fourth green bond in September, a EUR1bn (USD1.2bn) 8-year senior non-preferred deal. The bond obtained Certification under the Climate Bonds Standard, according to the Low Carbon Buildings, Solar, and Wind Criteria.

For the third consecutive year, in September, multinational telecommunications conglomerate **Verizon Communications** (Verizon) priced a green bond, this time a USD1bn 20-year. Verizon published an updated green financing framework in August 2021 which demonstrated strong thought leadership. The framework specified five categories of eligible expenditures; described how the entity will meet its science-based transition targets; and introduced a criterion for the selection of underwriters consistent with its sustainability objectives.

Remarks:

- It is persistently challenging to find adequate data for USD green bonds and their vanilla baskets which further restricts the opportunity to draw reliable conclusions from a small sample. For example, order book data was not available for six of the 20 green bonds and six of the vanilla bonds in our sample.
- 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 25 and a complete list of those bonds is on page 19.

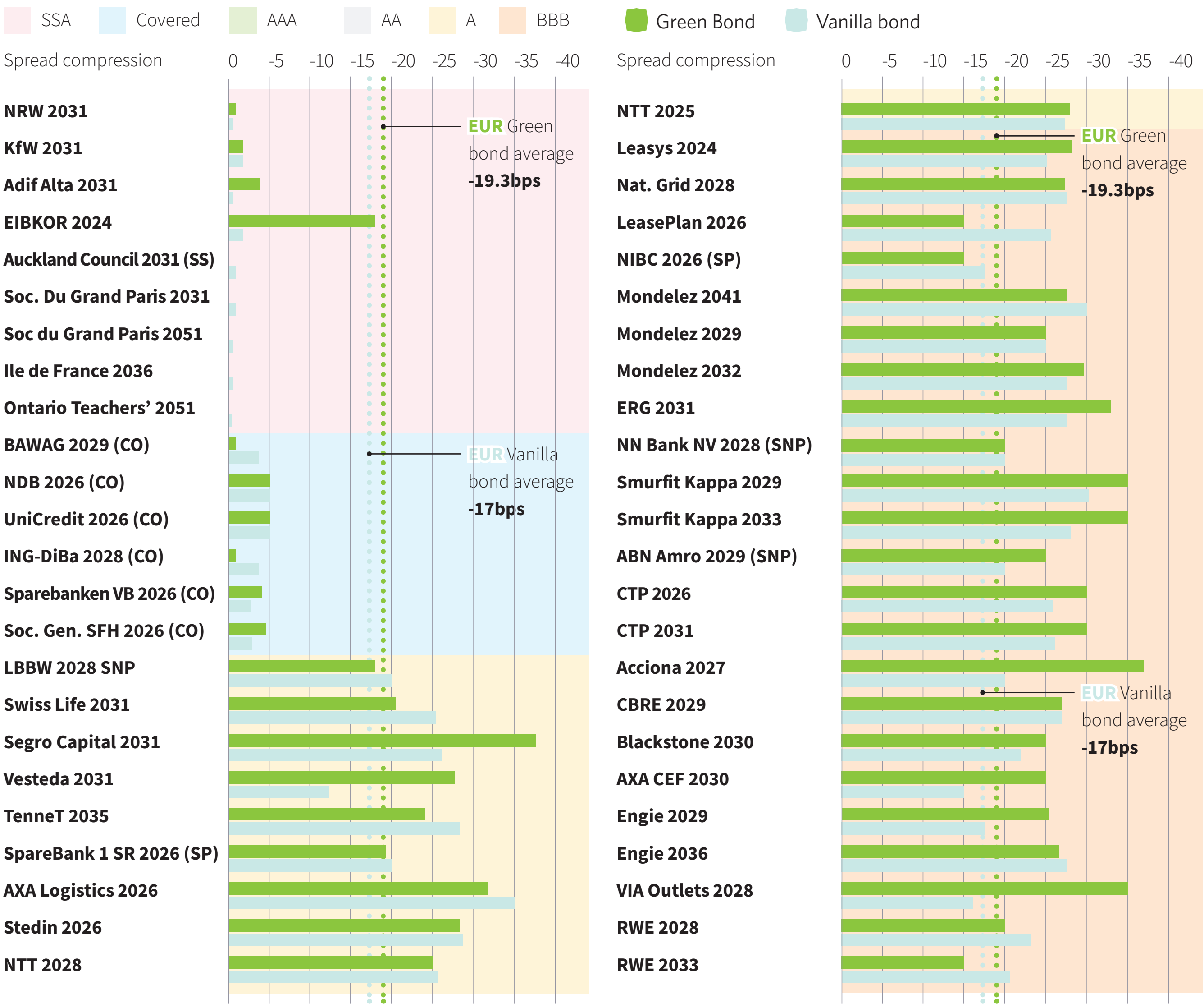
2. Spread compression and book size: green bonds in both EUR and USD attracted larger book cover and exhibited larger spread compression on average, than vanilla equivalents

• **EUR:** Average oversubscription was 3.4 times for green bonds, and 2.7 times for vanilla equivalents. Spread compression averaged 19.3bps for green bonds and 17bps for vanilla bonds.

• **USD:** Average oversubscription was 3 times for green bonds and 2.7 times for vanilla equivalents. Spread compression averaged 25.9bps for green bonds and 21.7bps for vanilla bonds.

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.

EUR: Green bonds acheived greater spread compression on average, compared to vanilla equivalents



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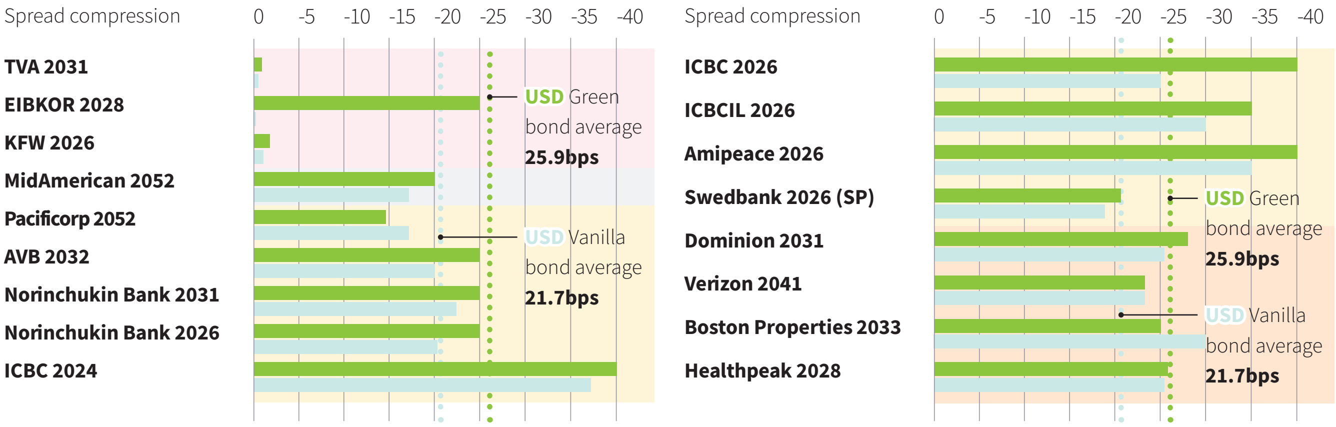


EUR green bond pricing

EUR green bonds achieved larger order books in H2 2021 (3.4x) compared to the prior half year (2.9x). Conversely, spread tightening was less aggressive with an average of 19.3bps against 20.4bps seen in H1. Green bonds, on average, outperformed vanilla equivalents on both metrics.

Individually, 61% of green bonds experienced greater oversubscription compared to vanilla equivalents, an increase compared to the 40% seen in H1 2021. LBBW 2028 (SNP) had book cover of 2.2 times, which was the same as its vanilla pair. Of the remaining bonds in the sample, 28 had larger cover than vanilla equivalents, while 18 did not.

Slightly over half (53%) of green bonds achieved larger spread compression that their vanilla equivalents. Five bonds achieved the same amount of tightening as their respective vanilla counterparts: KfW 2031, NDB 2026 (CO), UniCredit 2026 (CO), Mondelez 2029, and NN Bank NV 2028 (SNP). 23 green bonds tightened more than their baskets, while 20 did not.

Book cover

Three green bonds stood out by attracting orders amounting to over seven times larger than their deals.

Spanish renewables company **Acciona Energy** built the largest book cover of 7.5 times. The pure-green credentials of the issuer helped to attract investors to the EUR500m (USD578m) six-year deal.

The September **KfW 2031** accumulated EUR22bn of orders, covering its EUR3bn (USD3.5bn) final size by 7.3 times. This was the largest EUR denominated green bond from a SSA issuer to date, and, evidently, investors welcomed the initiative.

Auckland Council's first EUR green bond attracted an order book that covered its EUR500m (USD565m) no grow transaction by seven times. The issuer described the composition of the order book as a diverse range of high-quality real money accounts, predominantly from Europe, which helped to diversify the investor base.

Paper-based packaging company **Smurfit Kappa** priced its debut green bond in September. The two-tranche deal comprised a EUR500m (USD586m) 8-year, and a EUR500m (USD586m) 12-year. The bonds achieved order books of 6.6 and 5.8 times, respectively, after extremely strong investor engagement during the road show. The proceeds were earmarked to finance or refinance circular economy adapted products, and Land Use consistent with the entity's sustainability strategy.

Spread compression

UK REIT **Segro Plc** (Segro) priced its first green and first EUR bond in September. The EUR500m (USD586m) 10-year experienced spread compression of 37.5bps, the most aggressive of the EUR green bonds in H2. **Smurfit Kappa** also performed well on this metric with each of its green bonds tightening by 35bps.

ERG Spa (ERG), an Italian energy company with a focus on renewables, priced its third green bond in September. The spread on the EUR500m (USD591m) 10-year bond narrowed by 32bps during book building, complementing an order book that was 6.4 times oversubscribed. The proceeds of the bond will be used to finance or refinance Renewable Energy projects in Europe.

Among the top three performers on spread compression, none had a yield curve, hence the presence of a greenium could not be determined. However, all the bonds went on to tighten in the secondary market. All three issuers remarked that they were very happy with the reception of their green bonds.

NB1: *There was no book cover data for the vanilla basket of TenneT 2035, hence it was not included in the average numbers.*

USD green bond pricing

The H2 2021 USD green bond sample achieved three times book cover on average, which was more subdued than the record 4.8 times achieved in H1. Likewise, average spread compression of 25.9bps was lower than the 29.9bps witnessed in the prior half year.

Seven out of 11 (64%) green bonds achieved larger book cover than vanilla counterparts, four did not. Most (13 out of 17 or 81%) green bonds experienced larger spread compression compared to equivalents.

Book cover

Six bonds in the USD sample were excluded from the book-cover analysis because they did not have any data available (see NB2). Tennessee Valley Authority (TVA) did not have any comparable bonds and there was no book-cover information available for the comparable bond of KfW 2026.

Verizon's third green bond was well received by the market. The USD1bn 20-year covered its book by five times, the largest among the USD green bonds in H2.

TVA has stated its ambition to reach net zero by 2050. Its sustainable financing framework was published in September, shortly followed by a USD500m 10-year debut green bond which attracted book cover of 4.4 times. The bond went on to price with a greenium and helped TVA to achieve its lowest ever 10-year funding rate. Proceeds from the sale will fund TVA's transition to increased renewable energy generation, energy storage, transmission system upgrades, and the development of advanced clean energy technologies.

Chilean chemical company **Sociedad Quimica y Minera de Chile SA** (SQM) priced its first green bond in September. The 2051 maturity built an order book of USD3bn which covered the USD700m deal by 4.3 times. Eligible expenditures of the proceeds include the extraction of lithium and its subsequent processing. There was very limited market data available for this bond, but it has been included in this analysis to highlight the fact that green bonds can be used to fund a broad range of activities necessary for the transition to a low-carbon economy.

Spread compression

Spread compression data was available for all bonds in the USD sample except two (see NB2) and TVA did not have any comparable bonds.

The USD bonds experiencing the largest spread compressions were all Chinese financial institutions. None of them had any information available regarding book size.

Industrial and Commercial Bank of China (ICBC) priced a pair of green bonds in October. The USD1.05bn 2024 bond and the USD1bn 2026 bond each tightened by 40bps during book building. The 2024 priced with a normal new issue premium while the 2026 achieved a greenium. ICBC is a prolific issuer of green bonds, and the Climate Bonds Green Bond Database records 22 bonds amounting to USD14bn in six currencies including the Macau Pataca.

Bank of China has issued multiple green bonds in various currencies, but, in November, priced its first one issued through its special purpose vehicle, **Amipeace**. The USD600m 5-year bond enjoyed spread compression of 40bps and priced with a normal new issue premium.

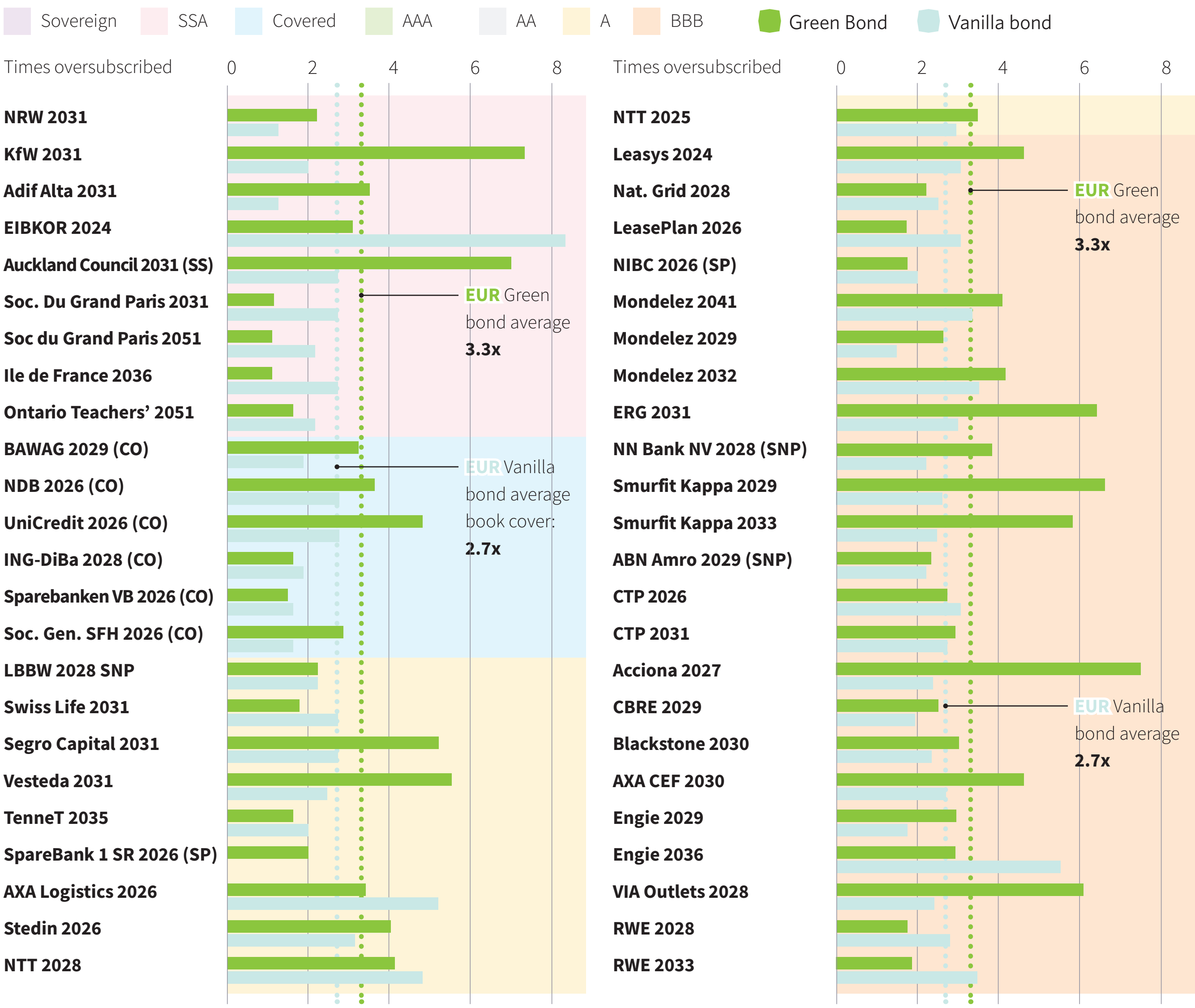
ICBICL Finance Co Ltd (ICBC) achieved spread compression of 35bps on its USD700m 2026 bond. The bond priced with a normal new issue premium. The proceeds of the bond will be split between Low Carbon Transport, Low Carbon Buildings, and Water projects.

NB2: *There was no order book data available for ICBC 2024, ICBC 2026, ICBCIL 2026, Amipeace 2026, Interchile 2056, or EIBKOR 2028.*

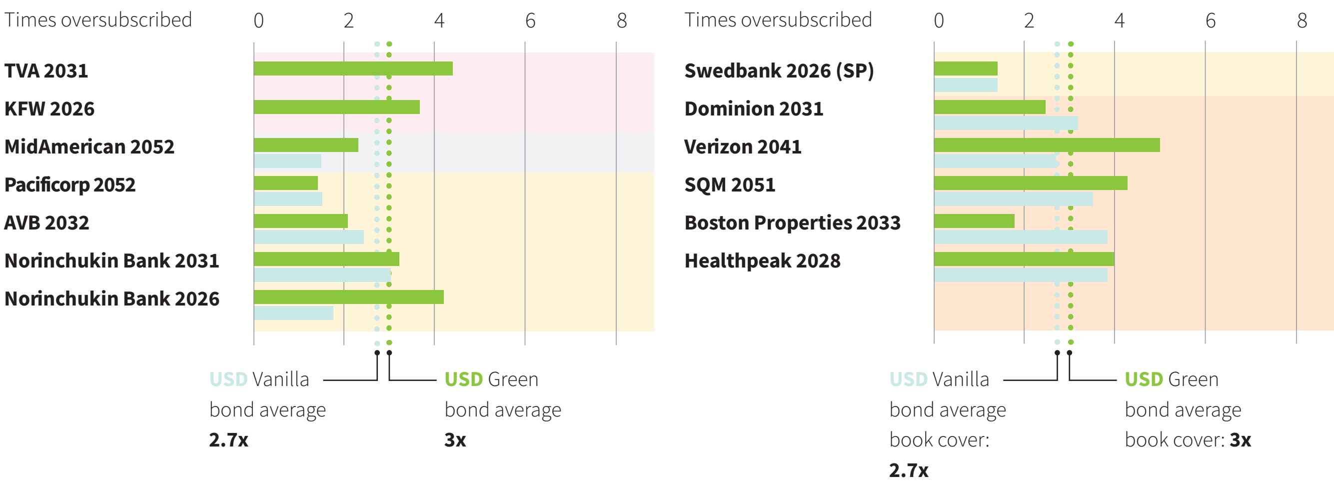
NB3: *There was no spread compression data available for Interchile 2056 or SQM 2051*

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 bonds. For an explanation of the methodology, see page 25, and for summary statistics of the baskets, see page 19.

EUR: Green bonds acheived larger book cover on average, compared to vanilla equivalents



USD: Green bonds acheived larger book cover than vanilla equivalents on average



3. Green allocations: 66% was allocated to investors describing themselves as green

The amount allocated to investors describing themselves as green or socially responsible was 66%

The 57 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:

- 30 issuers representing 33 bonds shared the data. *
- Seven issuers representing nine bonds replied without disclosing the data. *
- Seventeen issuers representing 25 bonds did not reply.
- As usual, the response rate from USD issuers was very low, with just five acknowledging the request.

***KfW disclosed for its EUR but not USD. Based on these responses, the average allocation to investors describing themselves as green was 66%, identical to the prior observation period.** Allocations ranged from 30% (Verizon 2041) to 95% (TenneT 2035).

As always, some issuers did not contribute because they doubted the accuracy of green investor calculations. Such calculations appear to be determined by a combination of factors including dedicated strategies, integration of ESG into investment process, the number of dedicated research analysts, commitment to the PRI principles, and prior bond purchasing behaviour.

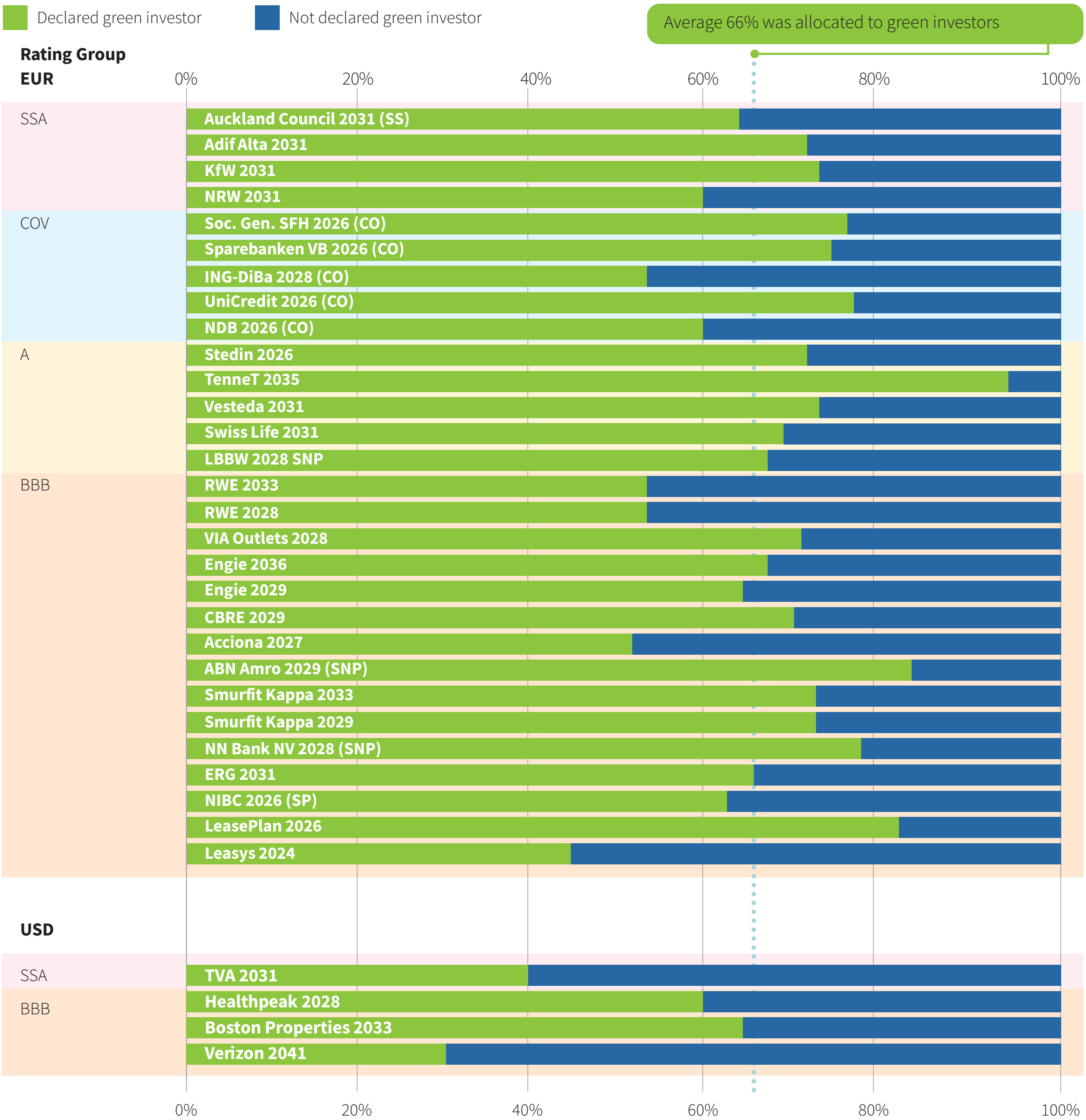
The classification of funds under EU Sustainable Finance Disclosure Requirements (SFDR) Article 8 and Article 9 could help to make the allocation process more transparent offering the ability to verify the legitimacy of sustainability claims. However, Principal Adverse Impact (PAI) statements for compliant fund managers are not due until mid-2023. Beyond this, applying the results to green bond allocations will take time and effort for brokers to implement, and nobody is even attempting to apply any such methodology at the moment. . Also, as with the current situation, there would be nothing preventing investors who were allocated based on an Article 8 or Article 9 classification from adding the green bonds to other portfolios.

Investors' enthusiasm to classify their funds as Article 8 or Article 9 has naturally resulted in a greater demand for sustainable finance instruments, including green bonds. This is expected to persist.

The green label definitely helps issuers to attract a broader and more diverse investor base. Issuers, including **Boston Properties,** noted that the green label had helped to increase demand for their bonds, which may have contributed to tighter pricing. US based REIT **Healthpeak Properties** issued its second green bond in November and observed that its transparent and robust green bond framework helped to attract ESG- focused investors to the deal.

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.*

66% of green bonds were allocated to green investors



4. The greenium: 17 out of 34 green bonds priced on or inside 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. Even when a bond prices on its yield curve, this is still the absence of a new issue premium and therefore positive for the issuers cost of funding.

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, geo-political issues, and the fall-out from global pandemics.

In H2 2021, we were able to build yield curves for 34 out of the 67 bonds in our non-sovereign sample.

50% of thesegreen bonds priced on or inside their yield curve. This is a decline from 79% in H1. Among the 17 bonds exhibiting a greenium or pricing on the yield curve in H2, 14 were priced in the third quarter (Q3). Likewise, bonds with a new issue premium were mostly priced in Q4, (15 out of 17). As noted in the introduction to this paper, investors exercised increased caution moving into year end, reflecting expected interest rate rises, and this approach extended into green bonds.

This does not mean that investor support for green bonds has evaporated because of an increase in supply. On the contrary, we expect demand to continue to outstrip supply for the foreseeable future as funds seek to classify themselves as SFDR Article 8 or Article 9 in Europe, and U.S. policy increasingly encourages accountability around responsible investments. However, as interest rates rise, bond prices generally fall, and while a lack of supply may temper the magnitude of the impact, a green label is unlikely to offer complete protection from this.

Within our sample of 34 green bonds:

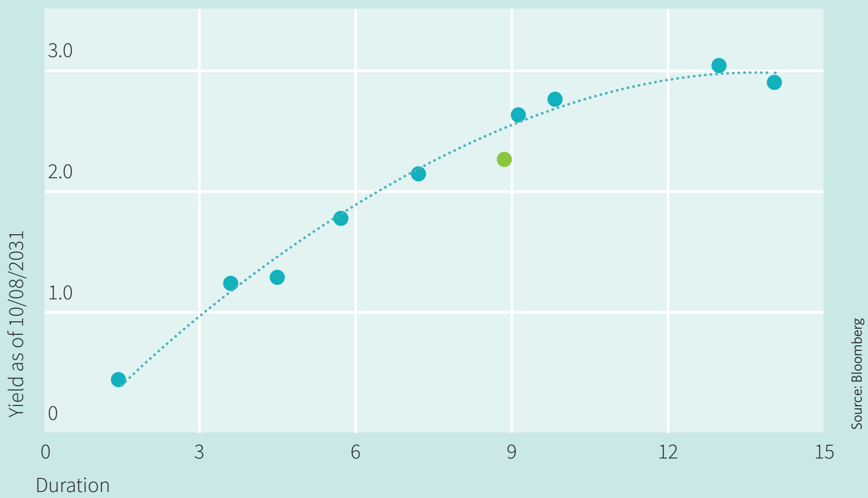
Pricing Outcomes	EUR		USD		Total
	Q3	Q4	Q3	Q4	
Greenium	4	1	3	1	**9**
On the curve	7	1	0	0	**8**
New issue premium	2	9	0	6	**17**
Sum	13	11	3	7	**34**

Non-sovereign green bonds exhibiting a greenium in H2 2021	
EUR	**Mondelez 2041**
	Mondelez 2029
	Mondelez 2032
	NDB 2026 (CO)
	Sparebanken VB 2026 (CO)
USD	**Dominion 2031**
	Verizon 2041
	TVA 2031
	Ind & Com. Bank of China 2026

Dominion 2031

American power and energy company Dominion priced its second green bond in August. Proceeds from the sale of the USD1bn 10-year were earmarked for financing or refinancing solar projects. The bond did not build a larger book than its vanilla basket but did experience larger spread compression. The bond priced through its own yield curve achieving a greenium.

Dominion Energy Inc. 2031 (USD) - greenium

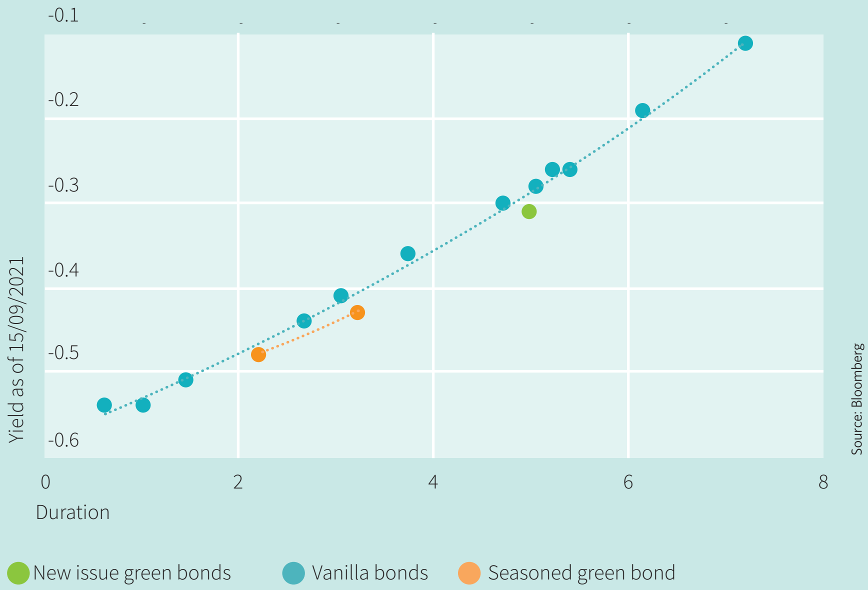


Norddeutsche Landesbank (NDB) 2026 (CO)

In July 2021, NDB fully integrated its previously independent real estate financing arm Deutsche Hypo. Deutsche Hypo had two green pfandbriefe outstanding, a 2023 and a 2024 maturity priced in 2017 and 2018, respectively, and each worth EUR500m (USD590m). In September, NDB priced its first self-labelled green pfandbriefe, a EUR500m (USD585m) 5- year. The green pfandbriefe was secured on a pool of green real estate assets, and the proceeds were earmarked for Energy Efficiency projects.

Following a virtual roadshow, the order book achieved oversubscription of 3.6 times, and the spread tightened from an IPT of mid-swaps +4 to -1 to price through its yield curve. The diversified order book introduced new accounts, including strong demand from the responsible investor community. The bond went on to tighten further after seven- and 28-days demonstrating value for both issuer and investors. The issuer remarked that it was satisfied with the transaction which lent strong support to green-financing activities, and that it expected to return to the green bond market.

NDB 2026 (CO) EUR - greenium



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 four suitable comparable bonds.

Comparable bonds used for this exercise must fit the specification for green bond selection outlined on page 25, 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 2010.

5. Performance in the immediate secondary market

- **Seven days after pricing,** 55% of green bonds had tightened more than comparable vanilla baskets; 71% had tightened more than their corresponding index.

- **28 days after pricing,** 52% of green bonds had tightened more than comparable vanilla baskets; 73% had tightened more than their corresponding index.

In H2 2021, 75% of individual green bonds in our sample had tightened 7 days after pricing; after 28 days that had increased marginally to 76%.

			% change 1 week			% change 1 month		
	Rating Group	Bond	Green Bond	Vanilla Basket	Corresponding iBoxx Index	Green Bond	Vanilla Basket	Corresponding iBoxx Index
EUR	SSA	NRW 2031	15.0%	-14.3%	-12.6%	1.0%	-12.2%	-21.7%
		KfW 2031	-19.4%	17.7%	3.8%	-27.8%	58.3%	-19.5%
		Adif Alta 2031	-12.0%	-14.3%	-24.8%	-9.0%	-12.2%	-38.5%
		EIBKOR 2024	-10.6%		1.8%	-44.3%		-24.2%
		Auckland Council 2031 (SS)	-14.2%	-12.5%	-35.8%	-6.8%	-4.4%	-5.3%
		Soc. Du Grand Paris 2031	-9.9%	-12.5%	69.6%	-4.4%	-4.4%	62.6%
		Soc du Grand Paris 2051	-0.7%	9.6%	3.6%	-7.4%	0.3%	3.4%
		Ile de France 2036	-18.8%	-12.5%	0.2%	-28.1%	-4.4%	1.1%
		Ontario Teachers' 2051	-1.6%	9.6%	-0.9%	-1.5%	0.3%	0.2%
	Covered	BAWAG 2029 (CO)	65.0%	9.6%	9.9%	-8.0%	8.9%	13.8%
		NDB 2026 (CO)	-32.0%	10.5%	4.0%	-162.0%	30.1%	11.5%
		UniCredit 2026 (CO)	17.5%	10.5%	-17.7%	-51.0%	30.1%	-11.1%
		ING-DiBa 2028 (CO)	-27.0%	9.6%	2.7%	-11.3%	8.9%	0.6%
		Sparebanken VB 2026 (CO)	28.0%	-76.0%	-11.6%	53.0%	-34.3%	0.2%
		Soc. Gen. SFH 2026 (CO)	-3.0%	-76.0%	-45.3%	-14.3%	-34.3%	-26.8%
	A	LBBW 2028 SNP	-9.8%	-1.5%	-1.6%	-10.4%	-8.0%	-5.2%
		Swiss Life 2031	-6.8%	-7.3%	-3.0%	-8.6%	-9.7%	-1.2%
		Segro Capital 2031	-3.3%	-5.3%	-1.0%	-3.7%	-5.2%	3.3%
		Vesteda 2031	-7.6%	-4.0%	4.9%	-5.6%	-4.0%	5.1%
		TenneT 2035	-5.6%	-4.3%	-2.8%	9.1%	-0.7%	13.8%
		SpareBank 1 SR 2026 (SP)	1.2%	-9.3%	-4.5%	27.5%	1.8%	42.3%
		AXA Logistics 2026	1.6%	-10.8%	-2.9%	10.2%	-5.4%	21.8%
		Stedin 2026	13.4%	-15.9%	7.2%	11.2%	-17.7%	21.2%
		NTT 2028	-11.8%	0.0%	-3.8%	-21.0%	9.0%	-4.1%
		NTT 2025	-8.1%	-28.7%	-3.6%	-17.6%	-48.7%	-4.5%
	BBB	Leasys 2024	-17.6%	4.7%	-2.1%	-18.6%	10.9%	0.0%
		Nat. Grid 2028	-7.5%	2.0%	0.7%	-13.3%	-2.5%	-3.2%
		LeasePlan 2026	-6.9%	-11.9%	-0.1%	-11.4%	-14.7%	-4.6%
		NIBC 2026 (SP)	-6.5%	-1.8%	0.9%	-6.4%	-0.2%	-3.4%
		Mondelez 2041	-2.5%	0.3%	-0.4%	-2.2%	-2.4%	-2.8%
		Mondelez 2029	0.9%	-2.3%	0.1%	4.6%	-8.6%	-2.7%
		Mondelez 2032	0.2%	-0.1%	-0.4%	1.5%	3.0%	-2.8%
		ERG 2031	-7.9%	-8.7%	-0.9%	-17.5%	-8.9%	-1.8%
		NN Bank NV 2028 (SNP)	-7.6%	-1.5%	-2.5%	-11.5%	-8.0%	-3.4%
		Smurfit Kappa 2029	-7.2%	6.3%	-0.8%	-12.1%	1.4%	0.9%
		Smurfit Kappa 2033	-6.2%	8.4%	-0.4%	-11.4%	-10.8%	1.2%
		ABN Amro 2029 (SNP)	-4.7%	-1.5%	1.5%	-2.2%	-8.0%	5.0%
		CTP 2026	-8.0%	-11.9%	-1.3%	-10.9%	-14.7%	2.8%
		CTP 2031	-4.5%	-5.3%	-0.2%	-5.9%	-5.2%	1.2%
		Acciona 2027	-4.6%	-0.7%	3.1%	-13.4%	0.6%	1.8%
		CBRE 2029	-4.9%	-7.3%	0.3%	-3.3%	7.9%	5.4%
		Blackstone 2030	-3.5%	-3.8%	-1.0%	-5.3%	1.0%	-3.9%
		AXA CEF 2030	-7.9%	-5.4%	-2.7%	-1.7%	-4.5%	1.8%
		Engie 2029	-14.5%	-0.6%	-0.5%	-11.2%	-5.6%	6.0%
		Engie 2036	-4.3%	-17.5%	1.5%	-5.7%	-15.7%	6.8%
		VIA Outlets 2028	-10.0%	-7.9%	-7.1%	-10.2%	-16.9%	11.6%
		RWE 2028	-4.5%	-0.1%	3.0%	-17.3%	15.3%	1.6%
		RWE 2033	-10.3%	-13.6%	-0.5%	-15.7%	-14.0%	-4.0%

	Rating Group	Bond	% change 1 week			% change 1 month		
			Green Bond	Vanilla Basket	Corresponding iBoxx Index	Green Bond	Vanilla Basket	Corresponding iBoxx Index
USD	SSA	TVA 2031	-100.0%		3.2%	-71.7%		5.5%
		EIBKOR 2028	1.7%	-5.3%	-8.8%	-18.0%	2.7%	-8.3%
		KFW 2026	-23.8%	4.0%	0.6%	-60.0%	25.7%	-3.0%
	AA	MidAmerican 2052	-4.7%	-3.0%	-2.5%	9.2%	1.8%	2.5%
	A	Pacificorp 2052	-7.3%	-3.0%	0.2%	-2.7%	1.8%	5.4%
		AVB 2032	-2.1%	3.0%	-0.8%	1.5%	8.4%	-0.2%
		Norinchukin Bank 2031	-18.8%	-0.6%	-5.1%	-18.8%	-0.3%	3.0%
		Norinchukin Bank 2026	-24.0%	-5.3%	-2.7%	-24.0%	-9.3%	5.5%
		ICBC 2024	n/a	8.0%	3.6%	6.8%	8.0%	15.8%
		ICBC 2026	10.3%	-7.3%	-0.1%	15.7%	-3.6%	5.7%
		ICBCIL 2026	5.5%	-9.7%	4.3%	3.6%	-8.7%	10.2%
		Amipeace 2026	1.2%	-5.2%	-3.5%	0.5%	1.2%	14.6%
		Swedbank 2026 (SP)	-4.3%	6.7%	6.0%	-2.1%	11.8%	8.4%
	BBB	Interchile 2056	-14.1%		-4.7%	-15.6%		-2.4%
		Dominion 2031	2.3%	1.5%	2.0%	-3.2%	-0.1%	-3.4%
		Verizon 2041	-1.8%	-10.1%	-0.1%	-4.1%	-7.3%	-3.2%
		SQM 2051	6.5%	-3.1%	2.6%	-0.7%	-2.1%	1.9%
		Boston Properties 2033	-0.8%	-0.1%	-0.1%	9.6%	6.0%	1.7%
		Healthpeak 2028	-4.2%	3.9%	1.9%	4.2%	5.8%	10.0%

Many bonds 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 benchmark 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 as closely as possible to the green bond. This comparison is a proxy for the opportunity cost to the investor. Secondly, we compare each green bond to a matched index to monitor their performance against the market.

After seven days

- 53% of green bonds had tightened by more than their vanilla baskets: 53% of EUR and 60% of USD green bonds.
- 71% of green bonds had tightened by more than their corresponding index: 75% of EUR and 59% of USD green bonds.

Compared to H1 2021 a larger percentage of green bonds tightened more than their baskets (46% in H1) and indices (67% in H1). More individual green bonds tightened on the break (75% compared to 69% in H1). **Typically, when bonds price with a new issue premium there is greater potential for tightening in the secondary market (assuming market conditions remain unchanged); hence, this result is as one would expect given the low number of bonds exhibiting a greenium in H2 compared to H1**.

In **EUR** 23 out of 45 green bonds had tightened against both their vanilla basket and matched index after a week (see NB1). Among them was **Engie 2029,** which had tightened by 6bps (14.5%) a week after pricing. The bond experienced higher book cover and spread compression during book building compared to its vanilla counterpart, but priced with a normal new issue premium. A EUR500m (USD560m) 15-year bond from French local authority **Ile-de-France** tightened by 7.3bps (18%) in its first week beating both its vanilla basket (-12.5%) and comparable index (-0.2%). After building a book 7.3 times its EUR3bn (USD3.5bn) size during book building and pricing on its own yield curve, **KfW 2031** managed to tighten by 2.5bps (19%) in its first week, while it's vanilla basket and corresponding index both widened.

In USD, 8 out of 15 green bonds had tightened against both their basket and matched index after a week (see NB2). **KfW 2026** tightened more than both equivalents, managing 1.3bps (23.8%), having priced with a normal new issue premium. **Norinchukin Bank 2026 and 2031** tightened by 12bps (24%) and 15bps (19%), respectively. There were not enough bonds to build a yield curve for Norinchukin, hence the presence of a greenium could not be determined.

NB1: *There was no one-week data for the corresponding vanilla basket of EIBKOR 2024. Two green bonds achieved an identical percentage price tightening compared to their vanilla baskets: Swisslife 2031, and Mondelez 2032.*

NB2: *There was no one-week data for two USD bonds: ICBC 2024, and TVA 2031. There was no data for the corresponding basket of Interchile 2056. Dominion 2031 achieved identical percentage tightening compared to its vanilla basket.*

After 28 days

- 52% of green bonds had tightened by more than their vanilla baskets: 57% of EUR and 41% of USD green bonds.
- 73% of green bonds had tightened when compared to corresponding indices: 75% of EUR and 68% of USD green bonds

The 28-day metrics for H2 were similar to those of H1: 52% of bonds had tightened more than their baskets against 57% in H1, while 73% tightened more than corresponding indices in H2 against 70% in H1. 31 green bonds tightened more than both vanilla baskets and corresponding indices, again similar to the H1 figure of 32 bonds.

In EUR, public sector entities **KfW 2031** and **Ile-de-France 2036** both tightened by 28% after the first 28 days, beating both baskets and indices. Four covered green bonds from **BAWAG 2029 (CO)**, **NDB 2026 (CO)**, **UniCredit 2026 (CO)**, and **ING-DiBa 2028 (CO)** all performed better than comparable metrics in their first month. A debut 2024 green bond from FCA Bank-owned car rental company **Leasys** narrowed by 8.8bps (19%) after the first month. There were not enough bonds to build a yield curve for this issuer, but the green label combined with the shorter maturity probably helped performance. The proceeds from the EUR500m (USD589m) bond will be used to finance Leasys fleet of zero emission and hybrid vehicles, and to expand its network of charging points.

In USD, 6 out of 15 green bonds achieved greater spread tightening compared to equivalents in the first month. Among them, **KfW 2026** had managed 3.2bps which translated into 60%, while **Norinchukin Bank 2026 and 2031** also continued to do well.

In H2 2021, the story in the secondary market remained similar to that of H1. Green bonds performed well in the immediate secondary market. Outright, three-quarters of green bonds in the sample had tightened after 7 and 28 days. On a relative basis, green bonds also appeared to demonstrate value for investors. After 7 days and 28 days, more green bonds had tightened by a greater magnitude than vanilla baskets and corresponding indices.

Methodology notes: *1. Vanilla baskets comprise the closest possible matches based on the considerations highlighted on page 25 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.[8] 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, Healthpeak 2028 was matched with the iBoxx USD Corporates BBB 5-7 index.*

7 calendar days include 5 data observations. 28 calendar days include 20 data observations.

6. Green bond ETFs

In July 2021, Lyxor launched its third green bond ETF, the Lyxor Euro Government Green Bond DR UCITS ETF. The fund aims to track the performance of the Solactive EU Government Green Bond Index and was launched with an initial size of EUR48m.

At the end of 2021, there were nine green bond ETFs with combined fund assets of USD1.4bn, an increase of 18% on the prior period (14% without the new fund). The iShares Global Green Bond ETF experienced the most pronounced growth during the period of 28%. Thus far, individual green bond ETFs have demonstrated continuous growth period on period, but for the first time, three of the smaller funds contracted. Rising interest rates will make the fixed income asset class less attractive to investors who may adjust their asset allocations over the coming year; and green bond indices do tend to have slightly longer duration compared to broad market equivalents, which can deter investors in a rising rate environment. The green bond ETF space is still in the early stages of development when small redemptions have more impact. However, the limited number of available sustainable investments compared to the amount of money being dedicated to responsible investments may offer some protection against excessive redemptions.

By mid-2021, the number of sovereign green bonds issued by Eurozone countries finally reached critical mass, facilitating the launch of a UCITS compliant ETF meeting the regulatory minimum diversification requirements. The July launch of the Lyxor Euro Government Green Bond DR UCITS ETF proved fortuitous, as issuance continued to grow. The progress in Eurozone diversification reflected global growth trends, as the volume of sovereign green bond primary issuance more than doubled in 2021. Fixed-income portfolio managers, regardless of mandate, now have no reason not to include green bonds in a portfolio as market diversity offers all the necessary granularity to implement allocation choices across corporate, sovereign, and SSA segments. In 2021, investors turned their attention to defining their internal net zero roadmaps. The green bond market turned out to be one the few adequate sources of the required impact disclosure, and this pattern looks set to accelerate.

Francois Millet,
Head of Strategy and ESG,
Lyxor ETF, Amundi group

ETF name	Index	Launch date	Size at launch	Local 30/6/2021	USD 30/6/2021	Local 31/12/2021	USD 31/12/2021	Change on period
Lyxor Green Bond DR UCITS ETF	Solactive Green Bond Index	01/02/2017	EUR5m	EUR 574.7m	EUR 681.0	EUR 654.1	EUR 744.8	9.4%
Van Eck Vectors Green Bond ETF	S&P Green Bond Select Index	01/03/2017	USD5m	USD 95.8m	USD 95.8m	USD 103.7m	USD 103.7m	8.3%
iShares Global Green Bond ETF	Bloomberg Barclays MSCI Global Green Bond Select Index	01/11/2018	USD25m	USD 213.2m	USD 213.2m	USD 273.1m	USD 273.1m	28.1%
UC MSCI European Green Bond ETF	Bloomberg Barclays MSCI European GB Issuer Capped EUR Index	01/11/2018	EUR20m	EUR 20.8m	EUR 24.6m	EUR 19.3m	EUR 22.0m	-10.8%
Franklin Liberty Euro Green Bond ETF	Bloomberg Barclays MSCI Euro Green Bond Index	01/04/2019	EUR10m	EUR 107.8m	EUR 127.7m	EUR 131.7m	EUR 150.0m	17.4%
Lyxor Green Bond ESG Screened	Solactive Green ESG Bond EUR USD IG TR Index	01/10/2019	EUR4m	EUR 26.1m	EUR 30.9m	EUR 33.3m	EUR 37.9m	22.5%
L&G ESG Green Bond UCITS ETF	JP Morgan ESG Green Bond Focus Index	01/02/2021	EUR22.9	EUR 23.2m	EUR 27.5m	EUR 23.3m	EUR 26.5m	-3.7%
Horizons S&P Green Bond Index ETF	S&P Green Bond U.S. Dollar Select Index	01/06/2021	CAD6.2m	CAD6.3m	CAD5.1m	CAD6.2m	CAD4.9m	-4.0%
Lyxor EuroGov Green Bond DR	Solactive Euro Government Green Bond Index	01/07/2021	EUR48m	**NEW**	N/A	EUR 52.1m	EUR 59.3m	N/A
Total Green bond ETF					**EUR 1205.8bn**		**EUR 1422.1bn**	**17.9%**

7. Spotlight: The Sovereign Green Bond Club

By the end of 2021, the Climate Bonds Green Bond Database included 46 unique sovereign green bonds with a combined volume of USD161bn.

Six nations issued debut green bonds in 2021, including debt market heavyweights the UK and Italy, and EM issuers Colombia and Serbia. In H2 2021, four sovereigns brought six new green bonds denominated in either EUR or USD which qualify for analysis in our pricing research.

EUR:

- Spain priced its first green bond.
- Germany returned to the green bond market for the fourth time.
- Korea issued its debut green bond.
- Hong Kong priced a pair of EUR green bonds.

USD:

- Hong Kong priced its fifth USD green bond.

The critical mass of investible sovereign green bonds has given rise to dedicated investment funds. In April 2021, Dutch Investor NN IP added the NN (L) Sovereign Green Bond Fund to its suite of green bond funds. The fund aims to incorporate environmental performance into its investment objectives and is permitted to buy the green debt of sovereign and supranational issuers. The fund is classified as Article 9 (dark green) according to SFDR. Article 9 funds are those which specifically have sustainable goals as an investment objective. The fund is benchmarked to the Bloomberg Barclays MSCI Euro Green Bond Treasury and Government-Related index.

In July 2021, Lyxor launched the world's first ETF tracking sovereign Eurozone green bonds. The fund tracks the Solactive Euro Government Green Bond Index which includes investment grade green bonds issued by Eurozone countries. Index inclusion is informed by the Climate Bonds Green Bond Database. This fund has been added to our ETF Monitor on page 14.

Spain

In September, Spain priced its first green bond describing its motivation as:

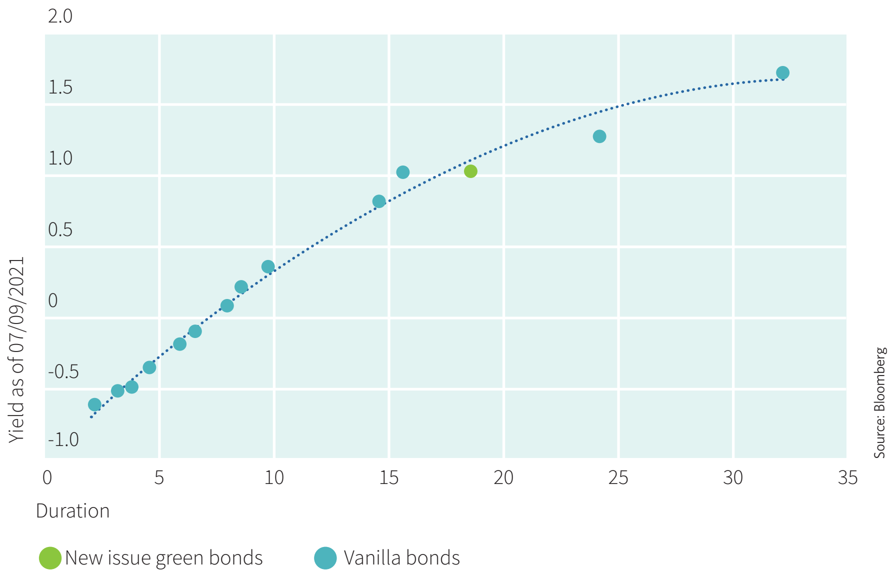
1. Promotion of Spain's environmental objectives and policies.

2. Sustainable debt market creation.

3. Demands of the investment community, leading to a more diverse investor base.

The framework aligned eligible expenditures with the six climate-change objectives of the EU Taxonomy, including Adaptation to Climate

SPGB 2042 - greenium



Sovereign Scorecard H2 2021	Spain	Germany	South Korea	Hong Kong
H2 2021	1% 30/07/2042	0% 15/08/2031	0% 15/10/2026	1. 1.75% 24/11/2031 2. 0% 24/11/2026 3. 1% 24/11/2041
Pricing date	07/09/2021	08/09/2021	06/10/2021	17/11/2021
Tenor	21 Years	10 Years	5 Years	1. 10 Years, 2. 5 Years 3. 20 Years
Original size	EUR5bn	EUR3.5bn	EUR700m	1. USD1bn, 2. EUR1.25bn 3. EUR500m
Size as of 31/12/2021	EUR5bn	EUR6bn	EUR700m	1. USD1bn, 2. UR1.25bn 3. EUR500m
Total green bonds				
Number of bonds	1	4	1	9
Total size of green bonds	EUR5bn/USD5.9bn	EUR24bn/USD25.5bn	EUR700m/USD760m	USD7.25bn
% total sovereign debt *	0.5%	2%	0.1%	23%

*Green bonds as a % of outstanding debt with greater than one year residual maturity as of 12/31/2021

Change, and the UN Sustainable Development Goals (SDGs). The largest share of the 2021 proceeds (71%) is expected to target Clean Transport including enhanced mobility, electric rail, and charging infrastructure. The expected breakdown of 2022 proceeds will be disclosed before the bond is reopened.

The EUR5bn (USD6bn), 2042 maturity deal was issued via a syndicate. The deal was 12 times covered, attracting EUR60bn worth of orders. This was the largest book cover of any inaugural European green sovereign syndication to date and enabled price tightening of 3bps, or 33%. The bond priced inside its own yield curve achieving a greenium.

Investors classified as green by the book runners took 66% of the deal and over 90% was placed with non-domestic investors. This satisfied the issuers desire to diversify the investor base, and indeed this was cited as one of the many successful elements of the deal.

Germany

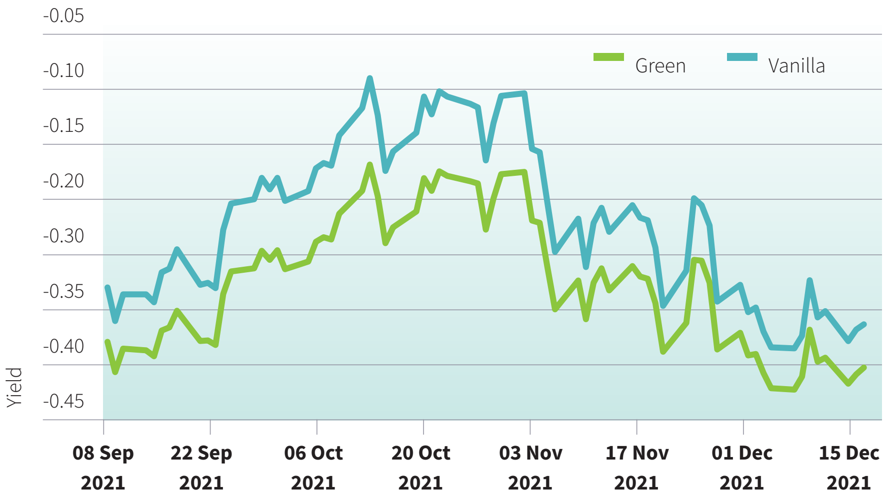
In early September, Germany priced its fourth sovereign green bond, a 10-year (Bund) with an initial size of EUR3.5bn. As with its prior three bonds, Germany followed its twin-bond methodology, pairing the new green deal with a EUR5bn vanilla Bund priced which had priced in June 2021.

The new green Bund was sold by auction which tends to attract more subdued order books compared to syndicated transactions. The book cover was slightly lower for the green twin (1.1x) compared to its vanilla equivalent (1.3x). Nevertheless, the bond achieved a greenium of 4.3bps, and continued to trade tighter in the secondary market.

The Bund auction group includes 31 primary dealers who are permitted to bid in auctions. Those dealers then distribute their allocations to their own clients; hence, it is not known who the end investors are.

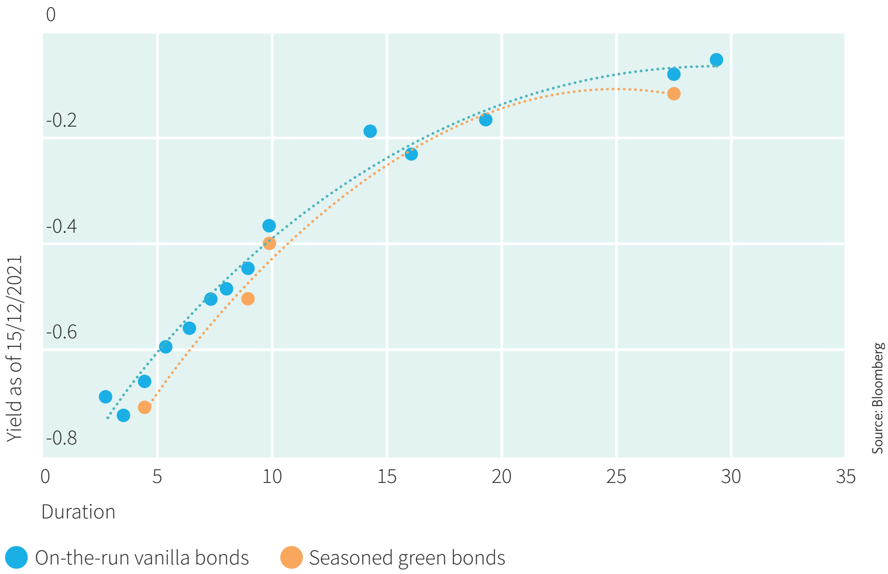
Germany now has a green yield curve comprising four data points, which consistently sits inside Germany's vanilla curve.

Green DBR 2031 - priced and remained inside vanilla twin



Data: Bloomberg

German green yield curve tighter than vanilla



Hong Kong

Hong Kong printed its first green sovereign in 2019 with a stated ambition to contribute to local market development. A further three USD green bonds were added in H1 2021, and in November Hong Kong added another trio: one USD, and a debut EUR two tranche deal.

1. USD. The USD1bn 10-year deal achieved book cover of 2.9 times, and price tightening of 27bps. Hong Kong now has five USD denominated green bonds outstanding, which together with a SUKUK comprise the entirety of its USD liabilities. The latest bond priced outside the green curve and a month later had moved in line.

2. EUR. The EUR deal was split between a EUR1.25bn (USD1.4bn) 2026 and a EUR500m (USD560m) 2042 tranche. Together, the two bonds attracted a book cover of 1.3 times and achieved spread tightening of 20- and 10bps, respectively. The pair of green bonds are the only EUR denominated Hong Kong sovereigns, hence we could not construct a yield curve.

The lead manager remarked that the green bonds in both currencies attracted strong support from dedicated green investors including many who were new to the name.

Korea

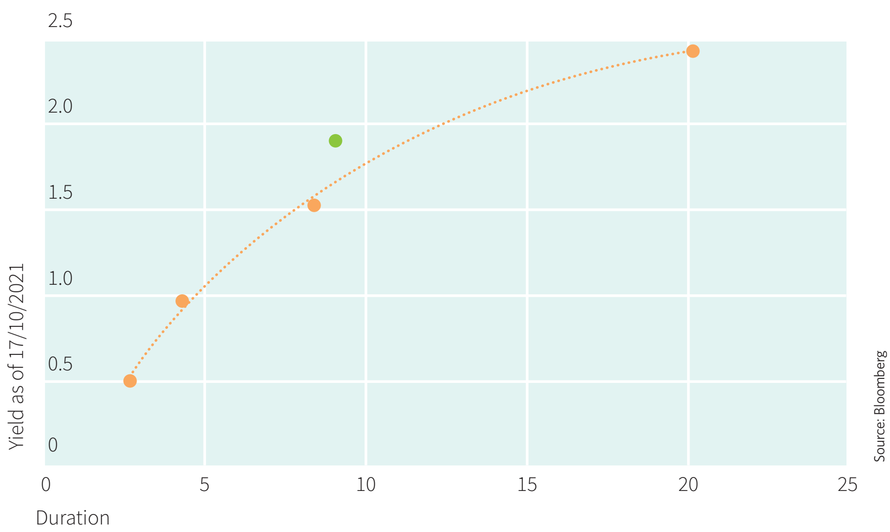
At the end of 2021, the Climate Bonds Green Bond Database included volumes of USD23bn originating from Korea making it the 14th largest source of green bonds and the second largest EM contributor after China. Korea has consistently pushed a green agenda announcing a Green New Deal in July 2020, and a net zero by 2050 target in October 2020. Multiple policies are in place to support these ambitions and a Korean green taxonomy is under development.

In early October, Korea issued its first sovereign green bond, a EUR700m (USD812m) deal with a 2026 maturity. The sustainability bond framework identified eight green UoP categories: Green Buildings, Sustainable Water and Wastewater Management, Renewable Energy, Clean Transportation, Energy Efficiency, Hydrogen, and Climate Change Adaptation.

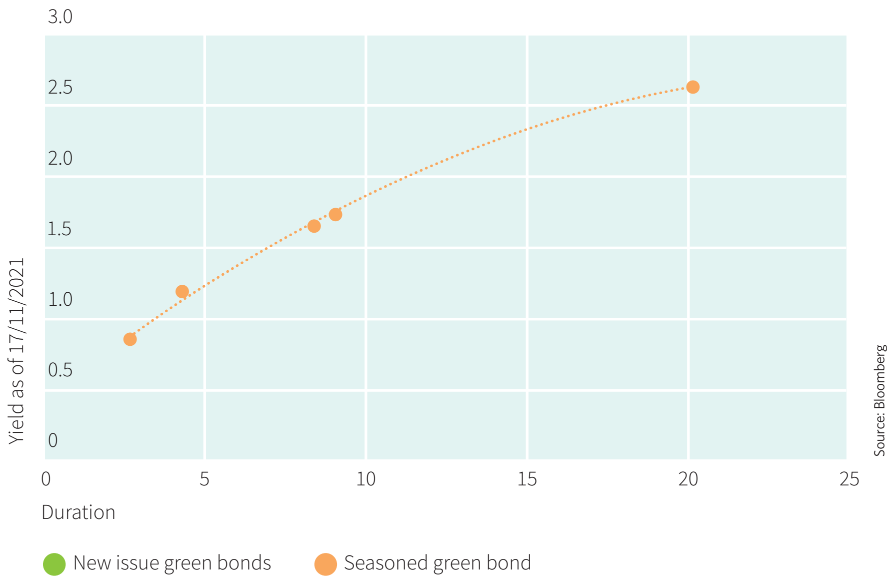
The green bond attracted a book of EUR4.2bn from over 150 accounts to achieve book cover of six times. The spread narrowed from mid-swaps +35 to price at +13. Most of the bond (90%) was placed with EMEA based accounts. In the secondary market, the bond continued to tighten, and the spread had narrowed by more than 50% after both 7 and 28 days.

Korea currently has two other EUR bonds outstanding, hence we could not build a yield curve.

Issue date Hong Kong 2031 USD - Normal new issue premium (to green curve)



+ 1 month Hong Kong 2031 USD - in line with green curve



8. Outlook

During the second half of 2021, USD240bn worth of green bonds was added to the Climate Bonds Green Bond Database, a record for any six-month period. Green bonds were issued in 28 currencies, with EUR (37%) and USD (26%) together supplying almost two-thirds of the total.

Our sample for H2 included 73 bonds, six of which were sovereigns. EUR denominated paper (53 bonds) continues to outstrip the USD sample (20 bonds). Many USD green bonds lack adequate clarity on their use of proceeds to enable inclusion in the Climate Bonds Green Bond Database without further input from issuers which is often not forthcoming. Further, market data tends to be patchier. Verizon stands out as an entity working to develop best practice in its disclosure, and its updated framework even includes criteria for brokers involved in its green bond deals.

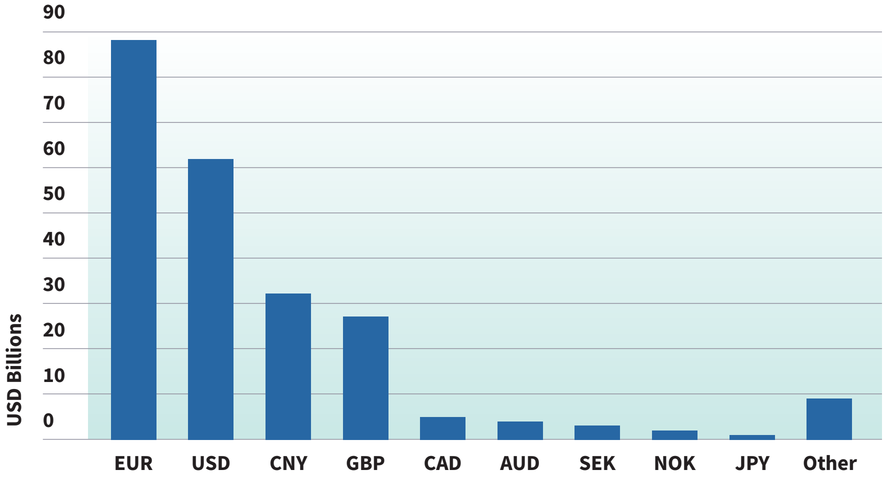
Spain and Korea (among others) joined the Sovereign Green Bond Club in H2. Sovereign green bonds are crucial for bringing the necessary scale and profile to the market and positive pricing outcomes such as those experienced by the green bonds in our sample which will hopefully encourage more sovereign issuers to take the plunge.

The performance of non-sovereign green bonds in H2 yet again demonstrated value for both issuers and investors. Green bonds, on average, achieved higher book cover, and larger spread compression than vanilla equivalents. In the immediate secondary market, green bonds tightened by more than vanilla baskets and corresponding indices, on average.

Pricing outcomes were notably different in Q3 and Q4. We built yield curves for 34 bonds in our sample, among which half priced either on or inside those curves. However, most of those observations occurred during Q3, while most of the Q4 bonds priced with a normal new issue premium (15 out of 17).

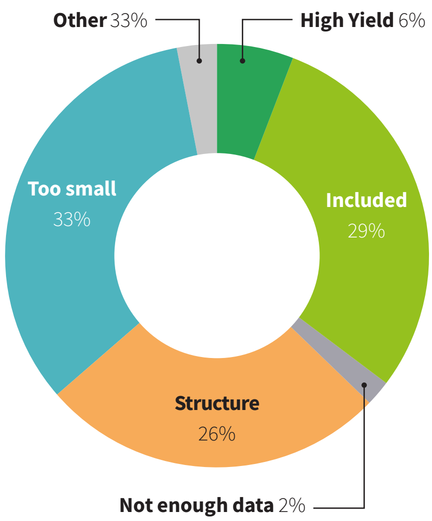
Central banks are in the process of, or have outlined their proposals for, winding down pandemic related and broader asset purchasing programmes, and interest rates are expected to increase in 2022. Investors are naturally cautious of investments that could be hurt by rising interest rates which includes all types of bonds. Green bonds are particularly vulnerable given the slightly longer dated nature of green bond indices compared to broad market counterparts.

Volume of USD240bn was added to the Climate Bonds Green Bond Database in H2 2021



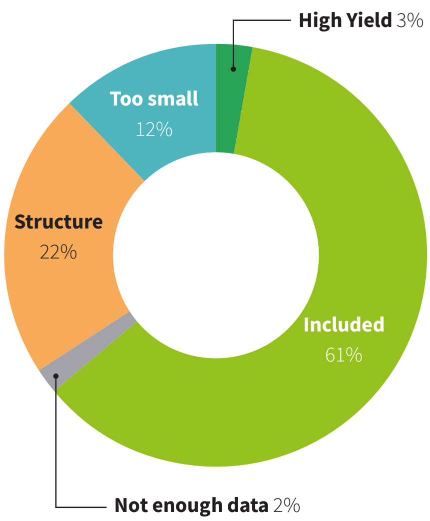
Source: Climate Bonds Initiative

A third of USD bonds qualified for analysis



Source: Climate Bonds Initiative

Two thirds of EUR green bonds qualified for analysis



Source: Climate Bonds Initiative

However, given the increase in demand for sustainable investments across the board, the green label may offer relative protection against this trend. Investors are keen to align their portfolios with the requirements of the SFDR Articles 8 and 9. According to a research report from Morning Star, 141 new fixed income funds with either label were launched in 2021.[4] This is expected to grow further, and, as a result, we expect demand for all types of sustainable finance instruments, including green bonds with robust frameworks, to rise.

The need for a low carbon transition is more pressing than ever, the IPCC published its sixth assessment report (AR6) in early 2022 which describes the threat that climate change poses to human well-being and the health of our planet as 'unequivocal'. All entities must urgently do everything possible to slow climate change and adapt to its impacts. We already have most of the required technologies and need leadership across sectors to push for swift adoption. Current best practice is good enough. Issuers should observe the present highest standards and tweak as those evolve. Spain published a very comprehensive green bond framework and has explicitly said it will be updated to incorporate the EU GBS and other developments. Verizon's updated framework includes new sustainable finance concepts which were not part of the discourse when its original framework was designed.

In 2021, USD517.4bn of debt was added to the Climate Bonds Green Bond Database, passing the annual half trillion for the first time. Climate Bonds expects that green bonds could double that figure in 2022 to reach the first annual trillion before the end of the year. Climate Bonds CEO Sean Kidney has gone a step further, nominating an annual USD5tn in green bond issuance by 2025.

This analysis is based on a limited number of green bonds, chosen according to the parameters outlined on page 25. Green bonds issued in other currencies, structures, formats, and sizes may perform differently from those discussed in this paper.

Climate Bonds started monitoring green bond pricing in 2016, and after five years (31 December 2021), 515 securities had been included in the analysis. As the profile of green bonds has evolved in the intervening period, pricing dynamics have also changed. Observations made five years ago will almost certainly not pertain to the current market which is rapidly developing. Climate Bonds will continue to monitor the behaviour of green bonds in the primary and immediate secondary market.

EUR summary statistics of bonds used for comparison

Bonds sharing similar characteristics to green bonds in our sample

Q3 Green bonds priced between July 01 and September 30	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
Landesbank Baden-Wuerttemberg 0.25% 21/07/2028	1	0.25	7	0.5	13-Jul
ABN AMRO Bank NV 0.5% 23/09/2029	1	0.5	8	1	16-Sep
Nationale-Nederlanden Bank NV 0.5% 21/09/2026	1	0.5	7	0.5	14-Sep
OP Corporate Bank Plc 0.375% 08/12/2028	1	0.375	7	0.5	01-Sep
Leasys SpA 0% 22/07/2024	1	0	3	0.5	15-Jul
Volkswagen Fin Serv AG 0% 05/08/2021	1	0	4	0.75	05-Aug
NRW Bank 0% 28/05/2031	1	0	10	0.5	21-Jul
Adif Alta Velocidad 0.55% 31/10/2031	1	0.55	10	0.6	29-Sep
Regional 10 Years	2	0.03	10	0.675	Jul-Sep
BAWAG PSK Bank 0.01% 03/09/2021 (CO)	1	0.01	8	0.5	24-Aug
ING-DiBa AG 0.01% 07/10/2028 (CO)	1	0.01	8	1.25	30-Sep
Covered Bonds 7 Years	5	0.01	7	0.7	Jul-Sep
National Grid PLC 0.25% 01/09/2028	1	0.25	7	1	25-Aug
State Grid Overseas Inv. 0.419% 08/09/2028	1	0.419	7	1	01-Sep
LeasePlan Corp NV 0.25% 07/09/2026	1	0.25	5	1	31-Aug
CTP NV 0.625% 27/09/2026	1	0.625	5	0.5	20-Sep
BBB Real Estate 4-6 Years	2	0.11	5	0.875	Aug-Sep
NIBC Bank NV 0.25% 09/09/2026 (SP)	1	0.25	5	0.75	02-Sep
Raiffeisen Bank Intl. 0.05% 25/08/2021	1	0.05	6	0.05	25-Aug
Mondelez International Holdings Netherlands BV 0.25% 09/09/2029	1	0.25	8	0.65	02-Sep
Pernod Ricard SA 0.125% 04/10/2029	1	0.125	8	0.125	04-Oct
Mondelez International Holdings Netherlands BV 0.625% 09/09/2032	1	0.625	11	0.65	02-Sep
BBB Consumer Discretionary 10-12 Years	2	0.69	11	0.5	Sep
Mondelez International Holdings Netherlands BV 1.25% 09/09/2041	1	1.25	20	0.7	02/09/2021
Becton Dickinson Euro 1.336% 13/08/2041	1	1.336	20	0.9	10-Aug
Swiss Life Finance I Ltd 0.5% 15/09/2031	1	0.5	10	0.6	08-Sep
JAB Holdings BV 1% 14/07/2031	1	1	10	0.5	07-Jul
ERG SpA 0.875% 15/09/2031	1	0.875	10	0.5	08-Sep
BBB Utilities 12-Years	2	0.68	12	0.725	Aug-Sep

Q3 Green bonds priced between July 01 and September 30 Continued from page	**Number of Bonds**	**Average Coupon (Par Weighted)**	**Maturity (Years)**	**Deal Size EURbn**	**Pricing date**
Norddeutsche Land. 0.01% 23/09/2029 (CO)	1	0.01	5	0.5	15-Sep
UniCredit Bank AG 0.01% 28/09/2026 (CO)	1	0.01	5	0.5	20-Sep
Covered Bonds 5 Years	2	0.01	5	0.75	Sep
Smurfit Kappa Treasury ULC 0.5% 22/09/2029	1	0.5	8	0.5	15-Sep
Brenntag Finance BV 0.5% 06/10/2029	1	0.5	8	0.5	29-Sep
Smurfit Kappa Treasury ULC 1% 22/09/2033	1	1	12	0.5	15-Sep
A Materials 12 Years	2	0.38	12	0.5	Sep
Kreditanstalt fuer Wiederaufbau 0% 15/09/2031	1	0	10	3	15-Sep
BNG Bank NV 0% 31/08/2028	1	0	7	1.75	24-Aug
Segro Capital Sarl 0.5% 22/09/2031	1	0.5	10	0.5	15-Sep
CTP NV 1.5% 27/09/2031	1	1.5	10	0.5	20-Sep
A-BBB Real Estate 9-11 Years	3	0.72	10	0.8	Aug-Sep
Acciona Energia Fin. SA 0.375% 07/10/2027	1	0.375	6	0.5	30-Sep
BBB Non-Fin Corporates 6 Years	2	0.08	6	0.75	Aug-Sep

Q4 Green bonds priced between 01 October and 31 December	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size USDbn	Pricing date
Sparebanken Vest Boligkreditt AS 0.01% 11/11/2026 (CO)	1	0.01	5	0.8	05-Oct
Societe Generale SFH SA 0.01% 02/12/2026 (CO)	1	0.01	5	1.5	23-Nov
DZ HYP AG 0.01% 26/10/2026 (CO)	1	0.01	5	1	19-Oct
CBRE Global Investors 0.9% 12/10/2029	1	0.9	8	0.5	05-Oct
Goldman Sachs Group 0.875% 05/09/2029	1	0.875	8	1	02-Nov
Vesteda Finance BV 0.75% 18/10/2024	1	0.75	3	0.5	07-Oct
A Financial Corporates 10 Years	2	0.875	10	0.925	Oct-Nov
Export-Import Bank of Korea 0% 19/10/2024	1	0	3	0.85	11-Oct
KfW 0% 15/11/2024	1	0	3	4	19-Oct
Blackstone Property Partners 1.625% 20/04/2030	1	1.625	8.5	0.5	13-Oct
UBS Group AG 0.875% 03/11/2031	1	0.875	10	0.875	27-Oct
Acef Holding SCA 1.25% 26/04/2030	1	1.25	9	0.5	19-Oct
Meimstaden Bostad Treasury 1.625% 13/10/2031	1	1.625	10	0.75	06-Oct
Engie SA 0.375% 26/10/2029	1	0.375	8	0.75	20-Oct
Non-Fin Corp BBB 9 years	2	0.72	9	1.225	Oct-Nov
Engie SA 1% 26/10/2036	1	1	15	0.75	20-Oct
Orange SA 0.625% 16/12/2033	1	0.625	12	0.625	07-Dec
RWE AG 1% 26/11/2033	1	1	12	0.6	17-Nov
BBB Non-Financial Corporate 12 Years	2	0.925	12	1.25	Oct-Dec
TenneT Holding BV 0.875% 16/06/2035	1	0.88	13.5	1	02-Nov
Pepsico Inc. 0.75% 14/10/2033	1	0.75	12	1	07-Oct
SpareBank 1 SR-Bank ASA 0.25% 09/11/2026 (SP)	1	0.25	5	0.5	02-Nov
AA-A Banks Senior Pref 5 Years	2	0.19	5	1	Oct
VIA Outlets BV 1.75% 15/11/2028	1	1.75	7	0.6	05-Nov
BBB Real Estate 7 years	2	0.80	7	0.6	Oct
AXA Logistics Europe Master SCA 0.375% 15/11/2026	1	0.375	5	0.5	08-Nov
Argan 1.011% 17/11/2026	1	1.011	5	0.5	04-Nov
Auckland Council 0.25% 17/11/2031	1	0.25	10	0.5	08-Nov
Societe Du Grand Paris EPIC 0.3% 25/11/2031	1	30%	10	1.75	16-Nov
Ile-de-France Mobilites 0.675% 24/11/2036	1	0.68	15	0.5	17-Nov
Regionals 10 Years	3	0.13	10	0.5	Oct

Q4 Green bonds priced between 01 October and 31 December	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size USDbn	Pricing date
Stedin Holding NV 0% 16/11/2026	1	0	5	0.5	09-Nov
BBB Non-Financial Corporate 5 Years	3	0.530	5	0.58	Oct-Nov
Societe Du Grand Paris EPIC 1% 26/11/2051	1	1	30	1.25	16-Nov
Ontario Teachers' Finance Trust 0.95% 24/11/2051	1	0.95	30	0.5	18-Nov
Regionals 30 Years	2	0.517	30	0.6	Oct-Nov
RWE AG 0.5% 26/11/2028	1	0.5	7	0.75	17-Nov
Non Financial Corporates BBB 7 Years	2	0.764	7	0.675	Oct-Nov
NTT Finance Corp 0.399% 13/12/2028	1	0.399	7	0.85	06-Dec
A Non-Financial Corporates 7 Years	2	0.1875	7	0.5	Nov
NTT Finance Corp 0.082% 13/12/2025	1	0.082	4	0.65	06-Dec
Toyota Motor Finance BV 0% 27/10/2025	1	0	4	0.75	19-Oct

USD Summary Statistics of bonds used for comparison

Bonds sharing similar characteristics to green bonds in our sample

Q3 Green bonds priced between July 01 and September 30	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size USDbn	Pricing date
AvalonBay Communities Inc 2.05% 15/01/2032	1	2.05	11	0.7	08-Sep
Simon Property Group LP 2.25% 15/01/2032	1	2.25	11	0.7	08-Sep
PacifiCorp 2.9% 15/06/2052	1	2.9	31	1	07-Jul
MidAmerican Energy Co 2.7% 01/08/2052	1	2.7	31	0.5	20-Jul
Atmos Energy Corp 2.85% 15/02/2052	1	2.85	31	0.6	21-Sep
Interchile SA 4.5% 30/06/2056	1	4.5	35	1.2	19-Jul
No comparable bonds					
Boston Properties LP 2.45% 01/10/2033	1	2.45	12	0.85	15-Sep
Extra Space Storage LP 2.35% 15/03/2032	1	2.35	11	0.6	13-Sep
Dominion Energy Inc 2.25% 15/08/2031	1	2.25	10	1	10-Aug
BBB Non-Fin Corp 10 Years	11	2.26	10	0.85	Jul-Sep
Verizon Communications Inc 2.85% 03/09/2041	1	2.85	20	1	01-Sep
BBB Non-Financials 20 Years	5	2.82	20	0.89	Aug-Sep
Sociedad Quimica y Minera de Chile SA 3.5% 10/09/2051	1	3.5	30	0.7	13-Sep
Westlake Chemical Corp 3.125% 15/08/2051	1	3.125	30	00-Jan	05-Aug
Tennessee Valley Authority 1.5% 15/09/2031	1	1.5	10	0.5	13-Sep
No comparable bonds					
Norinchukin Bank 1.284% 22/09/2026	1	1.284	5	0.5	14-Sep
A Financials 5 Years	2	1.39	5	1.375	Sep
Norinchukin Bank 2.08% 22/09/2031	1	2.08	10	0.5	14-Sep
A Financials 10 Years	2	2.39	10	1	Sep

Q4 Green bonds priced between 01 October and 31 December	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size USDbn	Pricing date
Export-Import Bank of Korea 1.75% 19/10/2028	1	1.75	7	1	12-Oct
Regional SSA 7 Years	2	0.00	7	0	Oct
Kreditanstalt fuer Wiederaufbau 1% 01/10/2026	1	1	5	3	13-Oct
Kommunalbanken AS 1.125% 26/10/2026	1	1.125	5	1.25	19-Oct
Ind. & Com. Bank of China Ltd/Sing. 1% 28/10/2024	1	1	3	1.05	21-Oct
ICBCIL Finance Co. Ltd. 1.625% 02/11/2024	1	1.63%	3	0.6	26-Oct
Ind. & Com. Bank of China Ltd/HK 1.625% 28/10/2026	1	1.625	5	1	21-Oct
ASB Bank 1.625% 22/10/2026	1	1.625	5	0.7	18-Oct
ICBCIL Finance Co Ltd 2.25% 02/11/2026	1	2.25	5	0.75	26-Oct
SMBC Aviation Capital FI 1.9% 15/10/2026	1	1.9	5	0.5	07-Oct
Amipeace Ltd 1.75% 09/11/2026	1	1.75	5	0.6	02-Nov
Sinochem Offshore Capita 2.25% 24/11/2026	1	2.25	5	0.5	24-Nov
Swedbank AB 1.538% 16/11/2026	1	1.538	5	1	09-Nov
Nationwide Building Society 1.5% 13/10/2026	1	1.5	5	1	01-Oct
Healthpeak Properties Inc 2.125% 01/12/2028	1	2.125	7	0.5	15-Nov
BBB Real Estate 7 Years	2	0.00	0	0	Nov

Methodology

This paper includes labelled green bonds issued during H2 2021. Labelled green bonds meeting the following specifications are included:

- Announcement date between 1 July 2021 and 31 December 2021
- 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 Green Bond Database

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 use of proceeds is not explicitly green. Baskets comprise the closest possible matches based on the following considerations in order of priority: a) currency, b) market type (EM/DM/Sukuk), c) no other thematic label, d) seniority, e) maturity, f) credit rating and g) sector, among bonds issued in the same quarter. 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 11 bonds. We acknowledge that bonds behave differently depending on when they are issued and that geo-political 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. Source Bloomberg, ticker MDLZ
4. https://www.fundresearch.de/fundresearch-wAssets/docs/SFDR-Article-8-and-Article-9-Funds-2021-in-Review.pdf

GB-TAP Green Bond Technical Assistance Program

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Climate Bonds INITIATIVE

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Design: Godfrey Design

Suggested citation: Harrison, C., *Green Bond Pricing in the Primary Market H2 2021, Climate Bonds Initiative, March 20221*

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If you would like to discuss this paper in more detail please contact: caroline@climatebonds.net.