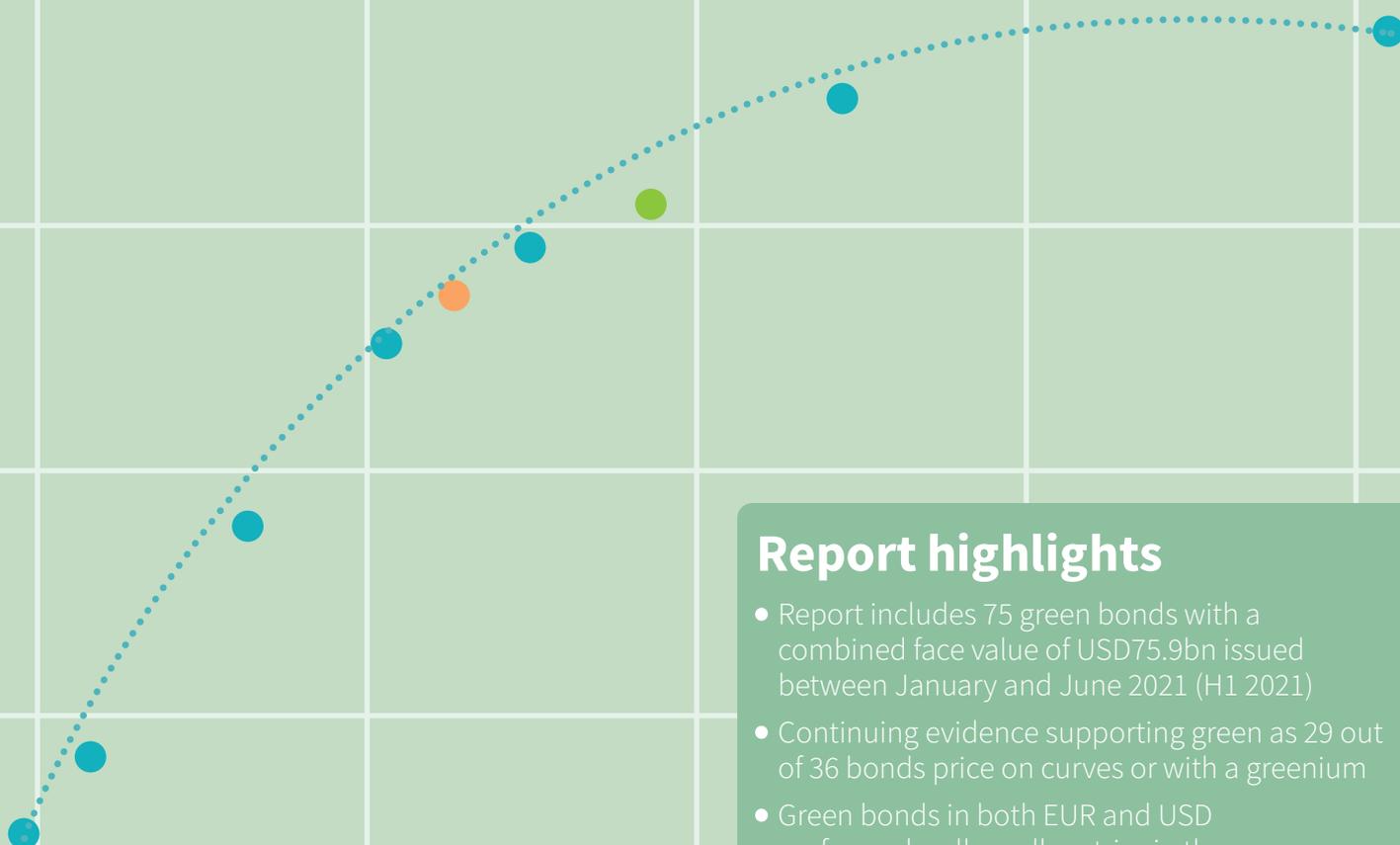


GREEN BOND PRICING IN THE PRIMARY MARKET:

January - June 2021

H1
(Q1-Q2)
2021



Report highlights

- Report includes 75 green bonds with a combined face value of USD75.9bn issued between January and June 2021 (H1 2021)
- Continuing evidence supporting green as 29 out of 36 bonds price on curves or with a greenium
- Green bonds in both EUR and USD performed well on all metrics in the primary market, on average
- Allocations to green investors increased by a massive 18% reaching 66%
- The Sovereign Green Bond Club: four issuers added six new bonds
- Spotlight: Green bond liquidity in the secondary market

Introduction

This is the twelfth report in our pricing series, in which we observe how green bonds perform in the primary markets. This report includes bonds issued in the first six months of 2021 (H1 2021).

Our methodology is designed to capture the most liquid portion of the green bond market and is therefore 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 30.

During this period, USD226.1bn of green bonds were added to the Climate Bonds Green Bonds Database, the most in any half year, and equivalent to 76% of the 2020 full year issuance (USD298.9bn). This paper includes 34% of that amount that met the above requirements (USD75.9bn), split between 75 green bonds from 62 issuers.

EUR is the dominant currency with 56 bonds totalling EUR51bn (USD61.2bn), while 19 USD denominated bonds had a combined issue size of USD14.1bn.

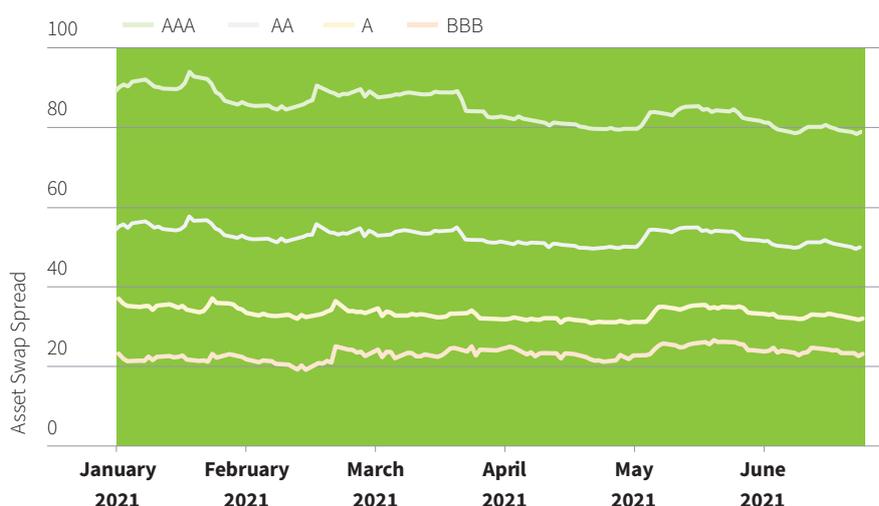
Report highlights

- **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 33 bonds in our non-sovereign sample. 26 priced on or inside their issuer's yield curves exhibiting a greenium. See more on page 10**
- **After 7 days, green bonds had, on average, tightened by more than corresponding indices. 28 days after pricing, green bonds had, on average, tightened more than vanilla baskets and matched indices See more on page 12**
- **Sovereign Green Bond Club: Four issuers added six new bonds worth a combined total of USD18.9bn. The three sovereign issuers with yield curves all achieved a greenium. See more on pages 16**
- **Spotlight: The green label and secondary market liquidity - we compare the secondary market behavior of green and vanilla utilities in 2020 and conclude that the green label can offer enhanced liquidity See more on page 20**

1. Market developments

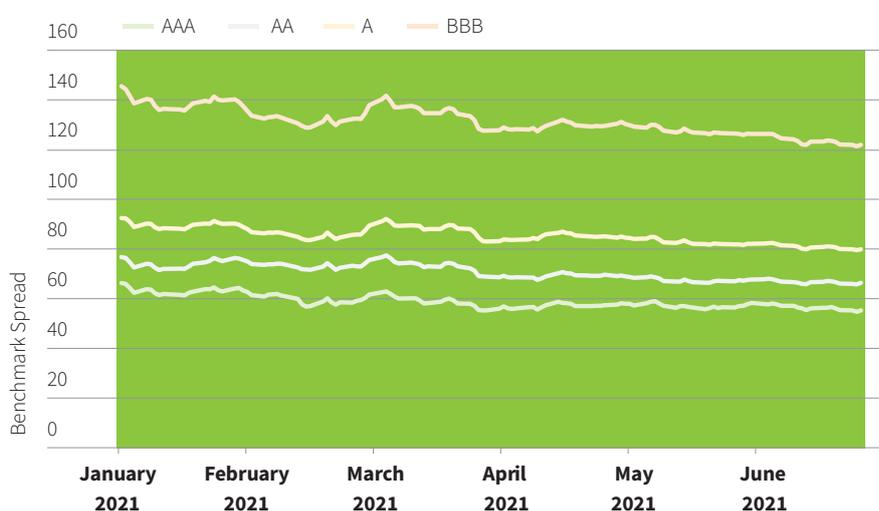
In a post-covid inflationary environment, investors were naturally cautious about overpaying for assets which could be hurt by rising interest rates. However, rates did remain low in H1, and technical factors such as continuing support from central banks and the impacts of other pandemic support, contributed to rising bond prices. Corporate bond spreads narrowed and those of broad market BBB indices in both EUR and USD tightened by 17% in H1 2021.²

EUR corporate credit spreads tightened in H1



Source: Refinitiv

USD corporate credit spreads tightened in H1



Source: Refinitiv

Against this backdrop, green bonds amounting to USD226.1bn were added to the Climate Bonds Green Bond Database during this period, with record issuance each month. EUR (USD105.5bn) and USD (USD63bn) denominated bonds together contributed three-quarters to the total amount. While supply has increased, demand for green bonds is growing all the time, and from a variety of sources. Among the investors publicly committing to responsible investment were the German Savings Banks and we highlight how EIB collaborated with this investor group on page 9.

The Sovereign Green Bond club continues to expand with two new EUR and four new USD sovereign green bonds being added to the Climate Bonds Green Bond database in H1. Sovereign issuers can add scale, liquidity, momentum, and profile to the green bond market, and offer a crucial source of capital to enable the achievement of the goals of the Paris agreement. For these reasons, and because market dynamics differ for sovereign issuers, we will examine sovereign issuance in a separate section in this and future pricing papers.

New Issuers in H1 2021

In H1 2020 62 entities issued 75 qualifying bonds. Among those were 15 first time green bond issuers, 13 of which issued EUR denominated bonds, while the remaining two were USD.

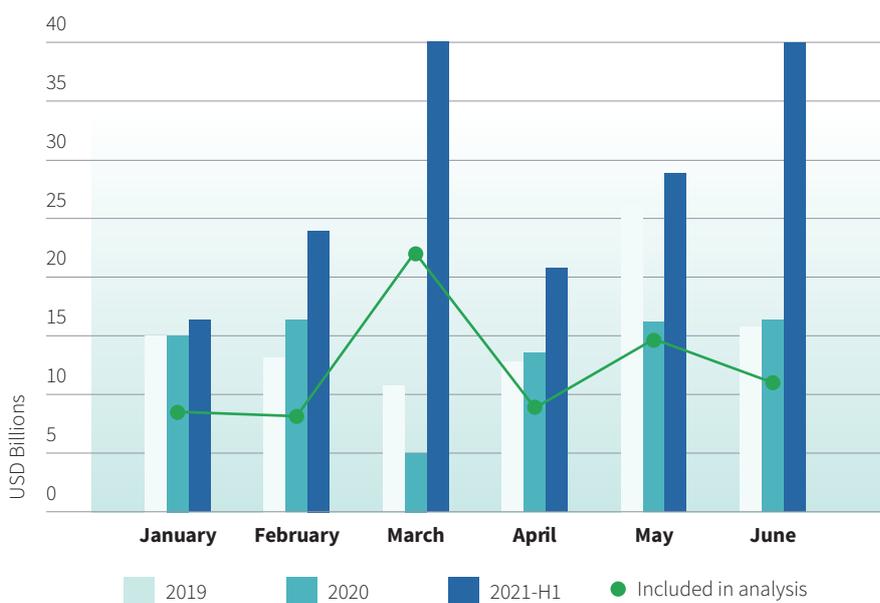
UBS finally printed its first green bond at the end of June with a EUR500m (USD594m) 5-year senior unsecured bond. The bond obtained Certification under the Climate Bonds Standard, according to the Low Carbon Buildings Criteria

VGP NV, a European provider of logistics and semi-industrial real estate printed its inaugural green bond at the end of March. The proceeds of the EUR600m (USD713m) 8-year bond were earmarked to finance or refinance eligible assets including Energy Efficiency, Low Carbon Buildings, Low Carbon Transport, Water, Waste, and ICT. The issuer has stated its intention to build out a green yield curve.

Excluding sovereigns, 43 repeat visitors issued 54 green bonds in H1.

Repeat issuance enables issuers as well as investors to leverage economies of scale. Issuers incur a marginally higher cost for their initial green bond as most of them carry out an internal audit to determine which assets and projects to include in their green bond, as well as external reviews. Investors benefit from buying bonds from repeat issuers as the due diligence on the issuing entity will be conducted for the first bond and reviewed for subsequent deals.

Record monthly issuance of EUR & USD green bonds



Source: Climate Bonds Initiative

Following its debut with a pair of USD bonds in September 2020, real estate investment trust **Equinix** returned to the market with both EUR and USD deals. The EUR bonds came first with a EUR500m (USD594m) 2027 maturity and a EUR600m (USD713m) 2033 priced in late February, the longer dated tranche having been upsized from the planned EUR500m (USD594m). A USD1bn 10-year was added in May. Equinix has a solid transition strategy in place including science-based targets incorporating scope 1,2, and 3 emissions. In January 2021, it joined European cloud infrastructure and data centre providers and European trade associations to form the Climate Neutral Data Centre Operator Pact and Self-Regulatory Initiative.³ The Pact is a commitment to ensure that European data centres are carbon neutral by 2030 by implementing measures such as improved energy efficiency, water conservation, recycling hardware, and reusing heat where practicable.

Three South Korean issuers returned to the green bond market, and all enjoyed strong pricing dynamics. Electric vehicle (EV) battery producer **SK Battery** priced USD700m 5-year in January. Auto manufacturer **Hyundai** issued a USD600m 5-year bond in February, and in late June, **LG Chem** issued USD1bn split evenly between 5 and 10-year maturities. Such issuers bring much needed sector diversity to the green bond market and offer investors the opportunity to lend to reliable entities that are contributing to the development of a net zero economy.

Remarks:

- Seniority rankings of financial corporate bonds are denoted using the following abbreviations: Senior Preferred = SP; Senior Non-Preferred = SNP; Covered = CO. As per our standard methodology, the payment rank of the green bond is matched, where practicable, when selecting vanilla bonds with which to compare the performance.
- Due to a lack of suitable comparable bonds, some bonds in our sample were paired with bonds issued in either the following or preceding quarter from their quarter of issue. A complete list of the bonds used as comparators is given on page 30.

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 2.9x for green bonds, and 2.6x for vanilla equivalents. Spread compression averaged 20.4bps for green bonds and 19.6bps for vanilla bonds.

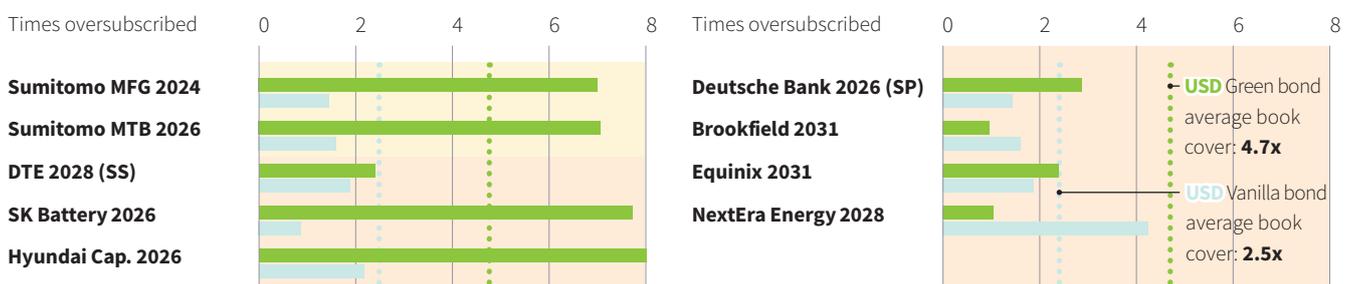
• **USD:** Average oversubscription was 4.7x for green bonds and 2.5x for vanilla equivalents. Spread compression averaged 29.9bps for green bonds and 24.8bps for vanilla bonds.

Green bonds are oversubscribed, and experience spread tightening as part of 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 achieved greater spread compression on average, compared to vanilla equivalents



USD: Green bonds achieved higher book cover than vanilla equivalents on average



EUR green bond pricing

EUR green bond order books were around 30% lower on average compared to H2 2020 as supply continued to increase and investors did not want to overpay for anything that could be hurt by rising interest rates. The average book cover for H1 was 2.9x, compared to 4.2x in H2 2020. Likewise, spread compressions for EUR green bonds were, at an average of 20.4bps, less dramatic than the average of 24bps seen in H2 2020.

Individually, just 40% of EUR green bonds achieved larger oversubscription than vanilla equivalents.

That compares with 70% in H2 2020. Among our sample of 54 green bonds, two achieved the same oversubscription as vanilla counterparts (Intesa SP 2028 (SP), and de Volksbank 2026 (SNP)), nineteen attracted larger book cover than equivalents, 21 attracted lower book cover than equivalents, and four were excluded from the analysis (see NB1).

Just under half (48%) of EUR green bonds experienced larger spread compression compared to vanilla equivalents. Two out of 54 achieved the same amount of spread compression as equivalents (Vonovia 2031, and Sparebank 1 SMN 2028 (SP)), 25 tightened more, and 27 tightened less.

Book cover

The largest book covers were achieved by four debut green bond issuers all of which issued in Q1. SSA issuers occupied two of the four top spots.

Debut issuer **Japan FOM 2028** had the largest book cover of 8x for its EUR500m (USD604m) January placement

Italian municipal utility **Acea Spa** attracted book cover of 6.5x for its 2030 bond, the longer leg of its two-tranche deal, which was upsized from EUR500m (USD594m) to EUR600m (USD727m). According to the issuer, investors were attracted to its concrete commitment to specific sustainability targets.

The first green bond from German local authority issuer **Hamburger Hoch 2031** was priced in April. The EUR500m (USD607m) deal attracted a book of 6x taking joint third place.

Polish oil refiner and petrol retailer **PKN Orlen** issued its debut green bond in May, a Climate Bonds Certified 2027 maturity with a framework referencing the EU taxonomy and financing renewable energy and clean transport assets. During the roadshow for the EUR500m (USD611m) bond, the issuer was interrogated about its long term, sustainable growth strategy and plans to dispose of its coal assets. Investors were evidently satisfied with the transition plan, since the book reached 6x the issue size which was the joint third largest among the EUR green bonds in our H1 sample.

Spread compression

Acea 2030 achieved spread compression of 40bps which was the joint-largest among the H1

sample. This bond priced on its yield curve and went on to tighten more than equivalents in the secondary market demonstrating value for both the issuer and investors. US real estate company Equinix issued a pair of EUR green bonds towards the end of February, exploiting interest rate differentials between the EUR and USD markets. The **Equinix 2027** tightened by 40bps sharing the top spot, while the **Equinix 2033** took third place with 37bps. Since these are the only two EUR Equinix bonds, there is no yield curve. However, both bonds performed better than equivalents in the immediate secondary market.

European property company **CTP NV** issued three EUR green bonds in H1 increasing its exclusively green yield curve to five bonds. The proceeds were used to prepay and refinance its secured portfolio which had been bank-funded. The completion of this exercise means that CTP has reduced its funding cost from 2.2% to 1.2%. The first of the three H1 bonds was priced in mid-February, a EUR500m (USD594m) 2025 maturity, followed in late June by a 2027 and a 2029 maturity each of which was also EUR500m (USD594m). The **CTP 2027** tightened by 37.5bps taking second place among the EUR H1 sample.

NB1: Four EUR bonds were excluded from book cover analysis. *Equinix 2027 and 2033, and Bank of China 2024 did not disclose book building data. Ned. Water 2051 achieved book cover of 2x but there was no data for the vanilla basket.*

USD green bond pricing

The H1 2021 USD green bond sample achieved the largest recorded average book cover of 4.8x, beating the previous high of 4.1x observed in H1 2019. Just nine out of 15 bonds in USD sample had data for both legs of the analysis (see NB2), and seven of those nine achieved larger book cover than corresponding vanilla bonds. 14 USD bonds had spread compression data, and again, a new peak of 29.9bps was recorded beating the 25bps seen in H2 2020. Sumitomo MTB 2026 matched the spread compression of its vanilla pair, nine green bonds tightened more than their pairs, while the remaining four did not.

Book cover

South Korean car manufacturer **Hyundai Cap. 2026** attracted a book that was 7.9x its issue size of USD600m for its second USD bond. Hyundai is one of a handful of auto manufacturers that has issued green bonds (see spotlight in our [H2 2020](#) publication), having visited the market 16 times in a variety of currencies since its debut in 2016.

Continuing the auto-theme EV battery developer **SK Battery America** achieved 7.5x book cover for its USD700m 2026 green bond. Proceeds of the bond will be rolled into Energy Efficient Buildings. SK Battery America was established by its South Korean parent as a US production base for EV batteries. SK Innovation ranked as the fifth largest EV battery manufacturer in 2020, with a

5.5% share of the global market. Clients include Hyundai Motor, Volkswagen, and Ford Motor Co.⁴

Sumitomo Mitsui Trust Bank priced its second green bond in mid-March, a USD500m 2026 maturity, and managed to cover its book by 7.2x. The bond was issued as part of a two-tranche deal, the larger portion of which was a USD1.75bn 3-year maturity and attracted a book cover of 1.7x. It has been suggested that smaller deals will always attract a book cover of greater multiples irrespective of its use of proceeds. While this may be true in this case, the green deal still attracted a larger commitment of USD3.6bn, compared to USD3bn for the vanilla deal. The proceeds of the green bond will be split between Low Carbon Buildings, Renewable Energy, Low Carbon Transport, and Water.

Spread compression

Spread compression data was available for all bonds in the USD sample except one (see NB3). Sumitomo MTB 2026 had the same amount of spread compression as its vanilla counterpart (30bps).

Among the nine green bonds tightening more than their vanilla equivalents, a trio of South Korean based corporates were the top performers. **SK Battery 2026** powered into first place, with spread narrowing of 45bps during book building.

LG Chem priced two green bonds at the end of June, each worth USD500m and maturing in 2026 and 2031. Both bonds tightened by 40bps during book building, charging into second place. LG Chem is concentrating its development agenda on auto and energy storage system (ESS) batteries, water treatment filters, and improving their performance. The proceeds of the bonds were earmarked for Low Carbon Buildings, Low Carbon Transport, Water, and Industry.

Hyundai Cap 2026 drove into third place, with its green bond achieving spread compression of 37.5bps.

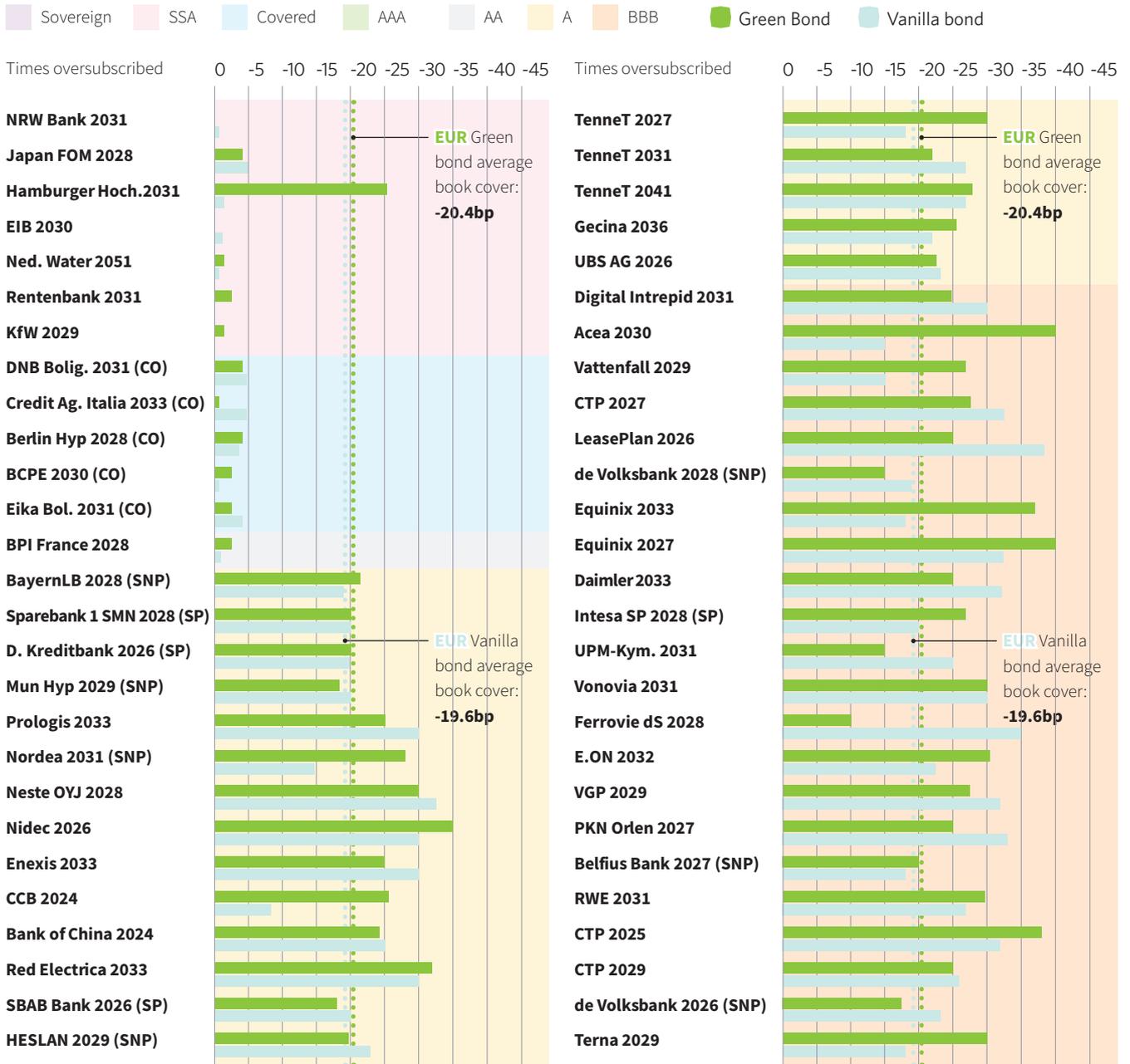
None of these issuers had USD yield curves hence we cannot remark on whether they received a pricing benefit for their green bonds.

NB2: Six USD bonds were excluded from the book cover analysis. *Bank of China (Lux) 2026, Bank of China (Sing) 2024, Kaiser Foundation Hosp 2041, and LG Chem 2026 and 2031 did not disclose book size. Efforts were made to contact these issuers to which they did not respond. EIB 2031 achieved book cover of 3.87x, but there was no data for the vanilla basket.*

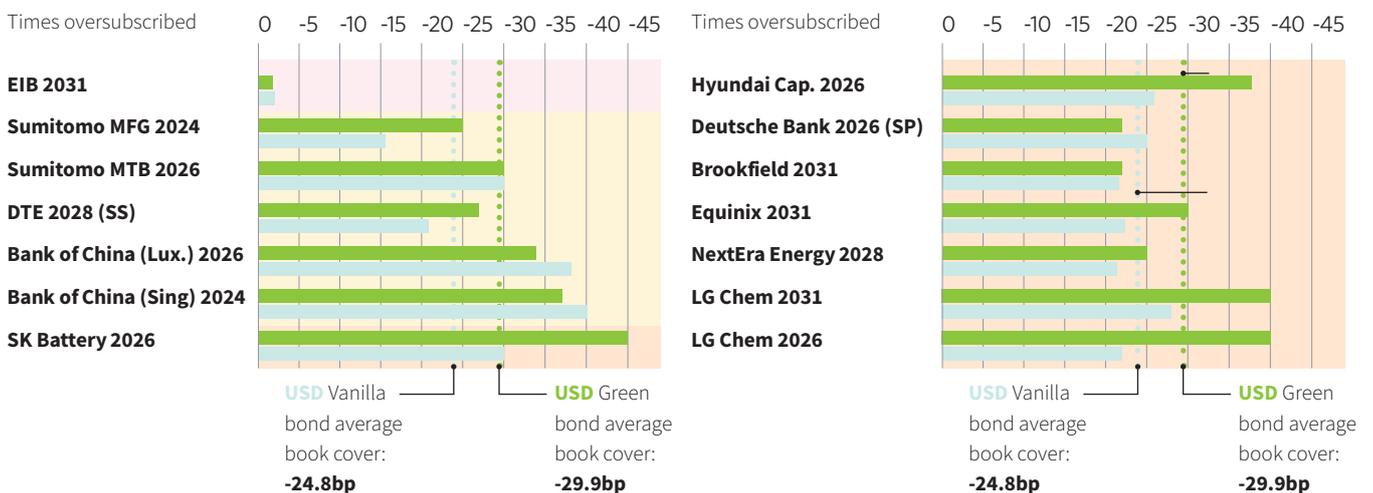
NB3: There was no spread compression data available for Kaiser Hosp 2041.

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 five bonds. For an explanation of the methodology, see page 30, and for summary statistics of the baskets, see page 30.

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



USD: Green bonds achieved greater spread compression on average, compared to vanilla equivalents



3. Green allocations: 56% was allocated to investors describing themselves as green

The amount allocated to investors describing themselves as green or socially responsible increased by 18% to 66%.

The 58 non-sovereign issuers included in this analysis were contacted and 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:

- 34 issuers representing 40 bonds shared the data
- Seven issuers representing seven bonds replied but were unable to disclose the data
- Nineteen issuers representing 22 bonds did not reply

Based on the responses we received, the average allocation to investors describing themselves as green was 66%, the highest we have seen in any period and an increase of 18% on H2 2020. Allocations ranged from 26% (SBAB Bank 2026 (SP)), to 100% (EIB 2030, see box). Multiple respondents remarked that the quality, quantity, and granularity of their order books contributed to favourable pricing. First time green bond issuer **VGP** (VGP 2029) noted that most of the investors they spoke to were sharply focused on VGP's green strategy, and its compliance with their own governance criteria. In this regard, the green label attracted extra support for the bond.

Sources of demand continue to grow

The focus on sustainable investing has skyrocketed in the last 12 months. In May 2021, Fitch Ratings noted that green bond fund assets under management (AUM) had increased by 80% year-on-year to reach EUR22bn (USD26bn) at the end of Q1 2021. This compares to the broader market, which has seen bond fund AUM increase by 4% over the same period.⁵ Such funds would likely be restricted to buying bonds bearing the green label. In addition to explicitly labelled green funds other sources of demand are also growing including:

- Funds with softer mandates bearing labels such as Sustainable, ESG, SDG, Paris Aligned and so on which often include a preference for green bonds where available. Many fund managers are launching new funds as well as rebranding existing funds.
- The ECB remains the largest buyer of EUR denominated bonds including those labelled green.

- Broad market investors: benchmark sized (EUR500m+) green bonds, which are increasing in number, attract attention from all types of investors, since they will qualify for inclusion in broad market fixed income indices. Broad market indices do not actively exclude green bonds.
- The growth of green labelled ETFs is addressed on page 15 and such products provide a broad range of investors access to green bonds via the secondary market.

Green bond frameworks incorporating the EU taxonomy

The EU Taxonomy offers an opportunity for improved data standardisation, and several issuers noted that including the EU Taxonomy eligible project categories in their green bond framework had helped to attract a seam of committed dark green investors. Such issuers included **de Volksbank** which was among the first to do so, **Deutsche Kreditbank**, whose framework also incorporated the current draft of the EU Green Bond Standard, and **Ferrovie dello Stato** which issued a Certified Climate Bond under the Low Carbon Transport Criteria.

E.ON could not disclose the split of investors but mentioned that they were happy with the quality of the order book which included substantial demand from investors with long term sustainability objectives. This was E.ON's first green bond under its framework that includes EU Taxonomy criteria, published in 2021 which also maps eligible projects under the ICMA GBP and the EU Taxonomy. Investors communicated to E.ON that they appreciated the clarity and consistency provided by its new framework.⁶

Standardisation of investor categories

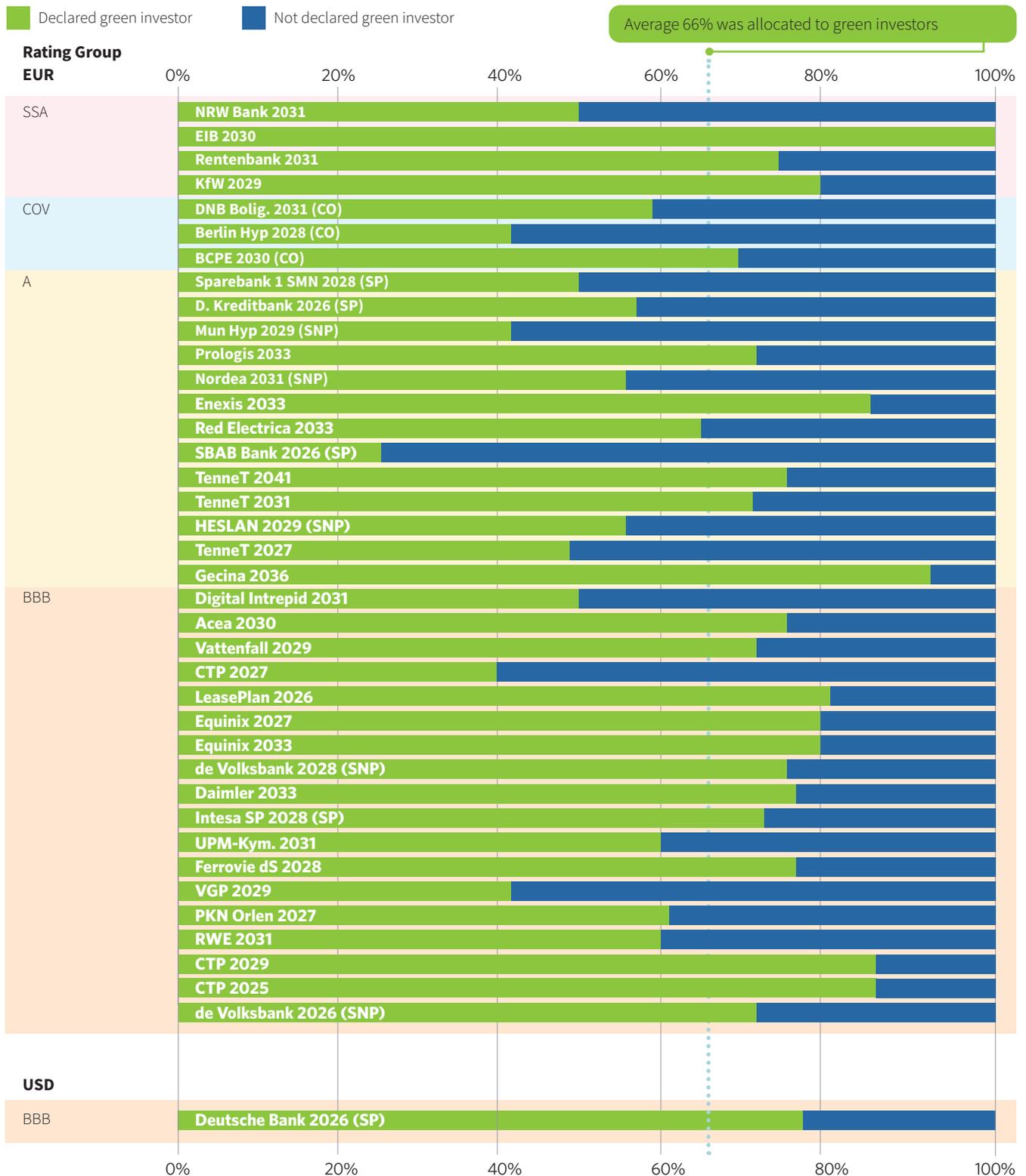
Among those who did not want to disclose, Belfius Bank described 'very strong' participation from green investors in its 100 strong order book. Vonovia was happy with its transaction but could not disclose the split of investors as there was insufficient transparency on which portfolios ended up absorbing the allocations.

The EU is leading efforts to standardise the definition of a green investor. From 1 January 2022 European investment firms describing their products as green, or socially responsible, will be required to disclose the percentage of their investments in compliance with the EU taxonomy, i.e., consistent with a net zero economy by 2050. This will give green bond issuers a clear benchmark to measure the relevant credentials of bidders and offer asset owners more transparency in the manager selection process. However, we asked issuers whether they had started to see any ramifications of this, and none replied that they had.

The only USD issuer to provide data was Deutsche Bank (Deutsche Bank 2026 (SP)). EIB and Equinix replied that they did not publish or have the data, and the rest did not respond.

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



German Savings Banks and European Investment Bank collaborate on ESG

In mid-March 2021, the European Investment Bank (EIB) priced a new EUR500m Climate Awareness Bond (CAB) due 2030 – the ninth reference point on EIB’s green EUR curve.⁷

The deal was exclusively marketed to and entirely placed with one category of investor: German **Sparkassen** (Savings Banks).

The Saving Banks are regional institutions providing banking services to retail clients, local public authorities, and small and medium sized enterprises that constitute the domestic borrowing community.

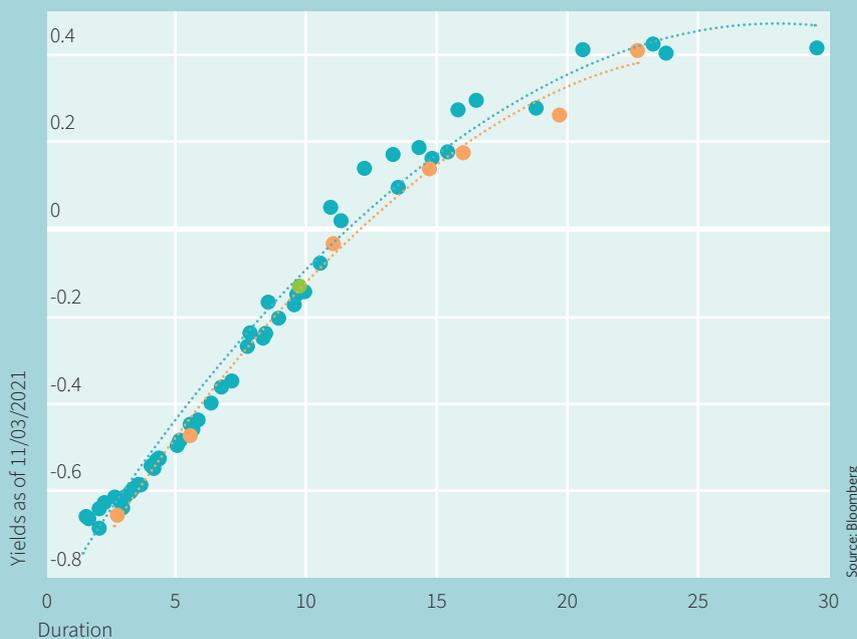
The German Savings Bank Association (DSGV) recently published its commitment to climate-friendly and sustainable business practices which has been signed by 213 members, including the three bookrunners in the CAB deal: Dekabank, Helaba and LBBW.⁸ This Commitment includes making business operations climate neutral by 2035, and encompasses the economic, social, and environmental elements of sustainability. It is applicable to all business units and includes targets and measures for retail banking, human resources, business operations, financing, local sponsorships, and crucially, own investments. In relation to the last point, it is stated that their own investment portfolios will be managed “in accordance with recognised sustainability criteria”.

The EIB’s EUR CAB due 2030 helps to fulfil this element of the commitment. The CAB documentation provides for the allocation of proceeds to EIB’s lending to activities that contribute to climate change mitigation in line with evolving EU Sustainable finance legislation, including the EU Taxonomy Regulation. This approach was also recommended by the Sustainable Finance Committee of the German Federal Government in its final report published in February.⁹

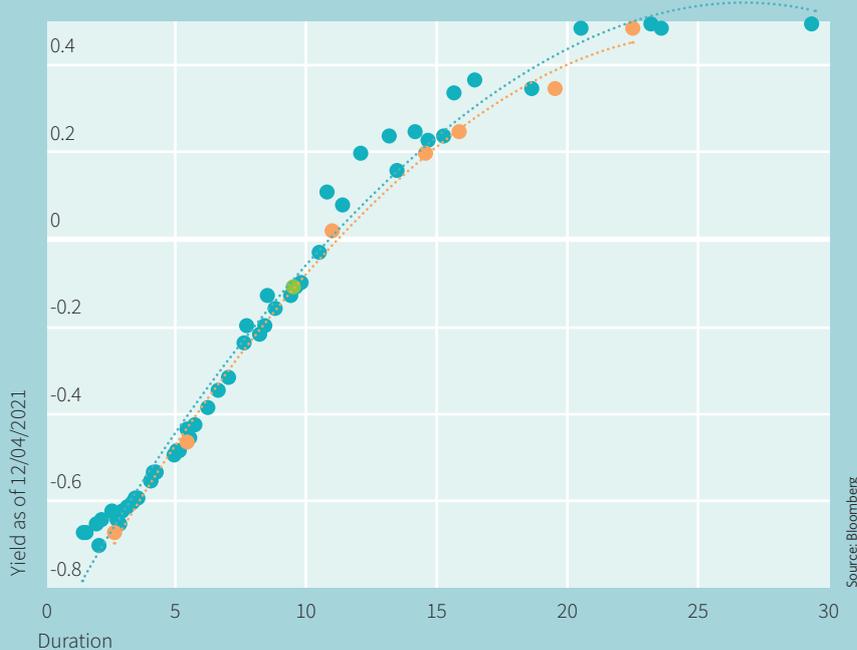
Collectively, the German Savings Banks have EUR1tn (USD1.18tn) in assets, hence the implementation of their commitment could be a key contribution to the growth in demand for the green label. With the transaction, the EIB engaged with the Savings Banks to underline the importance of their commitment on ESG issues.

The granularity of the transaction was highlighted by LBBW: “The granularity and high quality of the order book, which consisted of close to 30 savings banks and sector institutions, is a notable outcome of the

EIB 2030 EUR - on the vanilla curve, new issue premium to the green curve



+1 month EIB EUR - inside the vanilla curve, on the green curve.



- New issue green bonds
- Vanilla bonds
- Seasoned green bond
- Vanilla bonds issued on the same day as the green bond

transaction. Put it another way, these are more savings banks than we have seen in any other order book for the past two years.”¹⁰

As we have consistently seen with EUR bonds from EIB since, the bond priced on the vanilla curve, with a new issue premium to the green

curve. After one month, the bond had moved inside the vanilla curve and onto the green curve demonstrating value for both issuer and investor.

4. The greenium: 26 out of 33 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 costs 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.

Green bonds performed well in H1

In H1 2021, we were able to build yield curves for 33 out of the 69 bonds in our non-sovereign sample, of which 20 issuers (covering 24 bonds) had already issued green bonds sharing similar characteristics.

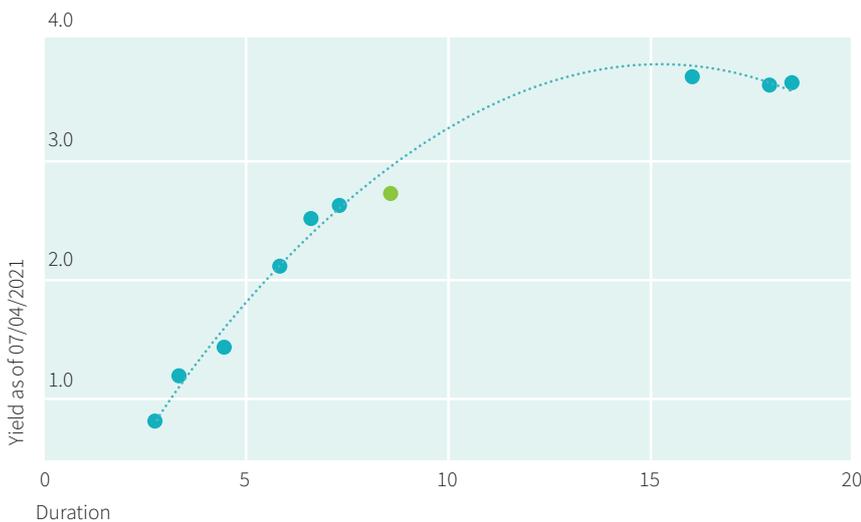
Within our sample of 33 green bonds:

Pricing outcomes	EUR	USD	Total
Greenium	6	5	11
On the curve	12	3	15
New issue premium	5		5
Indeterminate	2		2

Green bonds exhibiting a greenium in H1 2021

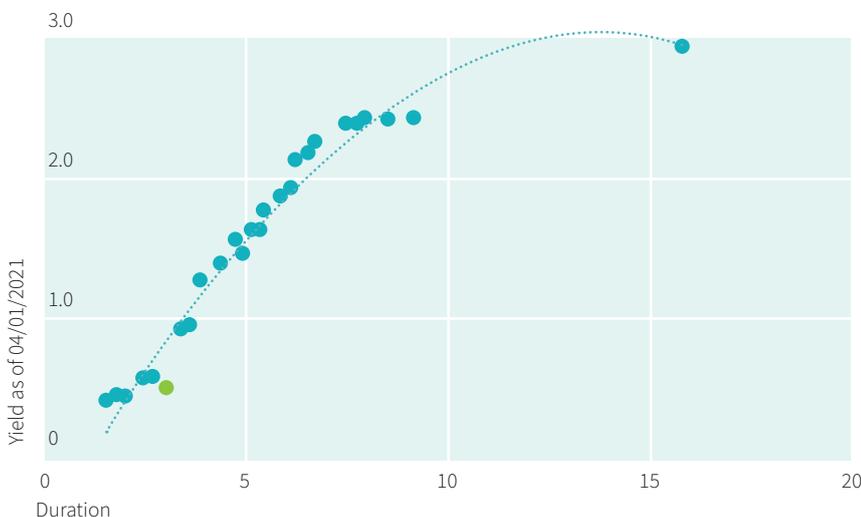
EUR	E.ON 2032
	Daimler 2033
	Ned. Water 2051
	Red Electrica 2033
	TenneT 2041
	UBS AG 2026
USD	Sumitomo MFG 2024
	Brookfield 2031
	Bank of China (Lux.) 2026
	Bank of China (Sing) 2024
	Equinix 2031

Brookfield 2031 USD - greenium



Source: Bloomberg

Sumitomo MFG 2024 USD - greenium



Source: Bloomberg

- New issue green bonds
- Vanilla bonds
- Seasoned green bond
- Vanilla bonds issued on the same day as the green bond

In H1 2021 79% of green bonds priced on or inside their yield curve. **This is a continuation of the strong investor support we witnessed in H2 2020** when an identical number of bonds priced on or inside their yield curve. In another similarity with H2 2020, USD bonds showed consistently strong pricing outcomes with all eight bonds in our admittedly small sample pricing on or inside their own yield curves. These included North American non-bank financial institution Brookfield Asset Management which priced its first green bond in April 2021, and Sumitomo MFG which brought a 2024 green bond in January, its first in USD.

Gecina rebrands all debt as green

In May 2021, French real estate company Gecina reclassified its debt portfolio under the green theme. Gecina labelled its 15 outstanding bonds worth a combined EUR5.6bn (USD6.8bn) as green and committed to issue all future bonds under the green label.¹¹ The ambitious framework was published in April 2021 and reviewed by Sustainalytics. Relabelling bonds contributes both scale and liquidity to the secondary green bond market and sends a signal to investors that Gecina has audited its activities according to climate compatibility. Gecina has committed to reaching net-zero by 2030. The company issued a new EUR500m (USD594m) 15-year green bond in June. The order book was 1.6x oversubscribed, and the bond experienced spread compression of 27.5bps in the primary market. The bond priced in line with Gecina's green yield curve. In the immediate secondary market, the bond performed very strongly, with the spread tightening 13.9% in the first week, and 27.2% after a month which was more than comparable bonds or the corresponding index and demonstrated value for both issuer and investor.

The reclassification of Gecina's debt is a manifestation of its CANOP-2030 (Carbon Net Zero Plan). Gecina is targeting net-zero emissions for its operations by 2030.¹² Climate Bonds is finalising a framework which will allow entities to Certify such entity level transition plans.

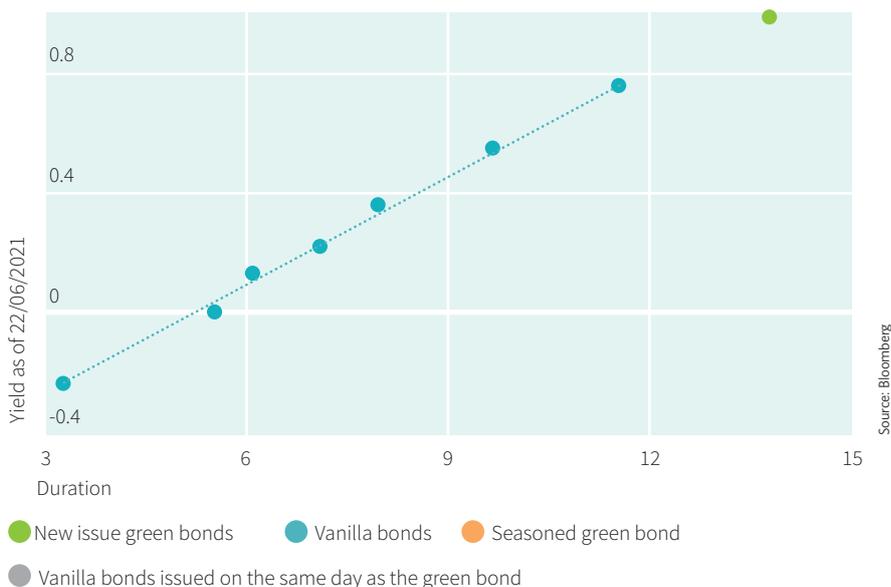
Methodology notes: We use yield on issue date, which reflects the price that the green bond offered on the pricing date. For comparable bonds, we use the yield-to-convention-mid.

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 30, 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.

Gecina 2036 EUR - on the green curve



5. Performance in the immediate secondary market

• **Seven days after pricing**, 46% of green bonds had tightened more than comparable vanilla baskets; 67% had tightened more than their corresponding index.

• **28 days after pricing**, 57% of green bonds had tightened more than comparable vanilla baskets; 70% had tightened more than their corresponding index.

In H1 2021, 69% of individual green bonds in our sample had tightened seven days after pricing; after 28 days that had increased to 86%.

Rating Group	Bond	% change 1 week			% change 1 month				
		Green Bond	Vanilla Basket	Corresponding iBoxx Index	Green Bond	Vanilla Basket	Corresponding iBoxx Index		
EUR	SSA	NRW Bank 2031	128.0%	32%	-14.8%	132.0%	61%	-13.4%	
		Japan FOM 2028	-14.5%	-14%	-85.8%	-22.3%	-13%	-51.6%	
		Hamburger Hoch. 2031	-36.1%	-65.0%	39.1%	-49.9%	-68.3%	44.6%	
		EIB 2030	2.5%	-32%	-10.8%	-2.3%	-35%	-16.7%	
		Ned. Water 2051	-17.3%	-10%	1.0%	-12.3%	-21%	18.9%	
		Rentenbank 2031	6.6%	-22%	0.4%	-10.3%	89%	2.2%	
		KfW 2029	-13.7%	-17%	-5.3%	-17.9%	-12%	0.4%	
		Covered	DNB Bolig. 2031 (CO)	24.5%	-12.5%	2.9%	-16.8%	-75.6%	-40.2%
			Credit Ag. Italia 2033 (CO)	17.2%	-12.5%	-36.4%	-10.2%	-75.6%	-29.6%
			Berlin Hyp 2028 (CO)	14.7%	2.9%	0.7%	-13.7%	-45.5%	-6.4%
			BCPE 2030 (CO)	0.6%	11%	10.9%	-33.8%	4%	4.6%
			Eika Bol. 2031 (CO)	-20.6%	33%	6.5%	-25.1%	-262%	2.8%
		AA	BPI France 2028	-17.3%	-2%	2.3%	7.0%	-5%	15.6%
		A	BayernLB 2028 (SNP)	-17.7%	4.0%	-155.3%	-16.3%	-3.5%	-297.7%
			Sparebank 1 SMN 2028 (SP)	-0.3%	-3.6%	0.7%	-0.7%	-5.5%	1.9%
			D. Kreditbank 2026 (SP)	-8.8%	-2.1%	-0.9%	-16.5%	-2.5%	-3.3%
			Mun Hyp 2029 (SNP)	-0.2%	0.5%	1.5%	-5.5%	8.6%	0.6%
			Prologis 2033	1.3%	-10%	2.0%	-2.6%	-11%	-0.7%
			Nordea 2031 (SNP)	0.58%	0.9%	0.60%	-10.0%	-3.3%	-5.4%
			Neste OYJ 2028	2.5%	-6.9%	-1.1%	2.7%	-3.1%	-7.1%
			Nidec 2026	-2.7%	1.1%	1.6%	-16.2%	-7.6%	-6.0%
			Enexis 2033	-3.5%	-3%	-0.8%	-6.1%	-5%	0.7%
			CCB 2024	-8.7%	-4.6%	-3.4%	-10.7%	-3.2%	1.7%
			Bank of China 2024	-9.7%	-4.6%	-2.7%	-7.0%	-3.2%	5.6%
			Red Electrica 2033	5.8%	-3%	8.8%	-3.7%	-5%	5.9%
			SBAB Bank 2026 (SP)	-12.2%	1%	-3.5%	-18.1%	0%	-9.5%
			HESLAN 2029 (SNP)	-7.8%	-10%	-0.6%	-8.3%	-9%	-4.2%
			TenneT 2027	-3.0%	-14%	-1.8%	-3.2%	-17%	-5.5%
			TenneT 2031	-9.3%	-9%	-1.1%	-15.2%	-11%	-5.1%
			TenneT 2041	-5.9%	-9%	-1.1%	-9.4%	-11%	-5.1%
			Gecina 2036	-13.9%	-2%	-4.4%	-27.2%	-9%	-8.3%
			UBS AG 2026	-3.6%	-2%	-4.6%	-23.4%	-17%	-11.1%
		BBB	Digital Intrepid 2031	-11.4%	n/a	-6.0%	-7.3%	2%	-5.3%
			Acea 2030	-1.4%	1.0%	4.2%	-24.4%	-8.1%	-5.3%
			Vattenfall 2029	-8.4%	1.0%	-1.6%	-7.2%	-8.1%	3.3%
			CTP 2027	-2.4%	-7%	0.3%	-2.9%	-2%	4.5%
			LeasePlan 2026	-3.3%	3.6%	-0.4%	-6.5%	0.7%	0.4%
			de Volksbank 2028 (SNP)	-1.7%	4.0%	2.7%	2.6%	-3.5%	2.9%
			Equinix 2033	-10.9%	-7%	2.4%	-8.5%	-7%	3.1%
			Equinix 2027	-6.5%	-7%	2.7%	-4.5%	-2%	2.9%
			Daimler 2033	-9.4%	-9.5%	0.2%	-24.7%	-10.8%	-6.6%
			Intesa SP 2028 (SP)	-4.0%	-3.6%	0.4%	-10.0%	-5.5%	-6.3%
		UPM-Kym. 2031	-3.9%	-11.9%	0.6%	-2.7%	-10.5%	-6.1%	
		Vonovia 2031	-0.2%	n/a	0.7%	-3.9%	2%	-6.0%	
		Ferrovie dS 2028	-6.6%	-11.9%	0.2%	-17.8%	-7.7%	-8.1%	
		E.ON 2032	-7.6%	0.4%	-8.1%	-10.4%	-6.1%	-9.8%	
		VGP 2029	3.4%	-2.2%	-4.5%	3.7%	-5.2%	-7.6%	
		PKN Orlen 2027	-13.3%	-7%	-0.7%	-14.5%	-3%	-3.5%	
		Belfius Bank 2027 (SNP)	-4.78%	-4.42%	-4.81%	-0.5%	-1%	-7.9%	
		RWE 2031	1.2%	-9%	-3.9%	-3.9%	-11%	-8.6%	
		CTP 2025	-1.9%	-7%	1.2%	-4.6%	-10%	-3.6%	
		CTP 2029	-2.3%	-3%	2.0%	0.9%	-9%	-4.3%	
		de Volksbank 2026 (SNP)	-1.7%	-4%	3.2%	-8.0%	-1%	-1.0%	
		Terna 2029	3.2%	-14%	1.8%	-12.9%	-17%	-5.4%	

	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	EIB 2031	-45.4%	-19.3%	-2.4%	-23.5%	-78.4%	-2.8%
	AA	Kaiser Foundation Hosp 2041	-15.1%	-16.0%	-3.3%	-12.5%	-16.4%	-1.6%
	A	Sumitomo MFG 2024	-16.6%	-3.2%	-2.9%	-5.7%	40.7%	-3.2%
		Sumitomo MTB 2026	-7.1%	13.8%	3.2%	-27.1%	9.5%	4.1%
		DTE 2028 (SS)	5.2%	17.7%	-0.8%	-4.0%	27.8%	-1.9%
		Bank of China (Lux.) 2026	n/a	3.5%	-4.2%	-14.0%	3.5%	-13.4%
		Bank of China (Sing) 2024	n/a	0.2%	-4.3%	-13.2%	-0.02%	-15.1%
	BBB	SK Battery 2026	-4.5%	-3.1%	1.4%	-2.5%	-1.4%	-5.6%
		Hyundai Cap. 2026	-4.5%	-2.2%	-7.0%	-6.6%	2.9%	-6.0%
		Deutsche Bank 2026 (SP)	3.6%	0.0%	-0.8%	-7.8%	0.0%	-9.2%
		Brookfield 2031	4.6%	4%	-0.7%	1.7%	2%	1.1%
		Equinix 2031	3.9%	-0.6%	-0.1%	1.9%	0.9%	-2.2%
		NextEra Energy 2028	5.7%	-2.2%	0.3%	-12.0%	-8.6%	-5.8%
		LG Chem 2031	9.7%	0.3%	1.4%	15.6%	3.2%	1.4%
		LG Chem 2026	12.8%	3.4%	-0.5%	18.5%	2.4%	4.9%

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

- 46% of green bonds had tightened by more than their vanilla baskets: 46% of EUR and 48% of USD green bonds.
- 67% of green bonds had tightened by more than their corresponding index: 72% of EUR and 76% of USD green bonds.

Compared to H2 2020, a lower percentage of green bonds tightened more than their baskets (52% in H2 2020) and indices (56% in H2 2020). A similar number of individual green bonds tightened on the break compared to H2 (69% compared to 70% in H2 2020), and the lower relative numbers may be due to stronger dynamics in the primary market as we had noted in H2 2020.

In EUR 18 out of 52 bonds had tightened against both their vanilla basket and matched index after a week (see NB1). Among them was **Ned. Water 2051** which had narrowed by 17% one week after pricing. This bond also priced inside its own yield curve. The debut green bond from Norwegian credit institution Eika Boligkreditt AS (**Eika Bol 2031 (CO)**) had tightened by 21% after a week, beating both its comparable bond and corresponding index. This bond tightened more than its basket but had lower spread compression in primary. The bond was longer than other bonds on the yield curve, hence a greenium could not be determined. In the corporate space three bonds enjoyed double digit percent tightening in the first week and performed better than both comparables: **PKN Orlen 2027** (-13.3%) **Gecina 2036** (-13%) and **Equinix 2033** (-10.9%). These three bonds were issued by entities with well-defined transition strategies in place.

In USD, five out of 13 green bonds had tightened against both their basket and matched index after a week (see NB2). **EIB 2031** (-45%) tightened the most, beating both basket and index, having achieved a greenium in the primary market. Among private sector issuers, **Sumitomo MFG 2024** (-16.5%), **Sumitomo MTB 2026** (-7.1), **SK Battery 2026** (-4.5%), and **Hyundai Cap. 2026** (-4.5%) all tightened more than both vanilla baskets and indices, Only Sumitomo MTB 2026 had a yield curve, and did achieve a greenium, the other bonds exhibited strong dynamics during book building and we can therefore say that these are examples of bonds achieving value for both issuer and investor.

NB1: There was no one week data for corresponding vanilla baskets for two EUR bonds: *Vonovia 2031, and Digital Intrepid 2031.*

NB2: There was no one week data for two USD bonds: *Bank of China (Lux.) 2026, and Bank of China (Sing) 2024.*

After 28 days

- 57% of green bonds had tightened by more than their vanilla baskets: 54% of EUR and 67% of USD green bonds.
- 70% of green bonds had tightened when compared to corresponding indices: 74% of EUR and 53% of USD green bonds

The 28-day metrics for H1 were similar to those of H2 2020: 57% of bonds had tightened more than their baskets in H1 compared to 56% in H2 2020, while 70% tightened more than corresponding indices in H1 against 67% in H2 2020. 32 green bonds tightened more than both vanilla baskets and corresponding indices.

In EUR, public sector entities **KfW 2029** (-17.9%) and **Rentenbank 2031** (-10.3%) both tightened more than baskets and indices. **Ferrovie ds 2028** also did well in the first month, tightening by 17.8%, ahead of both comparable metrics. In the primary market, what we could determine about performance of those bonds was mixed, as Ferrovie ds 2028 did not have a yield curve, KfW 2029 priced with a new issue premium, and Rentenbank 2031 priced on the curve. Both KfW 2029 and Rentenbank 2031 attracted higher book cover and achieved larger spread tightening compared to vanilla equivalents.

Among the private sector green bonds performing better than both baskets and indices, **Gecina 2036** had tightened by 27.2% after a month taking the top spot followed by **Daimler 2033**. The German auto company made its green bond debut in September 2020 and followed up with a EUR1bn (USD1.2bn) 2033 maturity priced in early March 2021. The bond priced with a greenium and went on to achieve 24.7% tightening in its first month. **Acea 2030** tightened by 24.4% in the first month having enjoyed strong primary pricing dynamics and pricing on its yield curve. These are examples of green bonds offering clear benefits to both issuer and investor.

In USD, six out of 15 green bonds achieved greater spread tightening compared to equivalents in the first month. **Sumitomo MTB 2026** demonstrated the largest spread tightening of 27.1%. **Bank of China (Lux.) 2026** and **Bank of China (Sing) 2024** took the second and third spots with 14% and 13.2% of tightening respectively having both priced with a greenium.

In H1 2021, green bonds continued to perform well in the immediate secondary market. Outright, more green bonds had tightened after seven and 28 days than had not. On a relative basis, green bonds also appeared to demonstrate value for investors. After seven days, more green bonds had tightened by a greater magnitude than their corresponding indices, and after 28 days, more green bonds had tightened by more than both vanilla baskets and indices.

Methodology notes

1. Vanilla baskets comprise the closest possible matches based on the considerations highlighted on page 30. 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, Verizon 2030 is matched with the iBoxx USD Corporates BBB 7-10 index.

Seven calendar days include five data observations. Twenty-eight calendar days include 20 data observations.

6. Green bond ETFs

Global ETFs experienced net inflows of around USD639.8bn in H1 2021, setting another new record. Investors were keen to exploit the recovery driven equity rally and ongoing low interest rates. Existing green bond ETFs added to the solid growth achieved in 2020, and two new funds were launched, including one for Canadian Dollar investors, bringing the total to eight.

At the end of H1, the total fund assets in green bond ETFs amounted to EUR1bn (USD1.2bn). More than half of that amount is in the most established green bond ETF, the Lyxor Green Bond DR UCITS which increased its total fund assets by 4.7% in H1.

The VanEck Vectors Green Bond ETF experienced the most aggressive growth of the green bond ETFs, increasing its total fund assets by 68% in H1. The iShares Global Green Bond ETF and Franklin Liberty Euro Green Bond Fund each added 36%.

We expect that existing green bond ETFs will continue to add assets, and that new ones will be introduced, reflecting the increased awareness and investor preference towards investing sustainably. This will inevitably contribute to demand pressures faced by green bonds in both primary and secondary markets and a broader range of investors will be exposed to green bonds.

Our green bond ETF has seen an uptick in inflows this year, thanks to greater adoption among a broad set of investors and increasing awareness of how climate risks can potentially impact long-term returns. In many ways the growth of our ETF mirrors the overall green bond market in that it is growing quickly but we believe is still in the very early days of scaling up to its true potential. Along with this market growth comes more opportunity to segment the investable universe based on risk and return objectives, which provides more ways to incorporate green bonds within an overall sustainable portfolio and should broaden their appeal further. For example, we are seeing more U.S. based investors looking for a US dollar only green bond exposure to avoid currency risk and maintain an attractive yield, and that is now possible to do while maintaining diversification.

William Sokol, Product Manager ETFs,
VanEck

ETF name	Currency	Index	Launch date	Size at launch	Total Assests 31 Dec 2020	Total Assets 30 June 2021
Lyxor Green Bond DR UCITS ETF	EUR	Solactive Green Bond Index	February 2017	EUR5m	EUR548.7	EUR574.7m
Van Eck Vectors Green Bond ETF	USD	S&P Green Bond Select Index	March 2017	USD5m	USD56.9m	USD95.8m
iShares Global Green Bond ETF	USD	Bloomberg Barclays MSCI Global Green Bond Select Index	November 2018	USD25m	USD156.5m	USD213.2m
UC MSCI European Green Bond ETF	EUR	Bloomberg Barclays MSCI European GB Issuer Capped EUR Index	November 2018	EUR20m	USD21.0m	EUR20.8m
Franklin Liberty Euro Green Bond ETF	EUR	Bloomberg Barclays MSCI Euro Green Bond Index	April 2019	EUR10m	EUR 79.2m	EUR107.8m
Lyxor Green Bond ESG Screened	EUR	Solactive Green ESG Bond EUR USD IG TR Index	October 2019	EUR4m	EU20.2m	EUR26.1m
L&G ESG Green Bond UCITS ETF	EUR	JP Morgan ESG Green Bond Focus Index	February 2021	EUR22.9	**NEW**	EUR23.2
Horizons S&P Green Bond Index ETF	CAD	S&P Green Bond U.S. Dollar Select Index	June 2021	CAD6.2	**NEW**	CAD6.3

7. Spotlight: The Sovereign Green Bonds Club

At the end of June 2021, the Climate Bonds Green Bond Database included sovereign green bonds with a cumulative volume of USD110bn from 16 nations. Most of this was denominated in EUR (USD95bn/EUR83bn), while USD took second place (USD11.6bn). In H1 2021, the EUR or USD denominated green bonds of five sovereign issuers was added. All five of the issuers have visited the green bond market before.

EUR

- France priced its second green deal;
- France also tapped its existing 2039 green bond for EUR1.5bn(USD1.8bn) in January. At the end of H1 2021, The total size of this bond was EUR28.9bn (USD31.4bn);
- Germany issued its third EUR green bond;
- Chile tapped its 2031 green bond for EUR400m (USD485m) in January 2021. The bond is now EUR1.9bn (USD2.2bn) in total.

USD

- Indonesia added its third green bond;
- Hong Kong added three new deals

France

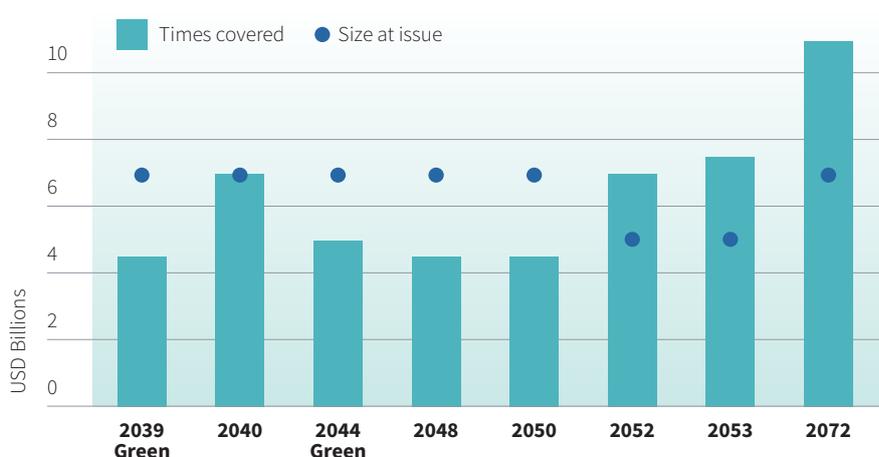
In March 2021, France priced its second green bond (GrOAT) with a maturity of 2044. The initial size was EUR7bn (USD8.3bn) which is standard for long-dated French sovereigns. Since 2017, France has printed eight bonds with a tenor of at least 20 years, and the initial size has been EUR7bn (USD8.3bn) for six of those while



the remaining two bonds launched with EUR5bn (USD5.9bn) each.

In preparation for its second green bond, the French Tresor opened dialogue with hedge funds who had traditionally submitted inflated orders which were not representative of their resulting allocations. As a result of these discussions, the order book was smaller than it had been for similar transactions but offered improved market transparency.

Book cover for long dated French Treasuries



Source: Climate Bonds Initiative

Sovereign Scorecard				
	France	Germany	Indonesia	Hong Kong
H1 2020	France 0.5% 24/06/2044	Germany 0% 15/08/2050	Indonesian Sukuk 3.55% 09/06/2051	Hong Kong 0.625% 02/02/2026, 1.375% 02/02/2031, 2.375% 02/02/2051
Pricing Date	16/03/2021	11/05/2021	02/06/2021	26/01/2021
Tenor	23 Years	29 Years	30 Years	5, 10, and 30 Years
Original Size	EUR7bn/USD8.3bn	EUR6bn/USD7.3bn	USD0.75bn	USD1bn, USD1bn, USD500m
Size as of 30/6/2021	EUR9.3bn/USD11bn	EUR6bn/USD7.3bn	USD0.75bn	USD1bn, USD1bn, USD500m
Total green bonds				
Number of bonds	2	3	3	4
Total size green bonds	EUR38.2bn/ USD42.1bn	EUR17.5/USD20.9bn	USD3.5bn	USD3.5bn
% total sovereign debt*	1.8%	1.2%	0.8%	9.8%

*Green bonds as a % of outstanding debt with greater than one year residual maturity as of 12/08/2021

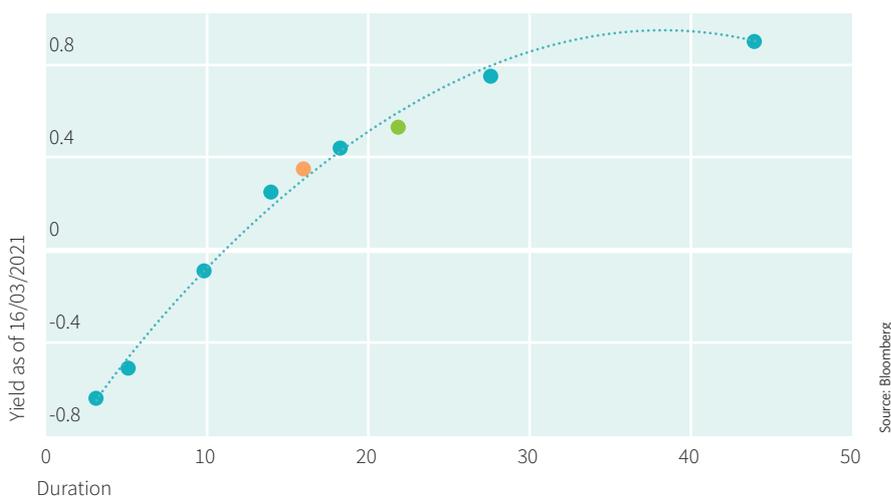
The GrOAT 2044 priced with a greenium. This was the first time a new French treasury had priced inside its own yield curve, demonstrating the maturity of the green bond market and the commitment of the green investment community. Consistent with the commitment made by the French Tresor to provide adequate liquidity to its green bonds, the new bond was tapped for EUR2.3bn (USD2.7bn) on 5 May of May 2021. The bond was still trading inside its yield curve hence the French Tresor continued to benefit from cheaper funding.

EUR4bn (USD4.7bn) of the EUR7bn (USD8.3bn) (56%) was allocated to investors describing themselves as green or socially responsible.

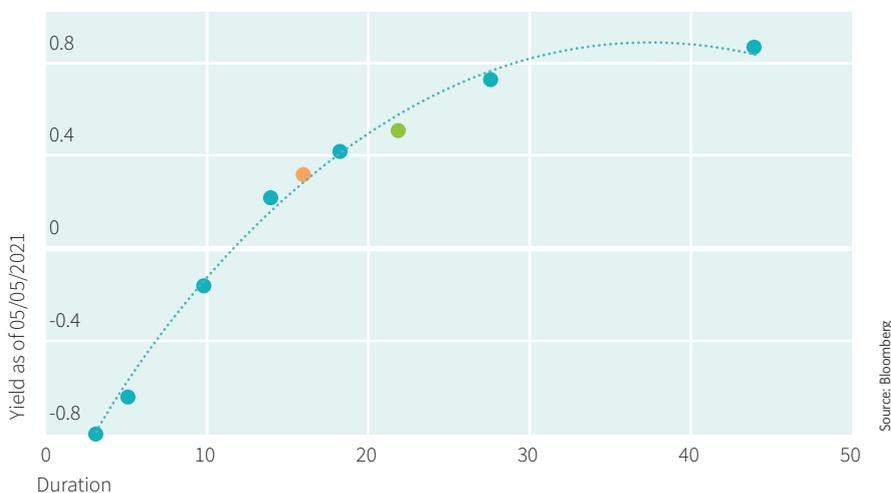
France priced its first GrOAT in January 2017, a 2039 maturity with an initial size of EUR7bn (USD8.3bn). It has been reopened 11 times through auctions (10) and syndicate (1) and by January 2021 had reached EUR28.9bn (USD31.4bn). As of June 2021, the GrOAT 2039 was the largest individual green bond.

France is one of the most sophisticated sovereign green bond issuers. All government expenditures are evaluated according to their compliance with the EU Taxonomy which helps policy makers to prioritise green projects.

FRTR 2044 EUR - greenium



Bond reopened: FRTR 2044 EUR - inside curve



- New issue green bonds
- Vanilla bonds
- Seasoned green bond
- Vanilla bonds issued on the same day as the green bond

Germany

In May 2021, Germany priced its third green bond, a Bund with a maturity of 2050 and an initial size of EUR6bn (USD7.3bn). Germany has already issued



two green bonds: a 10-year tenor (Bund) in September 2020, and a 5-year tenor (Bobl) in November of that same year. As with those, the new green issue was partnered with a vanilla twin sharing similar characteristics except that the use of proceeds was not explicitly earmarked for green projects.

We compare the book cover and issue size of the 30-year green Bund with that of its vanilla twin. At the end of June 2021, the vanilla twin was EUR28bn (USD33bn). The initial EUR2bn (USD2.3bn) was issued in August 2019 via auction. It was the first 30-year European

2050 green Bund has exhibited consistently lower yields compared to vanilla twin

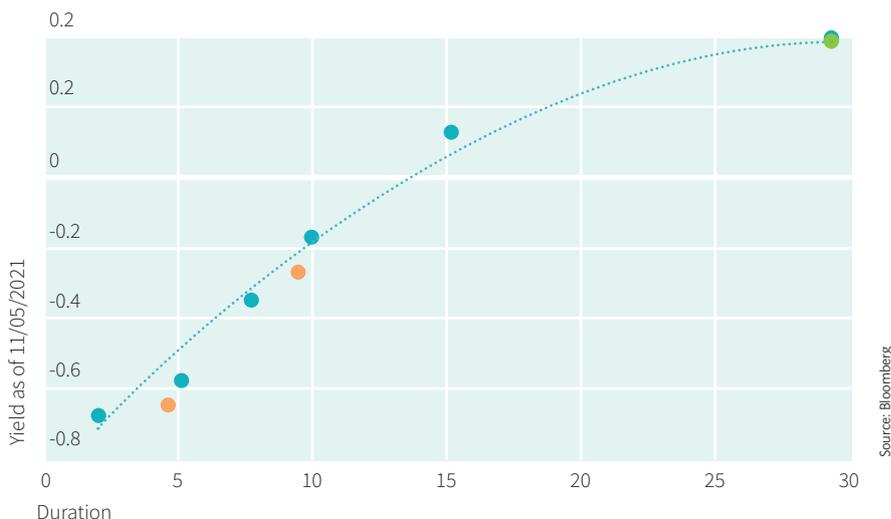


Data: Bloomberg

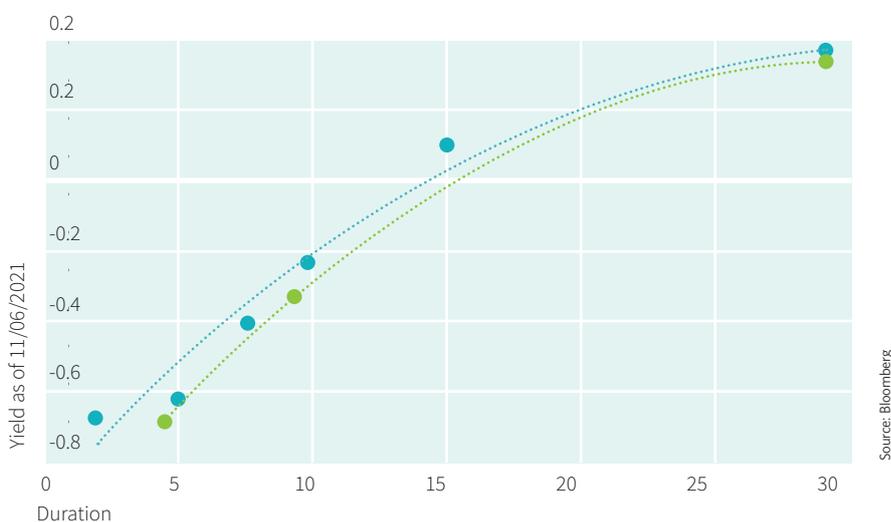
Government bond offering negative yield which impacted the order book, and the bond attracted relatively low interest from investors. The bond was then reopened multiple times by auction, and notably, a syndicated tap of EUR6bn (USD7.3bn) in October 2020 which attracted record demand of EUR31.5bn (USD37.2bn). In contrast, when the 30-year green Bund was priced in May 2021, a combination of an adjustment in investor expectations, the use of a syndicate, and the green label attracted an order book of EUR38.9bn (USD45.9bn), a new record, covering the transaction's EUR6bn (USD7.3bn) initial size by 6.5x. The green book attracted 284 investors, while the vanilla twin reopening attracted 120. The German Finance Agency decided not to publish the split between green and non-green investors since its objective is to attract new investors and issuers to the green bond market. The demand and final allocation included a broad range of investors with a higher number of real money accounts compared to the vanilla twin.

The green 30-year priced with a greenium, and at the end of June, it had consistently maintained a lower yield of more than 3bps compared to its vanilla twin. On 30 June, volatility for the prior 30, and 60 days had been slightly lower for the green twin compared to its vanilla counterpart. This is consistent with findings published in our H2 2020 report, where we noted that green bonds can provide a more stable investment compared to vanilla equivalents.

Germany 2050 EUR - Greenium



+1 month Germany: green curve inside vanilla curve



- New issue green bonds
- Vanilla bonds
- Seasoned green bond
- Vanilla bonds issued on the same day as the green bond

Germany 2051 volatility			
	Green 2051	Vanilla 2051	Difference
30-Days	11.213	11.264	-0.050
60-Days	11.870	11.874	-0.004

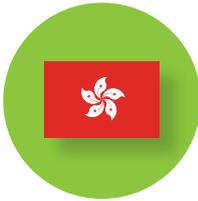
Data from Bloomberg as of 30/06/2020. The price volatility of a given period equals the annualized standard deviation of the relative price change for the relevant number of the most recent trading days closing price, expressed as a percentage.

Hong Kong green bonds exhibited strong dynamics in the primary market

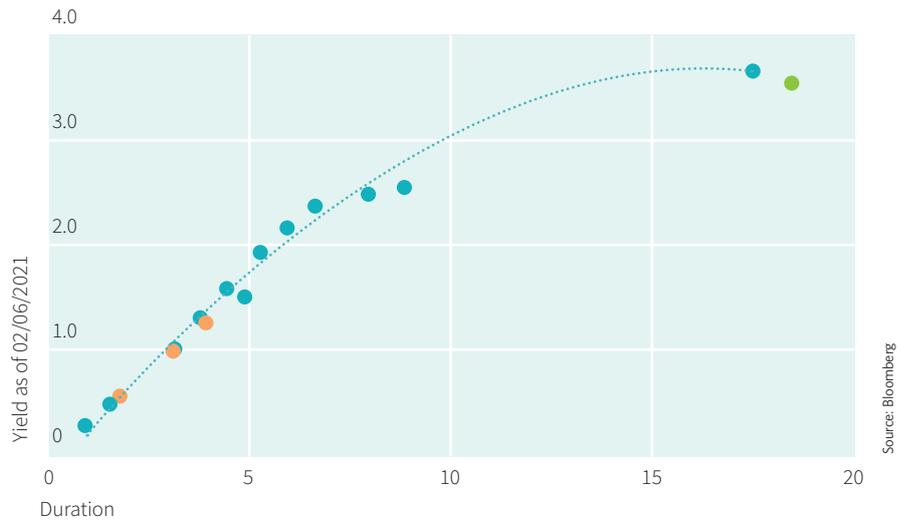
Maturity	Original Amount issued	Book cover	Spread compression	Spread change 7 days post issuance	Comparable index	Spread change 28 days post issuance	Comparable Index	Index used for comparison
2026	USD1bn	5x	27.5bps	-29%	3.27%	-24%	-7.33%	iBoxx USD Sovereigns & Sub-Sovereigns 3-5 years
2031	USD1bn	5x	22.5bps	-17%	-4.14%	-35%	-8%	iBoxx USD Sovereigns & Sub-Sovereigns 7-10 years
2050	USD500m	7x	27.5bps	-15%	-4.1%	-25%	-3.6%	iBoxx USD Sovereigns & Sub-Sovereigns 10+ years

Hong Kong

In January 2021, Hong Kong added three new USD denominated green bonds to its existing 2024 maturity green bond priced in May 2019. The 2026, 2031, and 2050 maturities reflect the commitment of the Hong Kong Monetary Authority to build a green yield curve. All three bonds exhibited very strong dynamics in the primary market and went on to tighten further in the secondary market after both seven and 28 days. In each case, the green bond tightened by a greater magnitude than its comparable index. The only other bond sharing the HKINTL ticker is the 2024 green bond, hence we could not build a yield curve. Around 55% of the bonds were allocated to investors describing themselves as green.



Indonesia 2051 USD - greenium



Source: Bloomberg

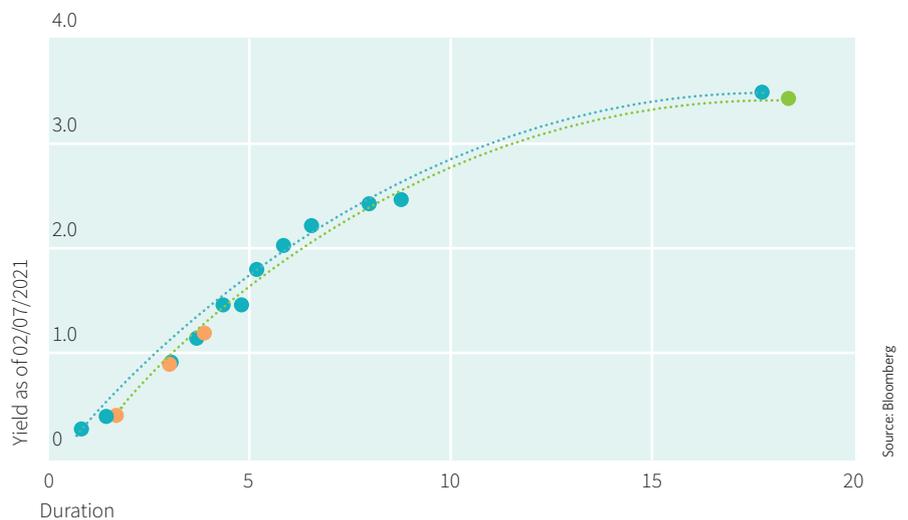
Indonesia

In early June 2021, Indonesia priced its fourth USD green Sukuk, a USD750m Sukuk maturing in 2051. Indonesia issued green Sukuk in 2018 (USD1.25bn 2023), 2019 (USD750m 2024), and 2020 (USD750m 2025) and is the largest issuer of green labelled Sukuk (Saudi Electricity is the second largest having issued two bonds worth USD1.5bn in 2020).



Like previous Indonesian green Sukuk, the bond enjoyed strong dynamics in the primary market. It achieved book cover of 4.5x and priced with a greenium. A month later, the green yield curve remained inside the vanilla curve. Participation of green investors was 57% which was a substantial increase from 34% achieved for Indonesia's last green bond priced in 2020.

+1month: Indonesia green curve inside vanilla curve



Source: Bloomberg

- New issue green bonds
- Vanilla bonds
- Seasoned green bond
- Vanilla bonds issued on the same day as the green bond

8. Spotlight: The green label and secondary market liquidity

The burning question

The purpose of this spotlight is to determine whether green bonds offer investors better liquidity compared to vanilla equivalents.

Evidence of superior liquidity could help to justify the presence of a greenium in primary markets.

The question we want to answer is:

If an investor bought an EUR Utility bond in 2019, what difference would the green label have made to its liquidity in 2020?

We have limited the pricing date to the year prior to the observation period. Broadly speaking, and in the absence of specific credit events, the liquidity of bonds tends to decrease over time.

The findings of our research demonstrate that green bonds traded more frequently, and exhibited narrower bid/offer spreads, in other words green bonds maintained higher liquidity, in the secondary market compared to similar bonds without the green label. These observations held true during March 2020 which presented some particularly difficult market conditions as the scale of the COVID pandemic became clear.

Motivation

2020 was characterised by some of the most challenging social conditions in living history which had unprecedented ramifications in financial markets. In the EUR market, yields rose as the market sold-off aggressively between 20 February and 23 March (the sell-off). Credit markets stabilised towards the end of March as central banks detailed massive support frameworks. The ECB announced its EUR750bn (USD881bn) Pandemic Emergency Programme on 20 March adding a further EUR600bn (USD705bn) on 4 June.¹³

During the sell-off, liquidity dried up for all types of bonds and higher dealing spreads made it harder to sell assets. Lack of liquidity is a feature of risk aversion, but market participants informed us anecdotally that green bonds did preserve sufficient liquidity to be transacted. We examined the data to determine whether there was evidence to support these claims. We concentrated on the utility sector because there was a critical mass of both green and vanilla bonds. The utility sector is regarded as one of the most recession proof.

Description of sample

Applying the methodology described above resulted in a sample of 46 bonds.

	Green	Vanilla
Number of bonds	17	29
Average years to maturity at issue	9.9	10.2
Average size at issue	EUR626m (USD735m)	EUR639m (USD751m)
Number of issuers	13	18

Methodology

Inclusion criteria:

- Sector classification: utilities
- Pricing date: between 01/01/2019 and 31/12/2019
- Currency: EUR
- Original size: at least EUR500m (USD587m)
- Credit quality: lowest credit rating from Moody's, S&P, or Fitch must be investment grade
- Seniority rank: senior unsecured
- Coupon: fixed. No sustainability-linked bonds
- Eligible collateral for Eurosystem credit operations with the ECB

Observation period: 01/01/2020 to 31/12/2020



Data provided by Tradeweb

Credit rating distribution	Amount outstanding	Number of bonds
Vanilla		
A	6%	2
AA-	5%	2
BBB+	24%	6
BBB	58%	17
BBB-	6%	2
Total vanilla	100%	29
Green		
A-	21%	4
BBB+	37%	5
BBB	32%	6
BBB-	10%	2
Total green	100%	17

Results of analysis

We looked at monthly trading data for each bond in the sample and compared the results. The results demonstrated that for bonds bearing a green label:

1. Average number of trades was higher for 11 out of 12 months
2. Bid/offer spread was narrower every month in 2020
3. Average bid/offer spread range was narrower for green bonds
4. Average turnover was greater in 7 out of 12 months

1. Average number of green bond trades was higher for 11 out of 12 months in 2020.

On average, green bonds in our sample traded more frequently than vanilla equivalents during the observation period. The only exception was July. In March 2020 there were, on average, 48% more green bond trades. The largest difference was May 2020, in which green bonds traded 2.4 times more frequently (average trades per bond was 14 for green bonds against 6 for vanilla).

2. Bid/offer spreads were narrower for green bonds.

The bid/offer spread is the difference between the highest price that a buyer is willing to pay and the lowest price that a seller is willing to accept and is a measure of market liquidity. A narrower bid ask spread suggests a greater number of buyers and sellers. For data consistency, our analysis was based on bid/offer spreads as of end of day.

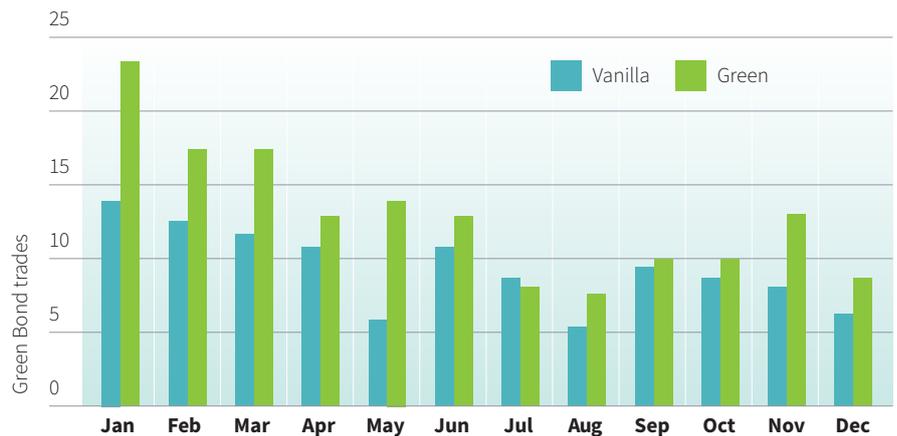
The average bid/offer spread was narrower for green bonds every month in 2020. While the difference was subdued in January and February, as soon as the markets came under pressure, green bond spreads narrowed. The biggest difference, of 9% (0.75bps), was observed in the month of April. This suggests that on average, the market for green bonds was more liquid compared to that of vanilla counterparts.

3. Average bid/offer spread range was narrower for green bonds

Another interesting measure, aside from the average bid/offer spread shown in 2. above is the bid offer range. This shows the dispersion of the bid/offer spread across the observed universe and is the difference between the largest and smallest bid/offer spread numbers in the sample. If the range is tight, the sample offers more predictability. If the range is broad, this increases uncertainty. **The bid/offer spread range was consistently narrower for green bonds.**

The largest average range for vanilla bonds was observed in December, with a 11.7bps range between the smallest and largest average spreads. For green bonds, the widest range was seen in March, at 5.5bps.

More green bond trades were observed in 11 out of 12 months



Source: Climate Bonds Initiative

Green bonds consistently exhibited narrower bid/offer spreads in 2020



Source: Climate Bonds Initiative

Vanilla and green bond bid/offer spread range



Source: Climate Bonds Initiative

4. Average monthly turnover was higher for green bonds in 7 out of 12 months

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

Individually, most bonds in each category exhibited total annual turnover of less than 40% in 2020.

Collectively, green bonds exhibited larger turnover in 7 out of 12 months. The largest difference was in May when green bonds achieved 60% more turnover compared to vanilla equivalents.

This suggests that green bonds can and do trade actively in the secondary market, emphasising that they can offer flexibility to investors.

Summary

Returning to the original burning question:

If an investor bought an EUR Utility bond priced in 2019, what difference would the green label have made to its liquidity in 2020?

The evidence presented above suggests that EUR Utility bonds sold in 2019 bearing the green label did offer more liquidity compared to those without the label in 2020.

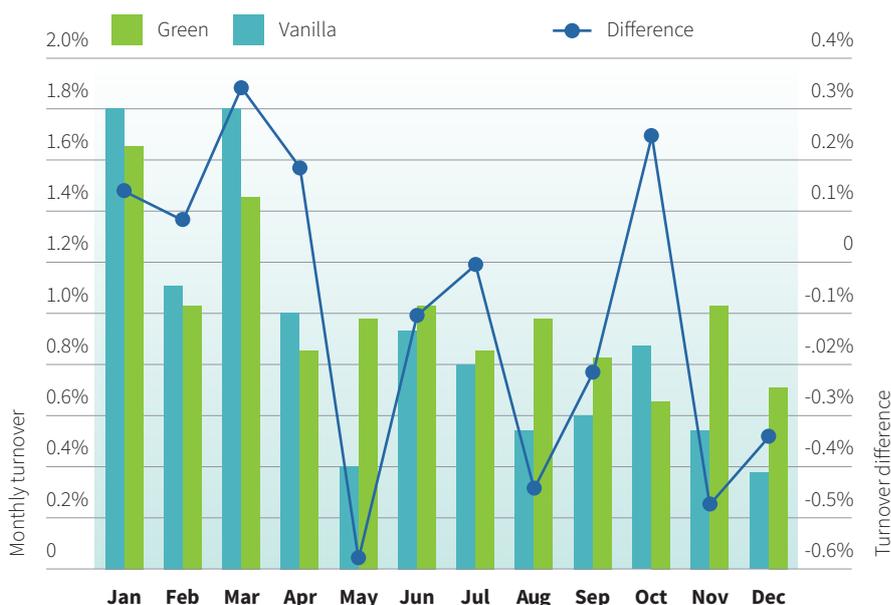
Green bonds in our sample traded more frequently, offered narrower bid/offer spreads, and the bid/offer spreads remained in a consistently narrower range compared to vanilla equivalents. Green bonds also exhibited higher turnover than vanilla bonds in 7 out of 12 months. In other words, green bonds in our sample maintained higher liquidity in the secondary market compared to similar bonds without the green label.

It seems that on average, green bond positions could be liquidated more easily, offering investors flexibility where it was needed.

While investors may pay more for green bonds in the primary market, flexibility in the secondary market could help to justify the existence of the greenium.

These differences are almost certainly attributable to the ongoing lack of supply in the labelled green bond market. At present, there will always be a buyer for a green bond because demand has grown so rapidly. We expect this imbalance to persist as more investors realise the importance of incorporating sustainability considerations into the investment process.

More green bond trades in 11 out of 12 months



9. Outlook

During the second half of 2021, USD226.1bn worth of green bonds were added to the Climate Bonds Green Bonds Database, a record for any six-month period. Green bonds were issued in 30 currencies, with EUR (47%) and USD (28%) together taking three quarters of the total.

Our sample for H1 included 75 bonds, the most we have ever looked at in a half year period. The USD (19 bonds) sample remains a fraction of that of EUR (56 bonds). USD bonds continue to lack the required disclosure and transparency, and data availability is comparatively poor. Nonetheless, the USD bonds that we looked at demonstrated very strong pricing dynamics, with six out of eight non-sovereign bonds with yield curves pricing with a greenium, and the remaining two pricing on their yield curve. The USD Indonesia 2051 bond also priced with a greenium, and Indonesia now has a green USD yield curve which sits inside its vanilla one.

Overall, performance in H1 demonstrated yet again that green bonds can offer value to both issuers and investors continuing the strong trends seen in H2 2020. Qualifying bonds attracted, on average, larger book cover than vanilla equivalents, and experienced more aggressive spread compression. The number of bonds pricing on or inside their own yield curves remains high at 26 out of 33 plus a further three sovereign bonds. In the immediate secondary market, USD and EUR green bonds tightened, on average, more than corresponding indices

after both seven and 28 days, and more than vanilla baskets after 28 days. There were multiple examples of green bonds performing strongly in the primary market and continuing to tighten in the secondary market offering value to both issuers and investors.

Our work on green bond pricing has indicated that green bonds tend to tighten by more than equivalents in the immediate secondary market, and there is also emerging evidence of green bonds having lower volatility. Our collaboration with Tradeweb reveals that in 2020, qualifying EUR green utility bonds issued in 2019 appeared to offer investors more flexibility in the secondary market too. Our analysis demonstrated that the number of trades was higher for the green bond sample in 11 out of 12 months, the bid/offer spread was narrower in every month, the average bid/offer spread range was narrower for green bonds, and the average turnover was greater for green bonds in seven out of 12 months. This suggests that investors attach a value to the green label, and the secondary market performance and flexibility could help to justify the existence of a greenium.

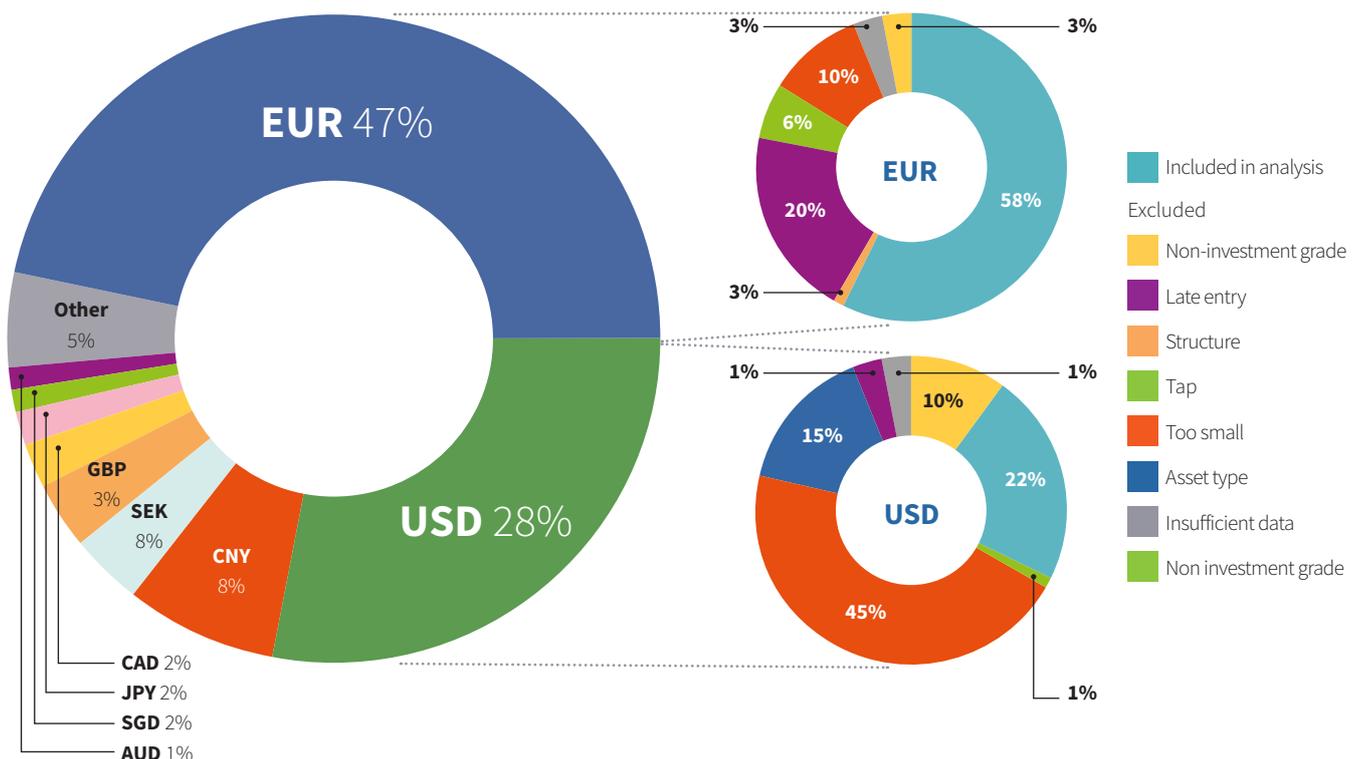
Climate change is influencing investment decisions and more investors are committing to green and responsible investment strategies as witnessed by the 18% increase in the amount of green bonds allocated to investors describing themselves as green or responsible. More instruments are needed to support increased capital flows. The high volume of green bonds

issued in H1 suggests that the Climate Bonds' goal of USD1tn in annual issuance is well within reach. The number and variety of green bond issuers continues to grow, enabling investors to build more diverse portfolios of green securities. Defined transition frameworks will further broaden the inclusion of a wider variety of entities.

The recent IPCC report provides even more overwhelming and urgent evidence that the impact (and associated costs) of going over 1.5 degrees is much greater than the costs of avoiding them.¹⁴ The IEA Net Zero report provides a pathway towards net zero by 2050 with ambitious targets for the growth of renewable energy and green hydrogen as well as a complete shift away from fossil fuels. The IPCC report also shows the need to invest much more in resilient infrastructure. It is now clear that even with rapid declines in emissions, there will be a time lag before these are reflected in temperatures, meaning decades of floods, forest fires and other climate-related disasters lie ahead. The need to build and finance resilient assets is clear.

Countries representing over 60% of the global economy have now made commitments to net zero, many of these have also made targets for 2030 indicating that the structural changes needed to the economy are not far in the future but are beginning today. Over 20 countries are developing green finance taxonomies in support of or in addition to net zero targets to show which investments are eligible to facilitate a transition.

EUR and USD remained the dominant currencies for labelled green bonds in H2 2020



All these factors move in support of greater green bond issuance from sovereigns, looking to meet their mitigation targets and finance more resilient assets as well as corporate entities requiring the financing to alter their business models in support of 2030 and 2050 climate targets.

This analysis is based on a limited number of green bonds, chosen according to the parameters outlined on page 30. 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 four and a half years (30 June 2021), 442 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 four 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

Q1 Green bonds priced between 1 January and 31 March	Number of Bonds	Average Coupon (Par Weighted)	Maturity	Deal Size EURbn	Pricing date
DNB Boligkreditt AS 0.01% 21/01/2031 (CO)	1	0.01	10	1.5	14-Jan
Credit Agricole Italia SpA 0.125% 15/03/2033 (CO)	1	0.125	12	0.5	08-Mar
Banks 10 Years (CO)	3	0.01%	10	0.7	Jan-Mar
Bayerische Landesbank 0.125% 10/02/2028 (SNP)	1	0.125	7	0.5	03-Feb
de Volksbank NV 0.375% 03/03/2028 (SNP)	1	0.375	7	0.5	24-Feb
A Banks 7 Years (SNP)	2	0.23	7	0.9	Jan
SpareBank 1 SMN 0.01% 18/02/2028 (SP)	1	0.01	7	0.5	11-Feb
Intesa Sanpaolo SpA 0.75% 16/03/2028 (SP)	1	0.75	7	1.25	09-Mar
A Financials 7 Years (SP)	3	0.16	7	0.9	Feb
Deutsche Kreditbank AG 0.01% 23/02/2026 (SP)	1	0.01	5	0.5	15-Feb
A Financials 5 Years (SP)	3	0.03	5	0.8	Feb-Mar
Nordea Bank Abp 0.5% 19/03/2031 (SNP)	1	0.5	10	0.5	15-Mar
Cooperatieve Rabobank 0.625% 25/02/2033 (SNP)	1	0.625	12	0.75	18-Feb
LeasePlan Corp NV 0.25% 23/02/2026 (SU)	1	0.25	5	1	15-Feb
PSA Banque France 0% 22/01/2025 (SU)	1	0	4	0.5	12-Jan
Muenchener Hypothekenbank 0.375% 09/03/2029 (SNP)	1	0.375	8	0.5	03-Mar
Nykredit Realkredit AS 0.375% 17/01/2028	1	0.375	7	0.75	15-Feb
Berlin Hyp AG 0.01% 24/01/2028 (SS)	1	0.01	7	0.5	16-Mar
AAA Consumer Finance 6-8 Years (CO)	3	0.01	7	0.75	Jan
OP Mortgage Bank 0.05% 25/03/2031 (SS)	1	0.05	10	0.75	18-Mar
AAA Consumer Finance 10 Years (CO)	2	0.01	10	0.625	Feb-Mar
CTP BV 0.75% 18/02/2027	1	0.75	6	0.5	11-Feb
Equinix Inc 0.25% 15/03/2027 (SU)	1	0.25	6	0.5	24-Feb
Grand City Properties SA 0.125% 11/01/2028	1	0.125	7	1	05-Jan
Equinix Inc 1% 15/03/2033 (SU)	1	1	12	0.6	24-Feb
LEG Immobilien SE 0.875% 03/30/2033	1	0.875	12	0.5	16-Mar
Digital Intrepid Holding BV 0.625% 15/07/2031 (SU)	1	0.625	10	1	05-Jan
Vonovia SE 0.625% 24/03/2031 (SU)	1	0.625	10	0.6	17-Mar
ICADE 0.625% 18/01/2031	1	0.625	10	0.6	11-Jan
Prologis International Funding II SA 0.75% 23/03/2033 (SU)	1	0.75	12	0.5	09-Mar
Simon Intl Finance SCA 1.125% 19/03/2033	1	1.125	12	0.75	19-Mar
Daimler AG 0.75% 11/03/2033	1	0.75	12	1	04-Mar
A-BBB Autos 8-12 Years	2	0.38	10	0.625	Jan

Q1 Green bonds priced between 1 January and 31 March Continued from page	Number of Bonds	Average Coupon (Par Weighted)	Maturity	Deal Size EURbn	Pricing date
Neste OYJ 0.75% 03/25/2028	1	0.75	7	0.5	18-Mar
Aker BP ASA 1.125% 12/05/2029*	1	1.125	8	0.75	05-May
Acea Spa 0.25% 28/07/2030	1	0.25	9	0.6	21-Jan
Vattenfall AB 0.125% 12/02/2029	1	0.125	8	0.5	05-Feb
Cadent Finance Plc 0.625% 19/03/2030	1	0.625	9	0.625	12-Mar
Nidec Corp 0.046% 30/03/2026	1	0.046	5	0.5	30-Mar
Wolters Kluwer NV 0.25% 30/03/2028	2	0.25	7	0.9	23-Mar
E.ON SE 0.6% 01/10/2032	1	0.6	11	0.75	25-Mar
BBB Utilities 10-12 Years	5	0.74	11	0.50	Jan-Mar
UPM-Kymmene OYJ 0.5% 22/03/2021	1	0.5	10	0.5	15-Mar
Holcim Finance Lux SA 0.625% 06/04/2021	1	0.625	9	0.5	30-Mar
Japan Fin Org Municipal 0.01% 02/02/2028	1	0.01	7	0.5	27-Jan
Corp Andina de Fomento 0.25% 04/02/2026	1	0.25	5	1.25	28-Jan
NRW.Bank 0% 03/02/2031	1	0	10	0.5	25-Jan
AA+ Regionals 10 Years	1	0	10	1	Jan-Mar
European Investment Bank 0.01% 15/11/2030	1	0	9	0.5	11-Mar
AAA Development Banks 7-10 Years	3	0	9	2.28	Jan
VGP NV 1.5% 08/04/2029	1	1.5%	8	0.6	31-Mar
Balder Finland OYJ 1% 20/01/2029	1	1.0%	8	0.6	13-Jan
Ferrovie dello Stato 0.375% 25/03/2028	1	0.375	7	1	18-Mar
Alstom SA 0% 11/01/2029	1	0	8	0.75	05-Jan
Hamburger Hochbahn AG 0.125% 24/02/2031	1	0.125	10	0.5	17-Feb
Kommunekredit 0% 03/03/2031	1	0	10	1	24-Feb

* Green bond issued in Q1 2020 paired with vanilla bond(s) priced in Q2

Q2 Green bonds priced between 1 April and 30 June	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
DNB Boligkreditt AS 0.01% 21/01/2031 (CO)	1	0.01	10	1.5	14-Jan
Credit Agricole Italia SpA 0.125% 15/03/2033 (CO)	1	0.125	12	0.5	08-Mar
Banks 10 Years (CO)	3	0.01%	10	0.7	Jan-Mar
KfW 0% 15/06/2029	1	0	8	4	07-Apr
EIB 0% 28/09/2028	1	0	7	3	11-May
Enexis Holding NV 0.375% 14/04/2033	1	0.375	12	0.5	07-Apr
Red Electrica 0.5% 24/05/2033	1	0.5	12	0.6	10-May
Eurogrid GMBH 0.741% 21/04/2033	1	0.741	12	0.5	13-Apr
China Construction Bank Lux. 0% 22/04/2024	1	0	3	0.8	15-Apr
Bank of China Lux. 0% 28/04/2024	1	0	3	0.5	21-Apr
CCB Europe SA 0% 28/06/2024	1	0	3	0.8	22-Jun
Neder Waterschapsbank 0.5% 04/26/2051	1	0.5	30	0.5	19-Apr
AAA SSA 30 Years **	3	0.32	30	0.53	Jan-Mar
BPI France 0% 25/05/2028	1	0	7	1.25	29-Apr
Institut Credito Oficial 0% 30/04/2027	1	0	6	0.5	14-Jun
AA SSA 5-7 Years	3	0.06	6.3	0.75	Apr-Jun
Ile de France Mobilites 0.95% 28/05/2041	1	0.95	20	0.5	25-May
Societe du Grand Paris 0.875% 10/05/2046	1	0.875	25	2	29-Apr
Freie Hansestadt Bremen 0.5% 06/05/2041	1	0.5%	20	0.5	29-Apr
SBAB 0.125% 27/08/2026 (SP)	1	0.125	5	0.5	20-May
A Banks 5 Years (SP)	2	0.09	5	0.5	Apr
SELP Finance SARL 0.875% 27/05/2029	1	0.875	8	0.5	20-May
CTP NV 1.25% 21/06/2029	1	1.25	8	0.5	14-Jun
BBB Real Estate 8 Years	3	0.74	8	0.75	May-Jun
BPCE SFH 0.125% 03/12/2030 (CO)	1	0.125	9	1.5	25-May
Swedish Covered Bond 0.01% 03/14/2030 (CO)	1	0.01	9	0.01	07-Jun
Land. Hessen-Thuringen 0.375% 04/06/2029 (SNP)	1	0.375	8	0.5	26-May
LB Baden-Wuerttemberg 0.375% 05/07/2029 (SNP)	1	0.375	8	0.5	27-Apr
Belfius Bank SA 0.375% 08/06/2027 (SNP)	1	0.375	6	0.5	01-Jun
De Volksbank NV 0.25% 22/06/2026 (SNP)	1	0.25	5	0.5	15-Jun
BBB Banks 5-Years (SNP)**	2	0.71	5	0.75	Feb-Mar
ACEF Holdings 0.75% 14/06/2028	1	0.75	7	0.5	07-Jun
Unibail-Rodamco-Westfld 0.75% 25/10/2028	1	0.75	7	0.65	17-May
EIKA Boligkreditt AS 0.125% 16/06/2031 (CO)	1	0.125	10	0.5	08-Jun
Covered Bonds 10 Years	2	0.04	10	0.875	Apr-Jun

Q2 Green bonds priced between 1 April and 30 June Continued from page	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
CTP NV 0.5% 21/06/2025	1	0.5	4	0.5	14-Jan
Euronext NV 0.125% 17/05/2026	1	0.125	5	0.6	Jan-Mar
Banque Fed. Cred. 0.25% 29/06/2028 (SP)	1	0.25	7	0.75	17-Jun
Yorkshire Building Society 0.5% 01/07/2028 (SP)	1	0.5	7	0.6	22-Jun
Gecina 0.875% 30/06/2036	1	0.875	15	0.5	22-Jun
BBB Real Estate 12 Years	3	1.17	12	0.7	May-Jun
UBS 0.01% 29/06/2026	1	0.01	5	0.5	22-Jun
Credit Suisse AG London 0.25% 05/01/2026	1	0.25	5	1.5	17-May
Caisse Nat. Reassurance 0.75% 07/07/2028 (SUB)	1	0.75	7	0.5	30-Jun
Mutuelle Assurance 0.625% 06/21/2027 (SUB)	1	0.625	6	0.5	14-Jun
Polski Koncern Naftowy 1.125% 27/05/2028	1	1.125	7	0.5	20-May
Aker BP ASA 1.125 (Not EM)	1	1.125	8	0.75	05-May
Ile de France Mobilites 0.4% 28/05/2031	1	0.4	10	0.5	25-May
Land Hessen 0.01% 18/06/2031	1	0.01	10	0.6	11-Jun
AAA SSA 10 Years	2	0.03	10	0.5	Apr-Jun
TenneT 0.125% 09/12/2027	1	0.125	6	0.65	26-May
EWE AG 0.25% 08/06/2028	1	0.25	7	0.5	01-Jun
Terna Spa. 0.375% 23/06/2029	1	0.375	8	0.6	16-Jun
Fluvius System OP 0.25% 14/06/2028	1	0.25	7	0.5	07-Jun
TenneT 0.5% 09/06/2031	1	0.5	10	0.5	26-May
TenneT 1.125% 09/06/2041	1	1.125	20	0.65	26-May
RWE AG 0.625% 06/11/2031	1	0.625	10	0.6	01-Jun
BBB Utilities 10-12 Years**	5	0.74	11	0.5	Jan-Mar
Landwirtsch. Ren. 0% 30/06/2031	1	0	10	1	23-Jun
Asia 0.1% 17/06/2031	1	0	10	1	08-Jun
** Green bond issued in Q2 2020 paired with vanilla bond(s) priced in Q1					

USD Summary Statistics of bonds used for comparison

Bonds sharing similar characteristics to green bonds in our sample

Q1 Green bonds priced between 1 January and 31 March	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
Sumitomo Mitsui Financial Group 0.508% 12/01/2024	1	0.58	3	0.5	04-Jan
Toronto-Dominion Bank 0.55% 04/03/2024	1	0.55	3	0.75	01-Mar
SK Battery America Inc. 2.125% 26/01/2026	1	2.125	5	0.7	19-Jan
Pioneer Natural Resource 1.125% 14/01/2021	1	1.125	5	0.75	14-Jan
Hyundai Capital Services 1.25% 08/02/2026	1	1.25	5	0.6	01-Feb
BBB Autos 5 Years	3	1.32	5	1.1	Jan-Feb
Deutsche Bank NY 1.686% 19/03/2026	1	1.69	5	0.8	16-Mar
BPCE SA 1% 20/01/2026	1	1	5	1.75	12-Jan
Sumitomo Mitsui TR BK LT 1.55% 25/03/2026	1	1.55	5	0.5	18-Mar
LSEGA Financing Plc 1.375% 06/04/2026	1	1.375	5	1	25-Mar
DTE Electric Co. 1.9% 01/04/2028	1	1.9	7	0.575	22-Mar
A Utilities 10 Years	2	2.2	10	0.65	Feb-Mar

Q2 Green bonds priced between 1 April and June 30	Number of Bonds	Average Coupon (Par Weighted)	Maturity (Years)	Deal Size USDbn	Pricing date
Brookfield Finance Inc. 2.72% 15/04/2031	1	2.724	10	0.5	07-Apr
Blue Owl Finance LLC 3.125% 10/06/2031	1	3.125	10	0.7	03-Jun
Bank of China (Lux) 1.4% 28/04/2026	1	1.4	5	0.5	21-Apr
Agricultural Bank of China (HK) 1.25% 17/06/2026	1	1.25	5	0.5	09-Jun
Bank of China (Sing.) 0.8% 28/04/2024	1	0.8	3	0.5	21-Apr
Agricultural Bank of China (HK) 0.7% 17/06/2024	1	0.7	3	0.5	09-Jun
Equinix Inc. 2.5% 15/05/2031	1	2.5	10	1	03-May
BBB Real Estate 10 Years	2	0.00	0	0	Jun
EIB 1.625% 13/05/2031	1	0.016	10	1.5	06-May
Asia Development Bank 1.25% 09/06/2028	1	1.250	7	1.5	02-Jun
Nextera Energy Capital 1.9% 15/06/2028	1	1.90	7	1.5	02-Jun
Puget Energy Inc. 2.379% 15/06/2028	1	2.38	7	0.5	03-Jun
Kaiser Foundation Hospital 2.81% 01/06/2041	1	2.81	20	1.25	08-Jun
United Health Group Inc. 3.05% 15/05/2041	1	3.05	20	1.5	17-May
LG CHEM 2.375% 07/07/2031	1	2.375	10	0.5	28-Jun
Hyundai Capital America 2% 15/06/2028	1	2	7	0.85	10-Jun
LG CHEM 1.375% 07/07/2026	1	1.375	5	0.5	28-Jun
Hyundai Capital America 1.5% 15/06/2026	1	1.5	5	0.85	10-Jun

Methodology

This paper includes labelled green bonds issued during H1 2021. Labelled green bonds meeting the following specifications are included:

- Announcement date between 01/01/2021 and 30/06/2021
- 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 five 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. iBoxx USD Corporate BBB and iBoxx EUR Corporate BBB
3. <https://www.climateutraldatacentre.net/>
4. <https://batteryindustry.tech/sk-battery-america-sells-1-bn-green-bonds-at-lower-rates/>
5. [Fitch Ratings research on the growth in green bond funds](#)
6. [E.ON green bond framework](#)
7. XS0301665310 maturity date of 2012 hence eight such bonds are outstanding
8. <https://www.dsgv.de/en/social-commitment.html>
9. https://sustainable-finance-beirat.de/wp-content/uploads/2021/03/210319_SustainableFinanceCommitteeRecommendations.pdf
10. LBBW deal review
11. FX rate as of 01/06/2021
12. <https://press.gecina.fr/news/gecina-targets-net-zero-carbon-for-its-operational-portfolio-by-2030-with-its-can0p-2030-plan-45e3-343e9-1.html>
13. Foreign exchange rates used Section 8 are as of 15/08/2021 and are given as an indication only.
14. <https://www.ipcc.ch/sr15/>



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