GREEN BOND PRICING
IN THE PRIMARY MARKET:
July - December 2020

H2 (Q3-Q4) 2020

Report highlights

- Report includes 54 green bonds with a combined face value of USD62.5bn issued between July and December 2020 (H2 2020)
- Strong evidence in support of green as 26 out of 33 bonds price on curves or with a greenium
- Green bonds in EUR and USD performed well on all metrics in the primary market, on average
- 56% of green bonds were sold to green investors
- Spotlight on German twin bond structure
- Spotlight on green bonds and transition in the auto sector

Climate Bonds INITIATIVE

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Introduction

This is the eleventh report in our pricing series, in which we observe how green bonds perform in the primary markets. This report includes bonds issued in the last six months of 2020 (H2 2020).

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 29.

During this period, USD178bn of green bonds were added to the Climate Bonds Green Bonds Database.[2] This paper includes the 35% of that amount that met the above requirements (USD63bn), split between 54 green bonds from 46 issuers.

EUR is the dominant currency with 35 bonds totalling EUR40.5bn (USD47.5bn), while 19 USD denominated bonds had a combined issue size of USD15.4bn.

Report highlights

- **Green bonds achieved a higher book cover and spread compression than vanilla equivalents, on average.**
  See more on page 3

- **Overall, 56% of green bonds were allocated to investors describing themselves as having green or ESG mandates.**
  See more on page 6

- **Most bonds exhibited a greenium - Yield curves could be built for 33 bonds in our sample. 26 priced on or inside their issuer's yield curves.**
  See more on page 8

- **German sovereign spotlight: Germany's unique twin bond structure demonstrates lower yields and volatility for green twins with the logical conclusion that governments should be encouraged to prioritise green expenditure knowing it is relatively cheaper.**
  See more on page 15

- **Seven and 28 days after pricing green bonds had, on average, tightened more than vanilla baskets and matched indices.**
  See more on pages 16

- **Auto sector spotlight Volkswagen and Daimler issued debut green bonds in September, but where are the green bonds from other auto issuers?**
  See more on page 20

1. Market developments

While 2020 was characterized by the most challenging financial market conditions in living history, all types of bonds enjoyed record issuance. After a strong first quarter, second quarter green bond issuance was impacted by the COVID-19 pandemic. A record breaking third quarter secured a strong finish as entities that had postponed green bonds earlier in the year came to the market. US entities clamoured to secure refinancing at prevailing low rates, with strong support from the FED, and ahead of the presidential election. Although the Biden administration is expected to rebalance US policy priorities in favour of the climate agenda, a policy led expansion could push up long term rates in the US. Indeed, after the US election in early November, there was a notable slowdown in supply of USD green bonds with just two of the 19 USD bonds qualifying for inclusion in this paper issued in the fourth quarter of 2020 (Q4). This paper captures half as many bonds for Q4 (18 bonds) compared to the third quarter (Q3) (36 bonds) and anecdotally, **dedicated investors reported difficulty in finding sufficient labelled green bonds towards the end of the year**.

New Issues in H2 2020

In H2 2020, 46 entities issued 54 qualifying bonds. Among them, were 27 repeat visitors, four of which issued more than one bond:

KfW (Germany) issued a EUR3bn (USD3.5bn) 8-year deal in July. The bond was subsequently tapped twice to become the largest individual SSA green bond ever issued and the fifth largest single green bond in the Climate Bonds Green Bond Database. A USD2bn 10-year in was issued in mid-August. KfW continues to be one of the most prolific issuers in the green bond market, and in 2020 issued EUR8.3bn (USD10bn) worth of green bonds over 14 transactions in six currencies.

In early October, **Société du Grand Paris** (France) priced a EUR6bn (USD7bn) two-part deal, the largest non-sovereign green deal of 2020. Société du Grand Paris was set up in 2010 by the French government to construct and deliver the 'Grand Paris Express' transport network, an expansion of the existing metro and commuter rail network in Ile-de-France. As the mass transit network is completely powered by electricity it qualifies for Certification under the Climate Bonds Standard, according to the Low Carbon Transport Criteria. Société du Grand Paris had 13 green bonds outstanding at the end of 2020.

In November, Dutch grid operator **TenneT** issued EUR1.4bn (USD1.6bn) of green bonds, upsized from EUR1bn due to strong investor appetite. The deal was split into two tranches: a 12-year maturity of EUR600m (USD720m), and a 20-year maturity of EUR750m (USD900m). TenneT had 16 green debt instruments outstanding at the end of 2020. See page 9 for remarks on TenneT's yield curve.

China Construction Bank (CCB) printed a two tranche USD deal in late July comprising a USD500m 8-year bond and a USD700m 5-year. The proceeds were earmarked for metro projects in two provinces, and the bonds were Certified Climate Bonds, under the Low Carbon Transport Criteria. At the end of 2020, CCB had five green bonds outstanding.

Twenty debut issuers printed a total of 24 green bonds including:

Germany launched its green bond programme with a EUR6.5bn (USD7.7bn) 10-year (Bund) in early September. This was followed by a EUR5bn (USD5.9bn) 5-year (Bobl) in early November. Germany identified around EUR12.7bn (USD15bn) of eligible expenditures in the 2019 budget and is planning to create a green yield curve using its unique twin bond structure. The pricing dynamics are discussed on page 15.

Volkswagen issued a 2028 EUR1.25bn (USD1.4bn), and a 2032 EUR750m (USD877m). The eligible green projects include the development of a modular electrification toolkit; and e-charging infrastructure. The deals were Certified Climate Bonds under the Low Carbon Transport Criteria of the Climate Bond Standard. The auto sector is discussed on page 20.

State owned **Saudi Electricity Company** issued a pair of green Sukuk, worth USD1.3bn split evenly between 2025 and 2030 maturities. The proceeds will finance energy efficiency and renewable energy projects.

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.

- Metlife Global Funding 0.95% 02/07/2025 (Metlife 2025) was priced on 29/06/2020, but was not picked up for inclusion in H1, hence it has been added to this paper.

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

• **EUR:** Average oversubscription was 4.2x for green bonds, and 2.9x for vanilla equivalents. Spread compression averaged 24bps for green bonds and 21bps for vanilla bonds.
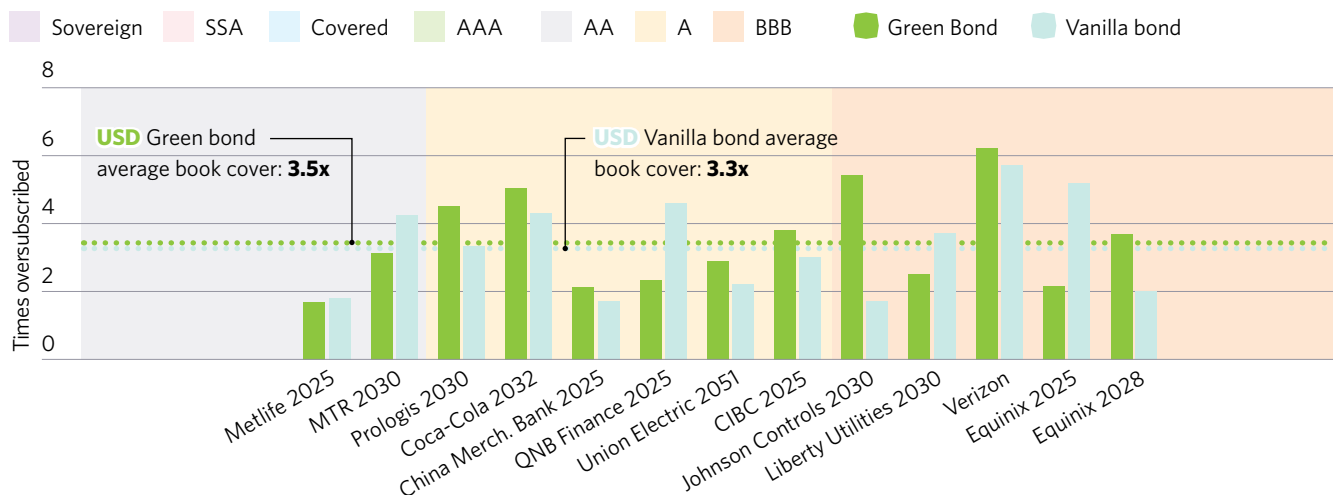
• **USD:** Average oversubscription was 3.5x for green bonds and 3.3x for vanilla equivalents. Spread compression averaged 25bps for green bonds and 27bps for vanilla bonds.

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.

25 out of 35 EUR bonds attracted higher book cover than vanilla equivalents

7 out of 13 USD green bonds attracted higher book cover than vanilla equivalents

EUR green bond pricing

EUR order books and spread compressions eased off slightly compared to H1 2020, as supply increased in Q3. The average H2 oversubscription for green bonds of 4.2x was the second highest we have recorded since 2016 (after H1 2020 which was 5.2x). Average spread compressions for EUR green bonds eased off by 1bp against H1 to 24bps and were the second highest recorded.

Findings:

- **More than two-thirds (70%) of EUR green bonds achieved larger oversubscription than vanilla equivalents.**

- Ten out of 35 EUR green bonds achieved lower book cover than their comparable baskets.

- Three-quarters of EUR green bonds experienced larger spread compression compared to vanilla equivalents.

- Four bonds were evenly matched (KfW 2028, Kommunekredit 2040, Sparebank 1 Vest Bolig. 2027 (CO), and Talent Yield 2025), and two lacked data (Germany 2030, and Germany 2025).

Book cover

The top two spots were filled by green bonds priced towards the end of November. Finnish pulp and paper manufacturer **Stora Enso Oyj** (Stora Enso 2030) achieved a book cover of 9.2x, the largest among EUR green bonds in H2. **Pasi Kyckling**, **Group Treasurer at Stora Enso** remarked "The green format and benchmark issue size clearly contributed to the investor interest, in addition to our general company strategy that has sustainability at its core".

Ontario Teachers' Pension Plan (Ontario Teachers 2030) achieved the second largest book cover with 8.9x. This is particularly notable given that Ontario Teachers' is in the SSA asset class, where pricing metrics are typically less dramatic compared to corporate issuers. Ontario Teachers' has committed to net-zero emissions by 2050 and has stated that it will hold itself accountable by establishing concrete targets for portfolio emissions and investments in climate solutions. Progress will be audited annually.

A well-defined sustainability or transition strategy such as that of Ontario Teachers' or Stora Enso that includes clear ambitions and quantified measures towards carbon-reduction targets can give investors additional comfort around green bonds and the wider labelled universe and minimise exposure to greenwashing.

Spread compression

Stora Enso 2030 exhibited spread compression of 50bp, but Daimler 2030 tightened the most, with its debut green bond narrowing by 57.5bps, the second highest spread compression we have seen since 2016 (following Prologis 2032 EUR which achieved record spread compression of 67bps in H1 2020). Volkswagen (VW) priced a pair of bonds in September. The VW 2028 tightened by 45bps, while the VW 2032 achieved 42.5bps. This squeeze on demand translated into a pricing benefit, as Daimler 2030, and VW 2028 and 2032 all priced with a greenium. There was no yield curve available for Stora Enso.

There is a notable shortage of green bonds from the auto sector, and we address this issue in more detail in our spotlight section on page 20.

NB1: *We did not measure spread compression for Germany 2025 and Germany 2030*

USD green bond pricing

The US experienced a record year for corporate bond issuance and strong demand was reflected in the pricing dynamics. In USD, average order books in H2 2020 for both green and vanilla bonds were larger compared to H1 2020 (3.5x versus 2.6x) but did not reach the high of 4.1x observed for green bonds in H1 2019.

Findings

- More green bonds achieved larger spread compression than vanilla equivalents, but the average for the vanilla bonds was still higher (27bps versus 25bps).

- Nevertheless, 25bps is the largest average spread compression for USD green bonds we have observed to date, beating the prior high of 20bp witnessed in H1.

Book cover

Data was available for 13 of the bonds in the USD sample. While only five of those attracted larger book cover than vanilla equivalents, the average book cover for green bonds was higher because of the magnitude of the top performers.

Multinational telecom, Verizon's (Verizon 2030) second green bond attracted the most interest, with a book cover of 6.2x while industrial, Johnson Controls (Johnson Controls 2030) took second place with its debut issue at 5.4x. Verizon 2030 priced inside its yield curve, exhibiting a greenium. There was no yield curve for Johnson Controls 2030. Both are US issuers, issuing in USD, and green bonds in this format tend to perform well since there are relatively few. Such demand dynamics are encouraging. We expect that the climate related ambitions of the Biden administration will encourage more US corporates to join the green bond market in 2021 and beyond.
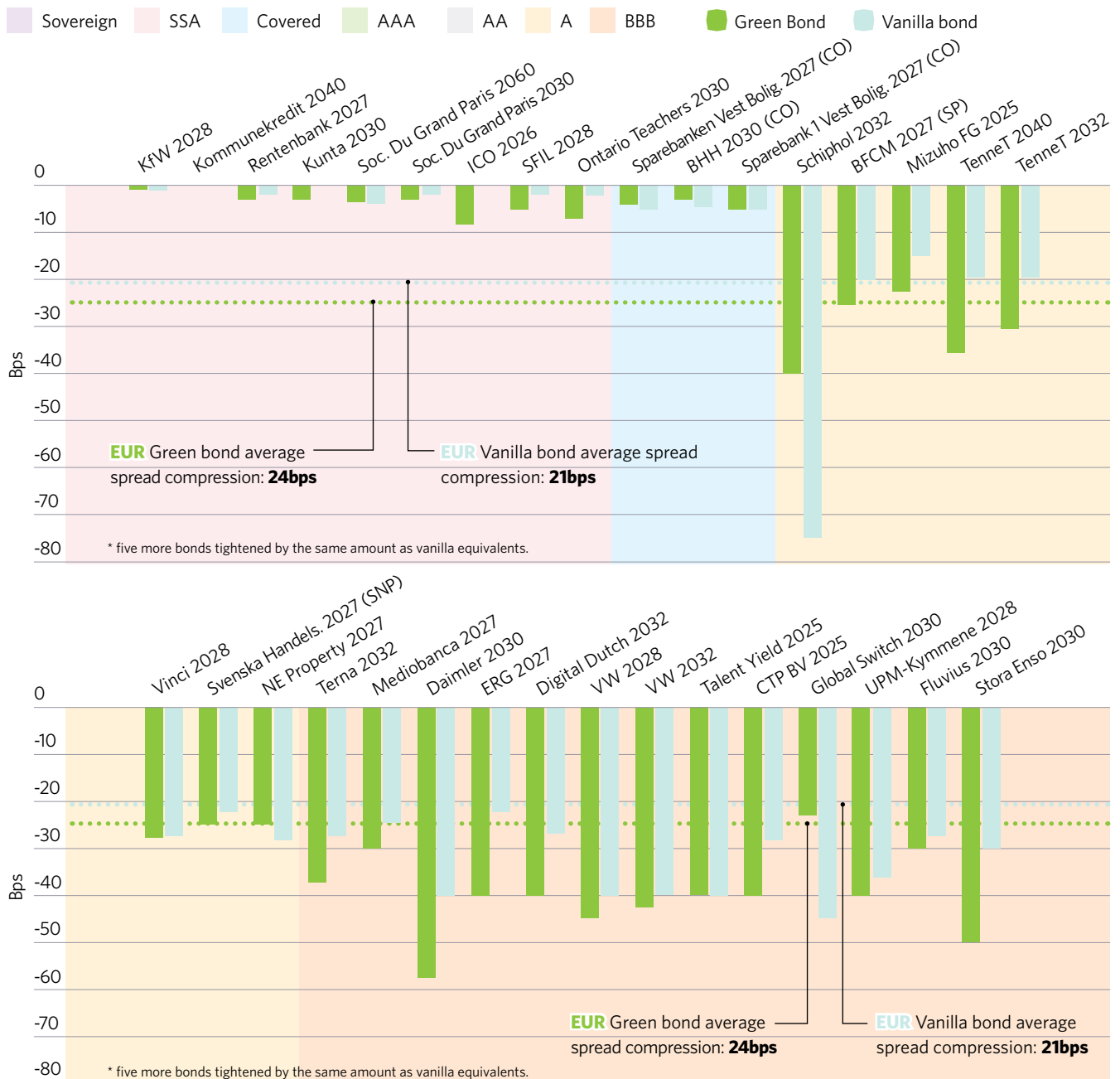
Spread compression

Spread compression data was available for all bonds in the USD sample. Green and vanilla bonds achieved the same levels in two cases: Metlife 2025, and Union Electric 2051. Among the remaining 17 green bonds, ten achieved larger spread compression, but the average for the vanilla bonds was still higher (27bps versus 25bps).
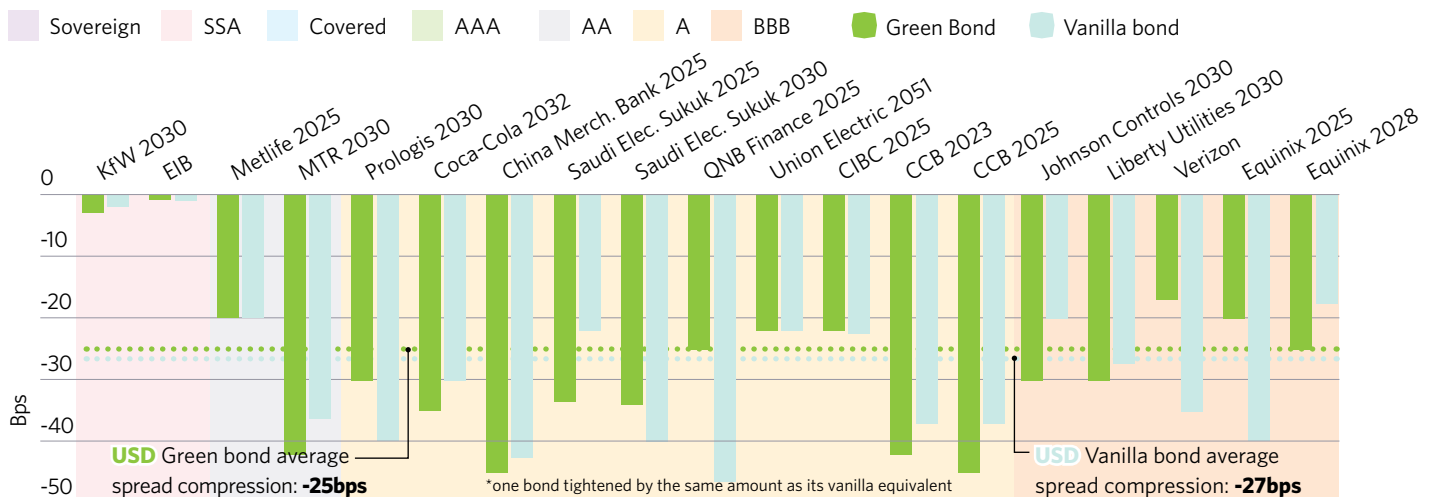
China Merch. Bank 2025 and CCB 2025 both tightened by 45bps in the primary market, the largest among the USD green bonds. Yield curves are not available for either bond so we cannot say whether this translated into pricing benefits.

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 three bonds. For an explanation of the methodology, see page 29, and for summary statistics of the baskets, see pages 25-28.*

21 out of 28 EUR green bonds tightened by more than vanilla equivalents during book building*

Legend: Sovereign | SSA | Covered | AAA | AA | A | BBB | Green Bond | Vanilla bond

Chart categories (top chart): KfW 2028, Kommunekredit 2040, Rentenbank 2027, Kunta 2030, Soc. Du Grand Paris 2060, Soc. Du Grand Paris 2030, ICO 2026, SFIL 2028, Ontario Teachers 2030, Sparebanken Vest Bolig. 2027 (CO), BHH 2030 (CO), Sparebank 1 Vest Bolig. 2027 (CO), Schiphol 2032, BFCM 2027 (SP), Mizuho FG 2025, TenneT 2040, TenneT 2032

Bps (y-axis): 0, -10, -20, -30, -40, -50, -60, -70, -80

EUR Green bond average spread compression: **24bps**

EUR Vanilla bond average spread compression: **21bps**

* five more bonds tightened by the same amount as vanilla equivalents.

Chart categories (middle chart): Vinci 2028, Svenska Handels. 2027 (SNP), NE Property 2027, Terna 2032, Mediobanca 2027, Daimler 2030, ERG 2027, Digital Dutch 2032, VW 2028, VW 2032, Talent Yield 2025, CTP BV 2025, Global Switch 2030, UPM-Kymmene 2028, Fluvius 2030, Stora Enso 2030

Bps (y-axis): 0, -10, -20, -30, -40, -50, -60, -70, -80

EUR Green bond average spread compression: **24bps**

EUR Vanilla bond average spread compression: **21bps**

* five more bonds tightened by the same amount as vanilla equivalents.

11 out of 18 USD green bonds tightened by more than vanilla equivalents*

Legend: Sovereign | SSA | Covered | AAA | AA | A | BBB | Green Bond | Vanilla bond

Chart categories (bottom chart): KfW 2030, EIB, Metlife 2025, MTR 2030, Prologis 2030, Coca-Cola 2032, China Merch. Bank 2025, Saudi Elec. Sukuk 2025, Saudi Elec. Sukuk 2030, QNB Finance 2025, Union Electric 2025, CIBC 2051, CCB 2023, CCB 2025, Johnson Controls 2030, Liberty Utilities 2030, Verizon, Equinix 2025, Equinix 2028

Bps (y-axis): 0, -10, -20, -30, -40, -50

USD Green bond average spread compression: **-25bps**

*one bond tightened by the same amount as its vanilla equivalent

USD Vanilla bond average spread compression: **-27bps**

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

• The 46 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:

- 29 issuers representing 33 bonds shared the data

- Ten issuers representing 11 bonds replied but were unable to disclose the data

- Eight issuers representing ten bonds did not reply

Based on the responses we received, the average allocation to investors describing themselves as green was 56%, the highest to date. Allocations ranged from 16% (Mediobanca 2027 (SP)), to 80% (BFCM 2027 (SP)). As usual, some issuers stated that they could have allocated 100% of their deal to green investors, such was the demand.

Germany issued its first green bond, the 2030 (Bund) in September 2020. Like most first time green sovereign issuers, Germany issued via a syndicate. The syndicate also allocated the Bund so investor data was available, and around a third was assigned to investors describing themselves as green or socially responsible. In November, Germany priced a second green bond, a 2025 maturity (Bobl). The Bobl was placed via an auction to the members of the 'Bund issues auction group' (primary dealers), and distribution data was therefore not available.

Multiple issuers, including Coca-Cola and BFCM noted that that the green deal had attracted new investors. According to the Climate Bonds Green Bond Treasurer Survey, published in March 2020, 98% of respondents said that their green bond attracted new investors.[3] Benefits of this were described as 1) a more diverse pool of investors, offering greater flexibility to reopen or issue new bonds; 2) a stickier investor base; and 3) greater visibility.

Some of those who did not disclose green allocations did not wish to do so because there remains no clear definition of green or socially responsible investors. It seems that investors are increasingly keen to classify themselves as green or socially responsible in the hope of obtaining larger allocations as highlighted in the Climate Bonds Sovereign GSS Bond Survey report published in January 2021.[4] Multiple sovereign issuers mentioned that investors had gone to extreme efforts to demonstrate their green credentials.

Efforts are currently being made to standardise the definition of a green investor. From 1st 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.

Methodology notes: *Green investor participation is provided by issuers. 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.*

56% of green bonds were allocated to green investors

Legend: ■ Declared green investor ■ Not declared green investor

Average 56% was allocated to green investors

Rating Group EUR

Sovereign
- Germany 2030

SSA
- KfW 2028
- Kommunekredit 2040
- Rentenbank 2027
- Kunta 2030
- ICO 2026

COV
- Sparebanken Vest Bolig. 2027 (CO)
- BHH 2030 (CO)
- Sparebank 1 Vest Bolig. 2027 (CO)

A
- Schiphol 2032
- BFCM 2027 (SP)
- Mizuho FG 2025
- TenneT 2040
- TenneT 2032
- Vinci 2028
- Svenska Handels. 2027 (SNP)

BBB
- NE Property 2027
- Mediobanca 2027
- Daimler 2030
- ERG 2027
- Digital Dutch 2032
- VW 2028
- VW 2032
- Fluvius 2030
- Stora Enso 2030

USD

SSA
- KfW 2030

AA
- MTR 2030

A
- Prologis 2030
- Coca-Cola 2032

BBB
- Johnson Controls 2030
- Verizon
- Equinix 2025
- Equinix 2028

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**".

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 2020, we were able to build yield curves for 33 out of the 54 bonds in our sample, of which 14 issuers (covering 16 bonds) had already issued green bonds sharing similar characteristics.

Within our sample of 33 green bonds:

- **19 priced inside their yield curve exhibiting a greenium.** In EUR: Germany 2025 & 2030, KfW 2028, Kommunekredit 2040, Rentenbank 2027, Kunta 2030, Sparebank 1 Vest Bolig. 2027 (CO), Daimler 2030, VW 2028 & 2032, and Fluvius 2030. In USD: KfW 2030, Metlife 2025, Prologis 2030, QNB Finance 2025, CIBC 2025, Verizon 2030, and Equinix 2025 & 2028;

- **Seven priced on the yield curve** (no new issue premia);

- **Five priced with normal new issue premia**; and

- Two were indeterminate.

In H1 2020 11 out of 21 bonds (52%) priced on or inside their yield curve, in H2 that rose to 26 out of 33 bonds (79%) suggesting robust demand for the green label demonstrated during book building is following through into pricing. **This is the strongest evidence of investor support we have seen for the green label to date.**

Green in the USA

We built yield curves for nine green bonds in our USD sample. Eight of those priced with a greenium, and one (EIB 2030) priced on the curve. This is consistent with the extraordinary demand for USD credit witnessed in 2020, but nevertheless notable in the context of green bonds. Between 2016 and June 2020 we constructed yield curves for a total of 47 USD green bonds. Just nine of those exhibited a greenium, 19 priced on the curve, and 19 priced with a normal new issue premium. In support of this, we kept hearing stories from issuers of green investors pulling out of these deals as pricing was squeezed tighter hence greeniums were not being achieved. The coming year will reveal whether the higher incidence of greenium in USD green bonds signalled the emergence of a larger pool of dedicated investors, or purely an extension of the increased demand experienced by all USD bonds during this period.

Among those pricing with greenium, Metlife 2025, QNB Finance 2025, CIBC 2025, and Equinix 2025 and 2028 were first time green bond issuers. Digital infrastructure company Equinix priced a trio of bonds in late September 2020. The 2025 and 2028 tranches were both green labelled, while a 2051 maturity was not. The pair of green bonds both exhibited a greenium while the longer bond did not. Around 53% of the 2025 and 41% of the 2028 tranche were placed with investors describing themselves as green.
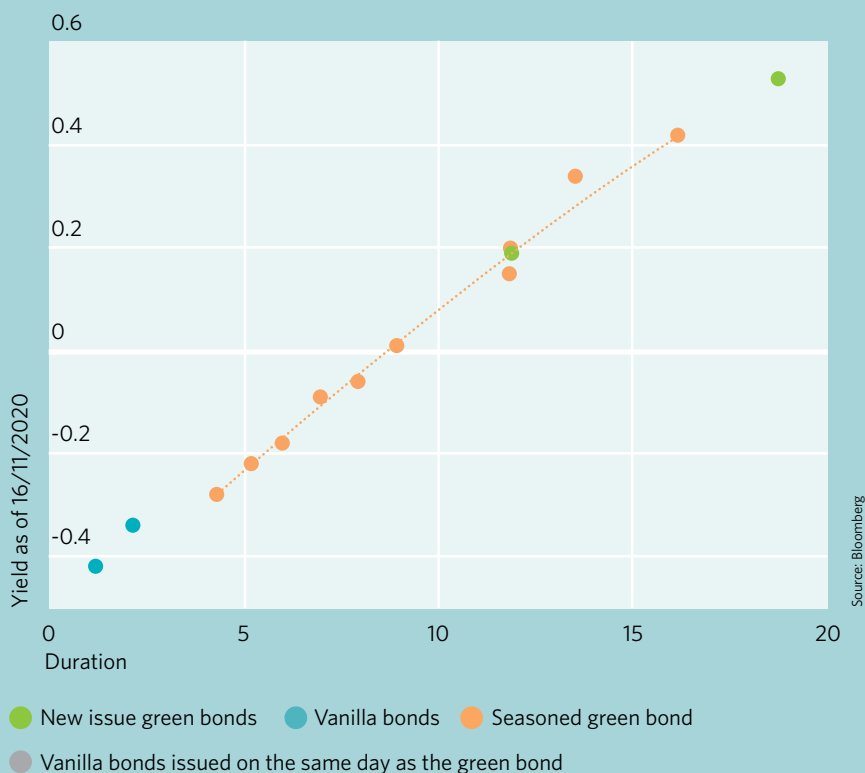
Spotlight on TenneT

Dutch grid operator TenneT has a well-defined transition strategy underway. The company has set out sustainability goals and targets in its Corporate, Social, Responsibility (CSR) ambition plan 2025. The report describes TenneT's efforts to lead the energy transition sustainably.

TenneT 2032 and 2040 were priced in mid-November. The Use of Proceeds were defined as 1. Transmission of renewable electricity from offshore wind power plants into the onshore electricity grid using direct current technology or alternating current technology and, 2. Developments, construction, and reconstruction of the onshore electricity grid to enhance the transmission capacity for renewable energy. All activities are aligned with the EU Taxonomy and contribute to UN SDGs 7 (affordable and clean energy), and 13 (climate action).

Maturing liabilities and new CAPEX have been financed with green bonds since 2015. There are just two non-green bonds remaining on the yield curve and the yields are relatively higher for those, suggesting that investors attach a lower value to those bonds. This is likely due to a combination of the lack of liquidity in the older paper, and the increasing preference for the green label.

The new bonds priced on the existing green curve. At the time the bonds were issued, they attracted the lowest recorded coupons for EUR corporate bonds at 0.125% for the 12-year, and 0.5% for the 20-year. This suggests that TenneT's transition strategy is helping it attract lower funding costs.

Tennet 2032 & 2040 EUR - on the green curve

Source: Bloomberg

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

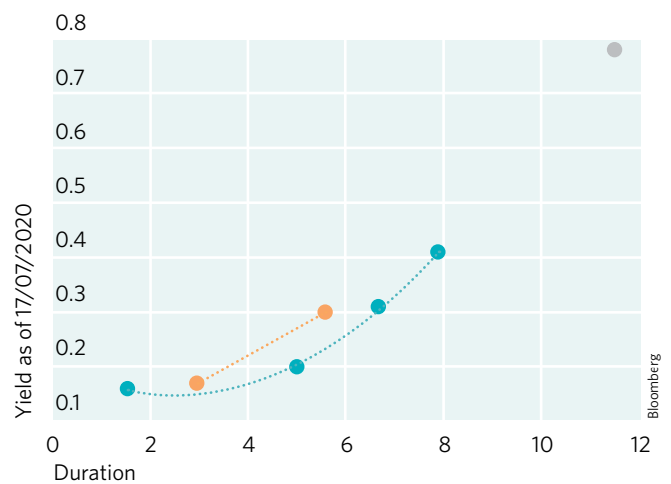## Metlife 2025 USD - greenium

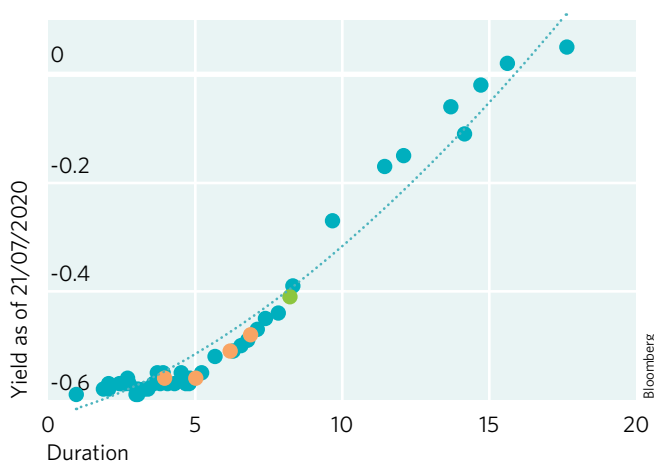## Sparebanken Vest Boligkreditt AS 2027 EUR - new issue premium

NE Property 2027 EUR - new issue premium
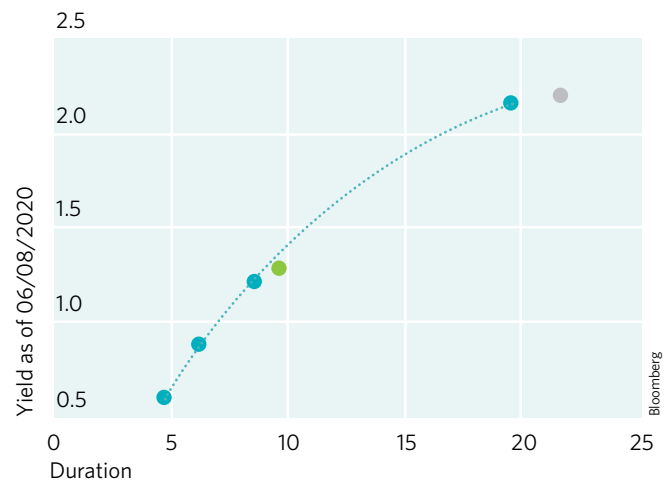

Terna EUR - indeterminate

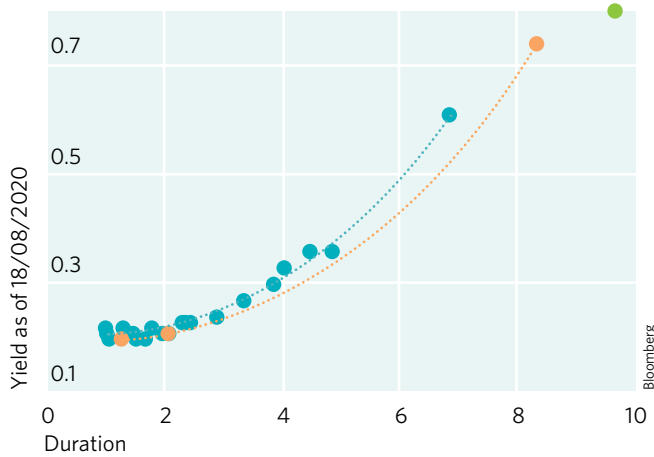## KfW 2028 EUR - greenium to vanilla curve, new issue premium to green curve
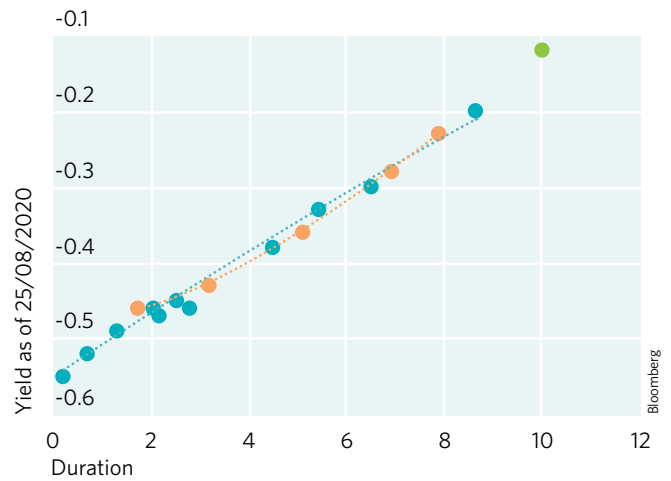

Prologis 2030 USD - greenium

● New issue green bonds   ● Vanilla bonds   ● Seasoned green bond   ● Non-green bond issued on the same day as the green bonds
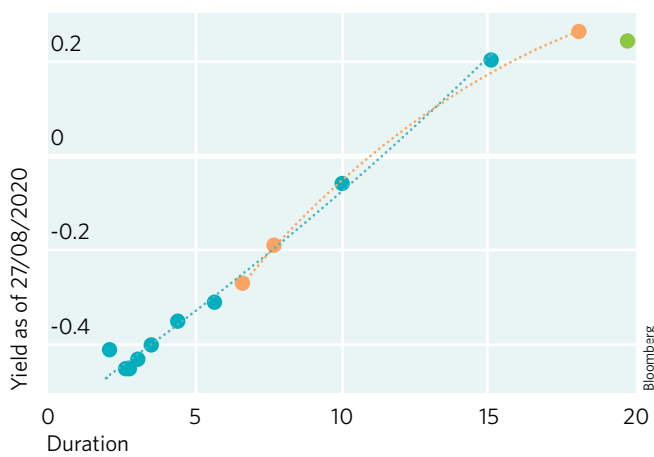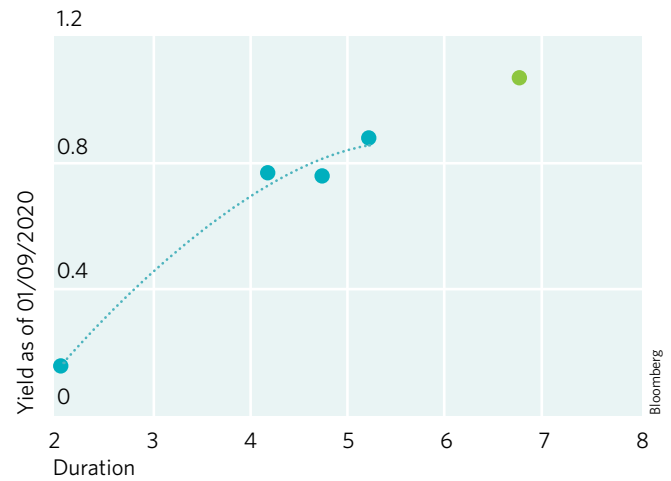
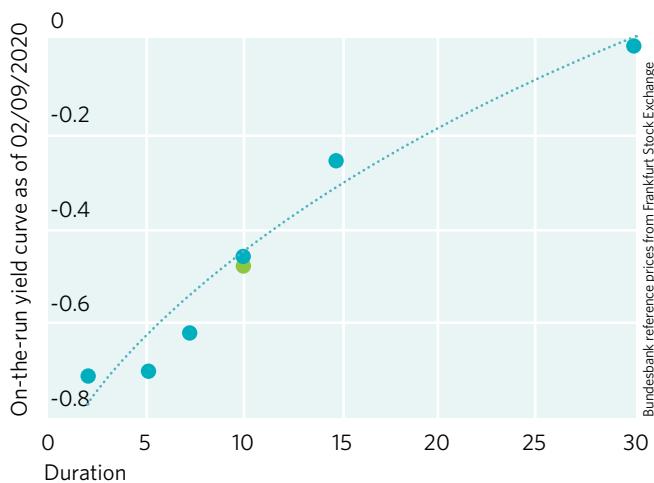## KfW 2030 USD - greenium

BHH 2030 (CO) EUR - on the curve

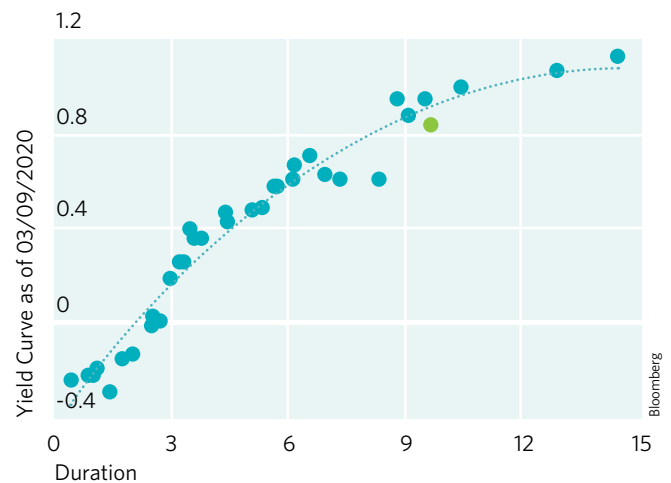## Kommunekredit 2040 EUR - greenium

Mediobanca 2027 (SP) EUR - new issue premium

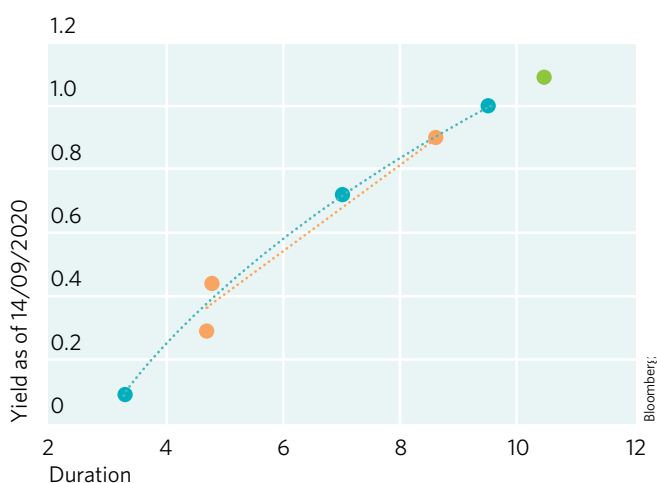## Germany 2030 (Bund) EUR - greenium

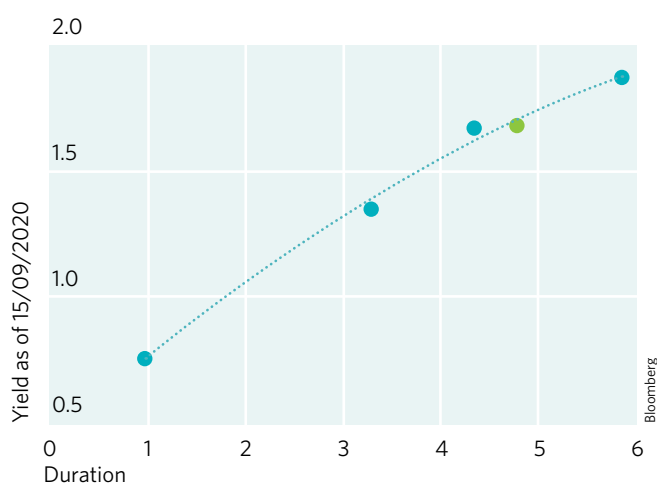## Daimler 2030 EUR - greenium

● New issue green bonds   ● Vanilla bonds   ● Seasoned green bond   ● Non-green bond issued on the same day as the green bonds
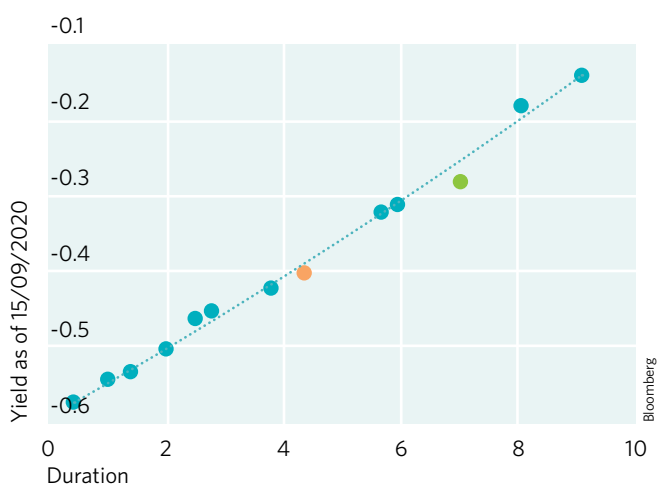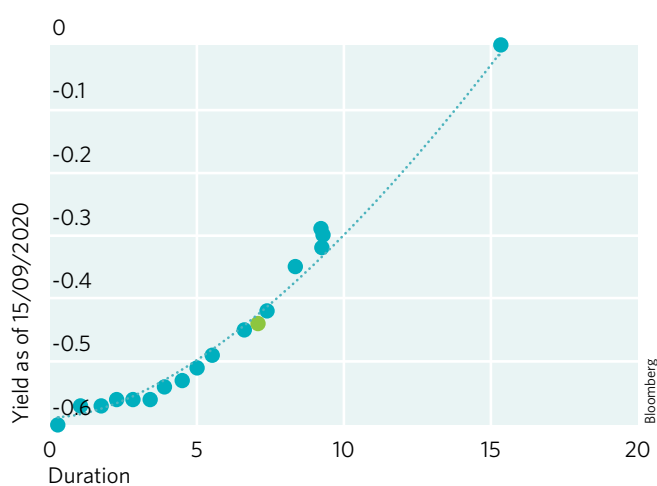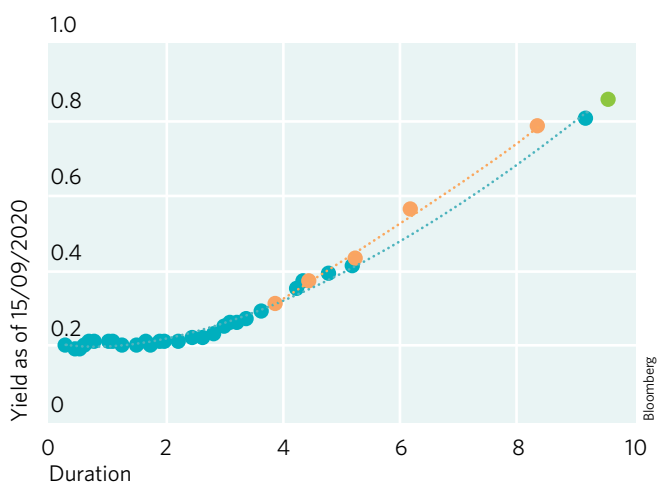
Digital Realty 2032 EUR - on the curve

Yield as of 14/09/2020 vs Duration

Bloomberg;

QNB Finance Ltd 2025 EUR - greenium

Yield as of 15/09/2020 vs Duration

Bloomberg

SpareBank 1 Bolig. 2027 EUR - greenium

Yield as of 15/09/2020 vs Duration

Bloomberg

RENTEN 2027 EUR - greenium

Yield as of 15/09/2020 vs Duration

Bloomberg

EIB 2030 USD - on the vanilla curve, greenium to green curve

Yield as of 15/09/2020 vs Duration

Bloomberg

VW 2028 & 2032 EUR - Greenium x 2

Yield as of 16/09/2020 vs Duration

Bloomberg

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

Verizon 2030 USD - greenium

Yield as of 16/09/2020

Duration

Bloomberg

Equinix 2025 & 2028 USD - greenium

Yield as of 23/09/2020

Duration

Bloomberg

BFCM 2027 (SP) EUR - new issue premium

Yield as of 01/10/2020

Duration

Bloomberg

Kunta 2030 EUR - greenium

Yield as of 06/10/2020

Duration

Bloomberg

Mizuho 2025 EUR - new issue premium

Yield as of 06/10/2020

Duration

Bloomberg

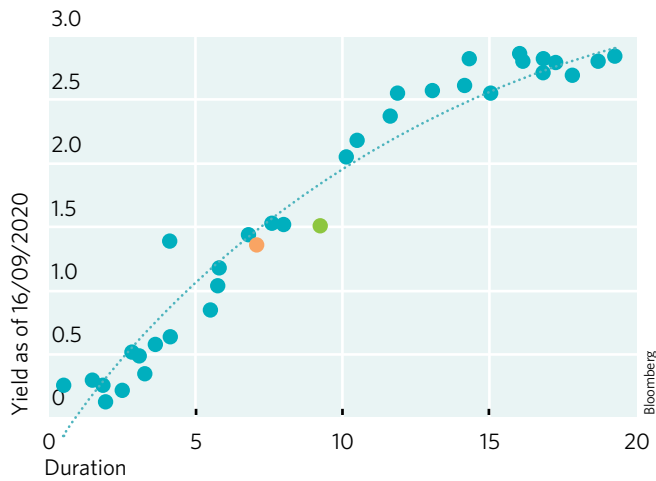## Societe du Grand Paris 2030 & 2060 EUR - on the green curve

Yield as of 07/10/2020

Duration

Bloomberg

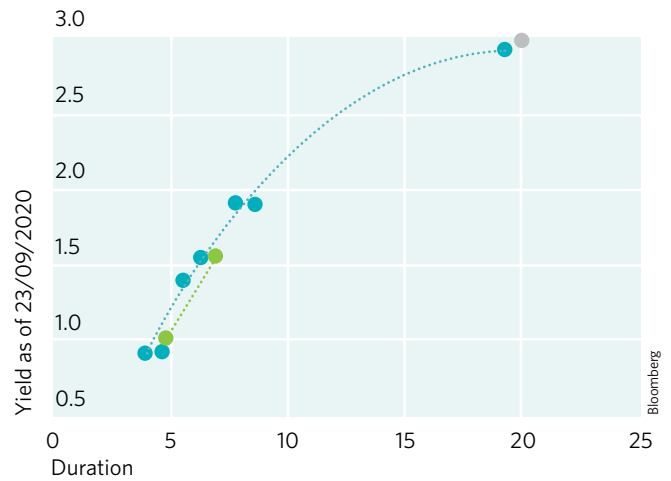● New issue green bonds   ● Vanilla bonds   ● Seasoned green bond   ● Non-green bond issued on the same day as the green bonds

CIBC 2025 USD - greenium
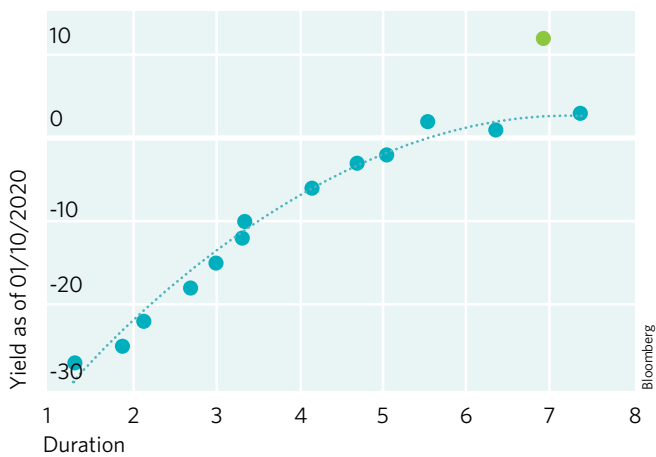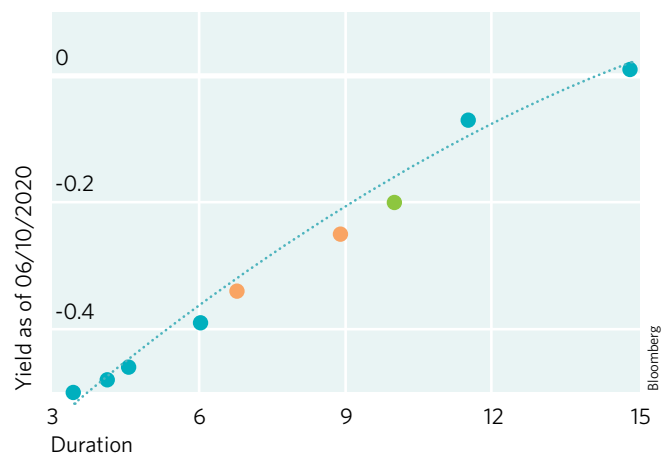

Yield Curve as of 19/10/2020 (y-axis)
Duration (x-axis)
Bloomberg

ICO 2026 EUR - indeterminiate

Yield as of 21/10/2020 (y-axis)
Duration (x-axis)
Bloomberg

Germany 2025 (Bobl) EUR - greenium

On-the-run Yield curve as of 04/11/2020 (y-axis)
Duration (x-axis)
Bundesbank reference prices from Frankfurt Stock Exchange

Fluvius 2030 EUR - greenium

Yield as of 25/11/2020 (y-axis)
Duration (x-axis)
Bloomberg

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 29, 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 01/01/2010.
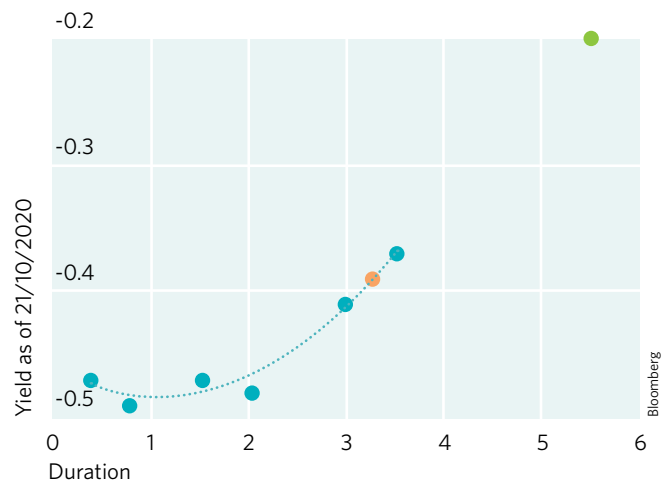
🟢 New issue green bonds   🔵 Vanilla bonds   🟠 Seasoned green bond   ⚪ Non-green bond issued on the same day as the green bonds

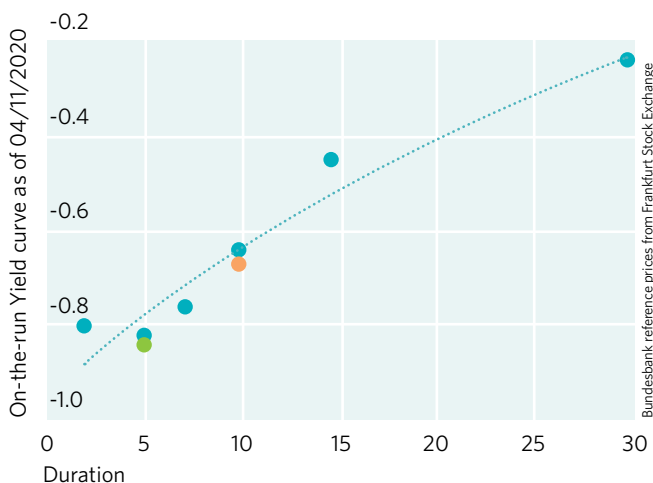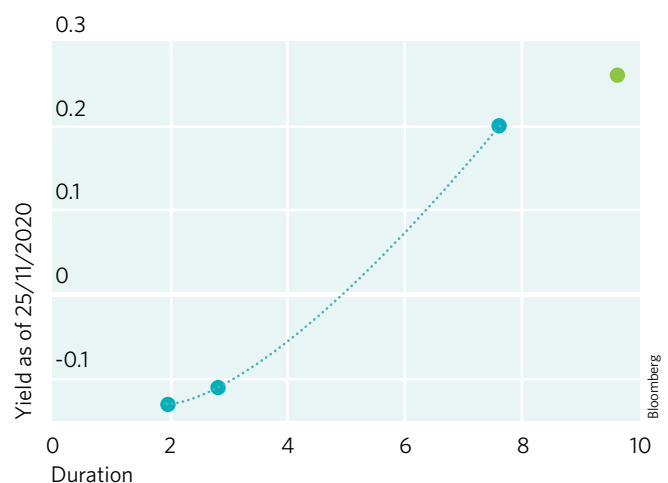## 5. Spotlight: German sovereign green bonds

In September 2020, Germany became the 15th sovereign nation to issue green bonds and introduced a unique twin bond structure. The twin bond structure involves issuing a conventional (vanilla) bond and a green bond, sharing similar characteristics, within a short period.

On 17th June 2020, the German Finance Agency (DMO) issued a EUR5bn (USD5.6bn) vanilla 10-year (Bund). This was subsequently reopened multiple times, reaching EUR30.5bn (USD34bn) by 20th November 2020. On 2nd September, the DMO also offered a EUR6.5bn (USD7bn) green Bund sharing the same coupon and maturity as the vanilla one. The only difference was the use of proceeds which were named as eligible expenditures falling into five categories: transport; international cooperation; research, innovation, and awareness raising; energy and industry; and agriculture, forestry, natural landscapes, and biodiversity. The DMO has termed this the 'green twin'. In effect this is a non-fungible tranche that will continue to maintain a separate identifier until maturity.
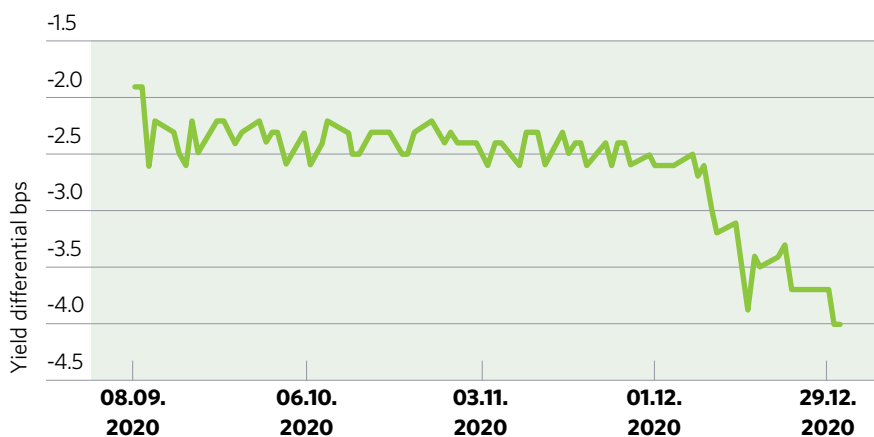
The green Bund priced with a greenium (1bp lower than the vanilla twin), and as of the end of 2020 had maintained consistently lower yields compared to its vanilla twin.[5] It is important to note that while the green twin is smaller, both bonds are of a vast size and share the same cash flows making it easy to determine whether investors assign a value to the green label. In addition, the DMO has promised to exchange the green twin for the vanilla twin at any time, so the difference in size should not affect liquidity.

Germany repeated this exercise on the 4th of November, issuing a green twin EUR5bn (USD5.9bn) 5-Year federal government bond (Bundesobligation or BOBL). The DMO operates according to a strict schedule of issuance, and the date coincided with the US Presidential election, hence press coverage was muted. However, **the green BOBL priced with a 1.5bp greenium**, **and exhibited a consistently lower yield compared to its vanilla twin until and at the end of 2020.**
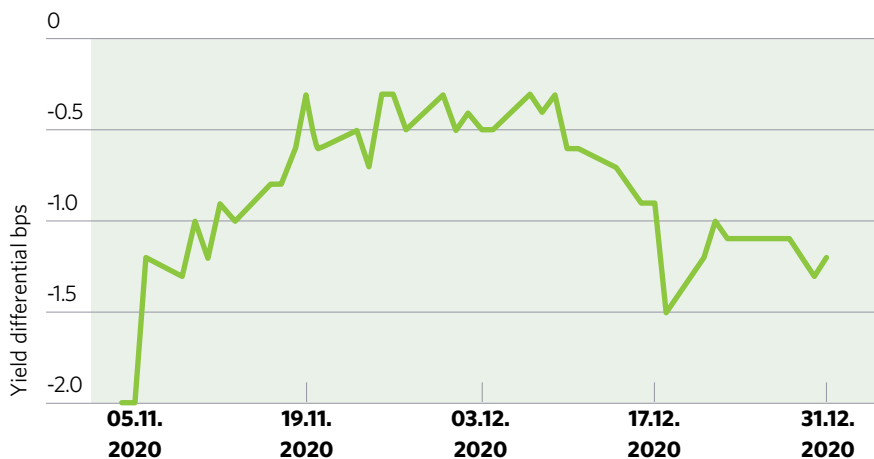
Historically, secondary market bond data tends to be unreliable, limiting analysis of the volatility in the green bond market. However,

The green Bund has exhibited consistently lower yields compared to its vanilla twin

Source: Bloomberg

The Bobl has exhibited consistently lower yields compared to its vanilla twin

Source: Bloomberg

a large, liquid, government bond with a green 'twin' is the dream case study. Both bonds trade actively in the secondary market, thus the prices reflect actual transactions. This enables us to draw more meaningful conclusions from the results.

As of 31st December 2020, **the green Bund had exhibited lower price volatility than its vanilla twin on a ten, 30, 60, and 90-day basis**.[6] The DMO retained some of the bond for market intervention but this would not impact relative stability since this is standard practice for all German government bonds. All things being equal, investors prefer lower volatility instrument. Some investors evaluate each instrument on a risk-adjusted returns basis, making lower volatility instruments more attractive than bonds with

an equivalent yield and higher volatility. If lower volatility were consistently present in sovereign green, social, and sustainability (GSS) bonds, it could help investors to justify a primary market greenium.

Although the observation period for the green BOBL was less than two months, it exhibited lower volatility than its twin on a 30-day basis. On both the 10-day and 60-day basis the volatility of the green bond was higher. Since the yield differential also appears to have narrowed during the initial secondary market trading period, this could be due to the new issue changing hands and finding the true price. [7]

Conclusion

The German Bund priced with a greenium, maintained a lower yield in the secondary market, and exhibited lower volatility compared to its vanilla twin. The Bobl priced with a greenium and maintained a lower yield in the secondary market compared to its vanilla twin, but the volatility was less conclusive. Nevertheless, this is clear evidence that investors attach a premium to the green label offering cheaper financing to DMOs, and that green bonds can provide a relatively more stable investment. **The logical conclusion is that governments should be encouraged to prioritise green expenditure knowing it is relatively cheaper and investors should commit more capital to green mandates.**[8]

German Sovereign Volatility

	Green Bund	Vanilla 'twin' Bund	Green Bobl	Vanilla 'twin' Bobl
10 day	3.142	3.144	1.306	1.283
30 day	3.384	3.435	1.375	1.387
60 day	4.026	4.044	1.587	1.585
90 day	3.667	3.680	n/a	

Data from Bloomberg as of 31/12/2020

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.

6. Performance in the immediate secondary market

• **Seven days after pricing,** 52% of green bonds had tightened more than comparable vanilla baskets; 76% had tightened more than their corresponding index.

• **28 days after pricing,** 56% of green bonds had tightened more than comparable vanilla baskets; 67% had tightened more than their corresponding index.

In H2 2020, 70% of individual green bonds in our sample had tightened seven days after pricing; after 28 days this had increased to 77%.

	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	KfW 2028	-18.0%	-37.0%	0.6%	-8.5%	-82.6%	-2.7%
		Kommunekredit 2040	3.2%	2.2%	6.7%	4.6%	-6.2%	5.3%
		Rentenbank 2027	-25.9%	-77.0%	-1.9%	-21.7%	-332.0%	-20.1%
		Kunta 2030	-60.5%	-65.0%	-9.3%	-116.5%	17.0%	-24.4%
		Soc. Du Grand Paris 2060	-3.3%	1.3%	0.5%	-6.7%	-4.4%	-7.5%
		Soc. Du Grand Paris 2030	-6.4%	-4.4%	0.5%	-28.7%	-5.0%	-7.5%
		ICO 2026	N/A	-65.0%	-1.1%	-47.7%	17.0%	-20.0%
		SFIL 2028	-20.8%	6.5%	-6.8%	2.9%	-23.9%	-4.0%
		Ontario Teachers 2030	-17.0%	-13.3%	-3.4%	-15.1%	-13.1%	0.0%
	Covered	Sparebanken Vest Bolig. 2027 (CO)	6.3%	-2.4%	-7.7%	-2.1%	-25.6%	-10.6%
		BHH 2030 (CO)	-15.3%	-4.4%	5.3%	-44.7%	-24.2%	-10.8%
		Sparebank 1 Vest Bolig. 2027 (CO)	-11.6%	-2.4%	-7.1%	-21.4%	-25.6%	-18.7%
	A	Schiphol 2032	-2.8%	-11.8%	-0.4%	3.5%	-9.2%	3.8%
		BFCM 2027 (SP)	-10.4%	2.6%	-8.5%	-6.1%	-14.3%	-5.7%
		Mizuho FG 2025	-12.0%	7.9%	-8.7%	-2.6%	-15.4%	-5.1%
		TenneT 2040	2.6%	-12.1%	-2.4%	6.4%	-27.7%	-9.4%
		TenneT 2032	0.5%	-12.1%	-2.4%	6.8%	-27.7%	-9.4%
		Vinci 2028	-0.1%	26.7%	-3.7%	30.0%	0.1%	-2.2%
		Svenska Handels. 2027 (SNP)	7.9%	3.1%	2.9%	8.1%	0.5%	3.0%
	BBB	NE Property 2027	-2.7%	-2.1%	-0.8%	-4.9%	-1.3%	-10.4%
		Terna 2032	-7.8%	-0.7%	-4.4%	-30.9%	-6.1%	-9.9%
		Mediobanca 2027	-4.7%	3.1%	-0.5%	-3.4%	2.8%	2.1%
		Daimler 2030	-1.6%	-3.2%	1.6%	-5.0%	-5.7%	3.4%
		ERG 2027	-3.5%	6.7%	0.6%	-8.1%	-1.0%	2.1%
		Digital Dutch 2032	-2.7%	0.4%	-2.7%	-2.3%	2.1%	-5.5%
		VW 2028	-0.8%	-3.2%	1.8%	-12.5%	-5.7%	-5.0%
		VW 2032	-2.5%	-3.2%	1.7%	-12.5%	-5.7%	-5.2%
		Talent Yield 2025	-7.3%	-13.4%	5.1%	-13.3%	-17.8%	-3.9%
		CTP BV 2025	0.5%	-2.1%	-1.5%	-11.5%	-1.3%	-11.2%
		Global Switch 2030	-2.4%	-6.4%	-6.0%	-5.0%	-10.5%	-9.1%
		UPM-Kymmene 2028	-6.2%	-9.1%	-2.7%	-5.9%	-11.1%	-8.1%
		Fluvius 2030	-8.2%	-11.1%	2.6%	-21.9%	-19.6%	-0.7%
		Stora Enso 2030	-15.3%	-2.9%	2.6%	-24.1%	-4.6%	-0.7%
USD	SSA	EIB	0.3%	8.7%	4.1%	0.3%	1.8%	1.1%
		KfW 2030	-24.7%	9.7%	-0.7%	-4.4%	4.4%	-4.6%
	AA	Metlife 2025	-0.1%	N/A	-10.7%	-28.7%	-6.3%	-22.5%
		MTR 2030	N/A	2.6%	8.4%	-0.9%	-3.5%	5.6%
	A	Prologis 2030	0.0%	1.3%	-0.4%	1.0%	-9.5%	2.5%
		Coca-Cola 2032	-5.8%	-5.0%	-3.3%	-5.8%	-4.5%	-0.1%
		China Merch. Bank 2025	4.7%	-11.9%	4.8%	4.7%	5.4%	16.7%
		Saudi Elec. Sukuk 2025	0.0%	N/A	0.5%	-6.1%	-2.9%	2.5%
		Saudi Elec. Sukuk 2030	2.1%	-1.0%	-0.8%	-13.2%	1.0%	-3.9%
		QNB Finance 2025	2.1%	-1.8%	3.9%	-6.3%	-3.6%	-8.8%
		Union Electric 2051	-3.8%	-2.5%	-6.4%	-8.1%	-19.5%	-7.5%
		CIBC 2025	-19.0%	-0.8%	-0.6%	-22.1%	-7.7%	-6.8%
		CCB 2023	-11.0%	1.1%	-4.7%	-9.8%	5.7%	-8.7%
		CCB 2025	-9.5%	0.8%	-7.3%	-8.6%	4.9%	-12.7%
	BBB	Johnson Controls 2030	-8.3%	-6.2%	-1.6%	-9.8%	-5.8%	-0.7%
		Liberty Utilities 2030	4.9%	0.9%	3.5%	3.4%	-7.6%	-0.5%
		Verizon	2.1%	0.9%	3.5%	-6.3%	-3.9%	-0.5%
		Equinix 2025	20.8%	13.1%	4.6%	-1.6%	-6.7%	-6.7%
		Equinix 2028	-23.1%	9.1%	2.7%	-36.2%	-3.8%	-5.6%

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 evaporates, 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,
- 52% of green bonds had tightened by more than their vanilla baskets: 50% of EUR and 56% of USD green bonds.

- 76% of green bonds had tightened by more than their corresponding index: 78% of EUR and 63% of USD green bonds.

Compared to H1 2020, a lower percentage of green bonds tightened more than their baskets, while a higher percentage of green bonds tightened more than their corresponding indices. 70% of individual bonds tightened on the break (initiation of secondary market trading), which is the same as H1 2020, but the lower relative numbers could be due to the strong dynamics in the primary market.

In EUR 16 out of 32 bonds had tightened against both their vanilla basket and matched index after a week. SFIL 2028 (-20.8%), Ontario Teachers' 2030 (-17.0%), and Stora Enso 2030 (-15.3%) all performed well compared to matched vanilla baskets and indices. These three bonds were among those that experienced larger oversubscription and spread compression in the primary market compared to vanilla equivalents. Coincidentally, none of them had yield curves available so evidence of a greenium could not be determined, but it seems that they are examples of green bonds offering benefits to both issuers and investors.

In USD, nine out of 16 green bonds had tightened against both their basket and matched index after a week. KfW 2030 (-18%), Equinix 2028 (-23.1%), and CIBC 2025 (-19%) tightened by the largest percentages and were among the bonds that beat both vanilla baskets and indices. All these bonds did exhibit a greenium, hence we can say they delivered value to both issuers and investors.

After 28 days,
- 56% of green bonds had tightened by more than their vanilla baskets: 48% of EUR and 68% of USD green bonds.

- 67% of green bonds had also tightened when compared to corresponding indices: 64% of EUR and 74% of USD green bonds

The 28-day metrics for H2 were like those of H1: 59% tightened more than their baskets in H1 compared to 56% in H2 while 67% tightened more than corresponding indices in both H1 and H2. Twenty-four bonds had tightened by more than both vanilla baskets and indices after 28 days.

In EUR, ICO 2026 (-47.7%), BHH 2030 (CO) (-44.7%), and Terna 2032 (-30.9%) tightened by the largest magnitude beating both vanilla baskets and indices. Performance for these three bonds was mixed in the primary market. All three achieved higher book cover than vanilla baskets, but BHH 2030 (CO) did not achieve greater spread compression while the other two bonds did. Terna 2032 priced with a new issue premium, hence the 30.9% tighter spread a month later would have pleased investors. BHH 2030 (CO) priced on the yield curve, so we can say that both sides benefitted here, and ICO 2026 had a longer maturity compared to other bonds on the issuer yield curve, hence a greenium was indeterminate.

In USD, the most dramatic tightening was experienced by Equinix 2028 (-36.2%), Metlife 2025 (28.7%), and CIBC 2025 (-22.1%). The debut green bond from Metlife experienced a smaller book, but greater spread compression than vanilla equivalents, and priced with a greenium. After 28 days, it had tightened by a larger percentage than its vanilla basket and matched index. Like CIBC 2025 and Equinix 2028 mentioned above, this bond demonstrated value to both issuer and investors.

After 28 days, more EUR and USD green bonds had on average tightened by more than both vanilla baskets and corresponding indices. Sixteen bonds from our EUR sample tightened more than both baskets and indices after both seven and 28-days. There is no obvious link between these bonds in terms of sector, maturity, credit rating, or issue date.

NB1: *Metlife 2025 was matched with NY Life Global Funding 0.95% 24/06/2025, for which there was no secondary market benchmark spread data for the 7-day data point. MTR 2030 did not have secondary market benchmark spread data for the 7-day data point. Saudi Elec. Sukuk 2025 was matched with QIB Sukuk Ltd. 1.95% 27/10/2025, for which there was no 7-day data point.*

Methodology notes:
1. Vanilla baskets comprise the closest possible matches based on the considerations highlighted on page 29. We have created this proxy to illustrate what else an investor could have done with their money during the same quarter. 2. Indices. We compare each bond to a standard iBoxx index. The indices are granulated by currency, asset class, tenor, and credit rating all of which can influence the behaviour of a bond. Each bond is therefore compared to an index sharing similar characteristics, for example, 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.

7. Green bond ETFs

ETFs experienced record net inflows of around USD763bn in 2020.[9] Among over 7,600 ETFs benefitting from this capital, there were six products designed to replicate the performance of green bond indices, five of which multiplied in size during 2020. COVID-19 has sharpened the focus on sustainable investing. It has become increasingly clear that the investment community has an important role to play in directing capital to support a sustainable future.

The largest - and longest established - green bond ETF is the Lyxor Green Bond DR UCITS which more than tripled in size in 2020. Smaller funds such as the Franklin Liberty Euro Green Bond ETF grew by over five times. The sharp growth in green bond ETFs is contributing to the demand pressure in the secondary market.

On the remarkable growth of the Lyxor Green Bond DR UCITS ETF, Francois Millet, Head of ETF Strategy, ESG, and Innovation at Lyxor Asset Management remarked:

"Since its creation in 2017, our green bond ETF grew along with the green bond market, to reach EUR500m assets under management in H2 2020. It tripled in size during the year thanks to demand from a diversified array of wealth and asset managers. As the investment universe has expanded by a factor of four since the fund's inception, higher bond diversification and fund size allowed the ETF to change status, gaining in index replication accuracy and liquidity. The enhanced ETF primary market eco-system and secondary market volumes allowed for higher execution capacity. Liquidity made outstanding progress, with bid-offer spreads compressing from 30-32 bp at fund's inception to 13-18bp in Q4 2020, and average daily volume multiplying by 20 since early 2019."

ETF name	Currency	Index	Launch date	Size at launch	Total Assets 31st Dec 2019	Total Assets 30th June 2020	Total Assets 31st Dec 2020
Lyxor Green Bond DR UCITS ETF	EUR	Solactive Green Bond Index	February 2017	EUR5m	EUR179m	EUR320m	EUR548.7m
Van Eck Vectors Green Bond ETF	USD	S&P Green Bond Select Index	March 2017	USD5m	USD26m	USD33m	USD57m
iShares Global Green Bond ETF	USD	Bloomberg Barclays MSCI Global Green Bond Select Index	November 2018	USD25m	USD43m	USD82m	USD156.5m
UC MSCI European Green Bond ETF	EUR	Bloomberg Barclays MSCI European GB Issuer Capped EUR Index	November 2018	EUR20m	EUR21m	EUR22m	EUR21m
Franklin Liberty Euro Green Bond ETF	EUR EUR	Bloomberg Barclays MSCI Euro Green Bond Index	April 2019	EUR10m	EUR16m	EUR29m	EUR79.2m
Lyxor Green Bond ESG Screened		Solactive Green ESG Bond EUR USD IG TR Index	October 2019	EUR4m	EUR4m	EUR10m	EUR20.2m

8. Spotlight: Auto sector green bonds drive off with a greenium

The need for and production of electric vehicles (EV) are well understood and the automobiles manufacturing (auto) sector is well on the road to a complete transition away from fossil fuel reliance.[10] So far, only a handful of auto manufacturers have issued green bonds, and there is huge potential for more to come to the market. In Q3 2020, four high profile auto companies issued debut green bonds to help finance their transitions away from Internal Combustion Engine (ICE) vehicles.

As confidence returned to the green bond new issue market in Q3 2020, there were numerous examples of bonds achieving large oversubscriptions and spread compressions, and pricing through their yield curves exhibiting greenium. These included EUR benchmark deals from autos Daimler, Volkswagen, and Volvo. Smaller deals came from Honda and Toyota in JPY, and Volvofinans Bank priced a three-tranche deal in SEK.

Daimler was the first of the EUR trio to come to the market, with a EUR1bn (USD1.1bn) 10-year deal priced on 3rd September, just one day after Germany debuted its EUR6.5bn (USD7.2bn) green Bund. Daimler's green bond was 4.2 times oversubscribed and achieved spread compression of 57.5bps during bookbuilding. Since initiating primary market pricing analysis in 2016, we have only seen one green bond with greater spread compression than this (Prologis 2032 EUR priced June 2020 with spread compression of 67bps). These metrics suggest robust investor appetite, and the bond priced inside its own yield curve.

Daimler included clean transportation, energy efficiency, pollution prevention and control, and renewable energy as eligible project categories in the financing framework. Development and production of zero-emission vehicles such as battery-electric (BEV) and fuel-cell electric vehicles (FCEV) were highlighted as examples. Daimler's green bond framework specifies a look back period of three years. The first green bond is expected mainly to refinance existing projects, while subsequent deals will support new projects.

Volkswagen issued a pair of green bonds on the 16th of September, having delayed the planned launch from March to avoid the COVID-19 chaos. The issue was split between a EUR1.25bn (USD1.4bn) 8-year and a EUR750m (USD834m) 12-year. The 8-year was the largest single green bond from the auto sector to date, and was more than four times oversubscribed, with spread

compression of 45bps. The 12-year was more than five times oversubscribed and tightened by 42.5bps. Both bonds priced inside the Volkswagen vanilla (conventional) yield curve driving off with a greenium. The green financing framework specified two sustainability projects: electric vehicles based on the modular electric drive toolkit (MEB) and charging instrastructure. The framework may later be extended to encompass other project categories.

On September 30th, **Volvo** priced a EUR500m (USD556m) 7-year bond with Use of Proceeds described as investments and expenditures for the design, development, and manufacturing of battery electric vehicles (BEVs). The credit rating of Volvo is in the high-BB category and the order book was four times covered. The bond priced at par to yield 2.5% against initial price thoughts of 2.875%, which the primary dealers described as flat to the estimated fair value curve based on the company's outstanding notes. As the bond priced inside estimated fair value, it achieved a greenium of 0.375%.[11]

Volvo is owned by Geely Holding Group (Geely), a Chinese auto company. Geely also owns the Zheijiang Geely London Taxi Corp which was the third auto issuer to come to the market in May 2016, (Toyota issued green ABS in 2014 and 2015, and Hyundai came to the market in March 2016) with a 5-year deal to fund electric taxi development. The bond was originally planned to be USD300m but when demand reached eight times that amount, it was increased to USD400m.

Further afield, **Honda** Finance in Japan printed its first green bond on 4th September, a JPY30bn (USD276m) 5-year. The proceeds were earmarked for hybrid vehicle leasing and loan businesses. Honda described the deal as being 'well received', with the order book reaching JPY100bn (USD 1bn). They confirmed that they would consider issuing more green bonds in the future if they needed additional funds.

Toyota came to the market on the 9th of October with a JPY30bn (USD282.5m) 5-year deal. The proceeds were earmarked to refinance loans for hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs) accumulated during the preceding two years.

Lastly, on November 11th, **Volvofinans Bank**, owned by Swedish Volvo and Renault dealers, issued a three-tranche green deal worth SEK1.5bn (USD300m). The book was

2.5x covered, and 31 investors got involved. The green bond framework describes eligible projects as loans and leases to fund the purchase of sustainable passenger vehicles.

Green investors are keen for auto supply to move up a gear

Volkswagen reported that around 69% of the 8-year, and 74% of the 12-year bond was allocated to socially responsible investors with Daimler describing participation from such investors as around two-thirds of the total. Volvo said that they also had high interest with the green arms of many of their regular accounts getting involved in the transaction, and that this demand pressure had contributed to the success of the deal.

The Climate Bonds Green Bond European Investor Survey noted that green bond investors wanted to diversify portfolios heavily dominated by the utility, financial, and real estate sectors.[12] Further, results of the Climate Bonds Green Bond Treasurer survey highlighted that a more diverse investor base was perceived as one of the multiple benefits of issuing green bonds.[13] The COVID-19 pandemic has magnified the contribution that the investment community must make in improving the quality and sustainability of life on our planet. Consequently, there has been much greater emphasis on investors committing to responsible investment strategies, including those involving green bonds. In addition to this, there is mounting evidence to suggest that green bonds experience lower volatility in secondary markets, partly because the investor base is often heavily weighted towards the buy and hold category.
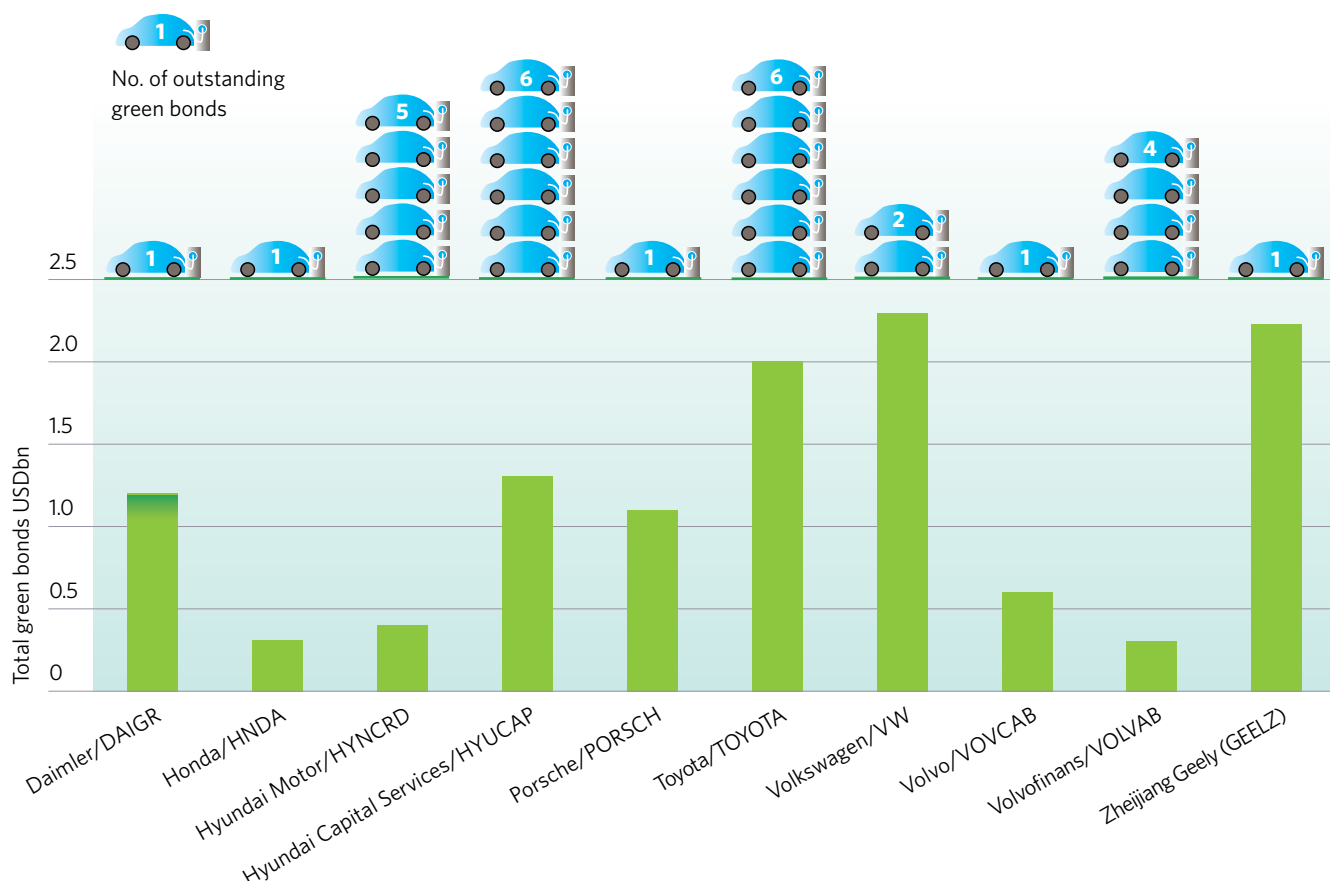
Green bonds signal a change of lane for auto issuers

The Climate Bonds Green Bonds Database includes 28 green bonds from the auto sector from ten issuers, with a total current size of USD9.9 bn.[14] In a segment of the market where investors are desperate to add sector diversification, they have all been very well received.

But these represent a tiny fraction of the potential market. As of February 2021, there were 90 auto companies with 2465 bonds outstanding amounting to USD719bn.[15] The ten most prolific auto issuers are responsible

Pole position: VW is the largest issuer of auto green bonds

No. of outstanding green bonds

Total green bonds USDbn

for 87% of the total (USD624.0bn) divided among 2038 individual bonds. All the top ten issuers (and most of the rest) have well developed electric vehicle programmes underway, but only five out of the top ten largest debt issuers have issued green bonds. In most cases electric vehicle development is being funded by bonds categorised as 'general corporate purposes'. In March 2020, it was reported that the largest automaker in the US, General Motors (GM), had committed USD20bn to developing EVs over the next five years, and the company subsequently became the first US-based automotive company to pledge to phase out all ICE vehicle production by 2035.[16] [17]USD20bn would more than double the current investible opportunity set in the auto sector for green bond investors.

Autos: The top ten bond issuers

Rank by USD amount out	Name	Domicile	Ticker	Total bonds amount out USD bn	Total number of bonds	Number of green bonds
1	**Volkswagen**	Germany	VW	106.8	152	2
2	**Toyota**	Japan	TOYOTA	97.4	376	4 outstanding, (3 further bonds have been redeemed)
3	**Daimler**	Germany	DAIGR	86.3	184	1
4	**Ford**	USA	F	83.0	342	0
5	**General Motors**	USA	GM	64.9	157	0
6	**BMW**	Germany	BMW	62.8	114	0
7	**Honda**	Japan	HNDA	38.8	93	1
8	**Renault**	France	RENAUL	26.4	42	0
9	**Nissan**	Japan	NSANY	22.1	45	0
10/11	**Hyundai Capital America/ Hyundai Capital Services**	South Korea	HYNMTR / HYUCAP	17.8/17.6 1/1.14	29/504	0/10 -22.50

Policy makers toot horns in support of EVs

According to the IEA, the stock of EVs on the road in 2019 reached 7.2 million, compared to just 17,000 in 2010.[18] With record sales in 2020 and double-digit growth rates in recent years, EVs are poised to overtake a large share of the global automotive stock in the coming decades, reaching a third by 2040.[19,20]

However, there are areas where improvements are needed. Removing the actual and perceived barriers to EV adoption includes addressing the limitations related to cost, charging infrastructure, and battery quality, capacity and recyclability. Ambitious policy commitments have and continue to play a crucial role for lowering these barriers and supporting the transition.

To drive down cost, many governments have introduced incentives such as tax breaks or purchase credits for companies and individuals. Perhaps the most successful example is in Norway where policy intervention has brought the total cost of ownership (TCO) of a new EV below that of an ICE vehicle and boosted the share of EVs to just over half of the country's overall car stock.[21] China, the largest EV market, has done this also at the city level with cities adopting entire fleets of electric buses as part of their public transportation networks – partially funded by green bonds.[22,23]

Green bond issuers Daimler and Volkswagen both benefit from the clear policy support of the German government. Germany has stated multiple times it will build back green, and in June 2020 announced enhanced policy measures to support the COVID-19 recovery including a doubling of existing subsidies on EVs. Germany will also implement higher taxes for vehicles consuming high levels of petrol.[24] In an indication of similar potential, South Korea recently announced measures to both extend electric vehicle subsidies and increase the budget as part of its green new deal. This was combined with ambitious targets for the number of EVs on the road.[25] Neighbouring Japan's government has also announced a target to eliminate all ICE vehicles by 2030, which will likely pan out positively for the electrification plans of existing green bond issuers Honda and Toyota.[26]

Steering the automotive industry from brown to green

Beyond car manufacturing, the entire automotive value chain can benefit from the development of green finance policies, standards and definitions in the context of a low-carbon transition. The robust investor demand for a more diverse set of industry sectors is a positive backdrop for the potential entrance of entities such as raw material suppliers, materials processing companies, original equipment manufacturers (OEMs) and car part makers, car retailers and leasing and ride sharing companies to enter the green bond market.

For example, the mining companies providing the rare-earths and lithium required for the batteries powering electric vehicles are well-placed to take advantage of green definitions for mining activities as they are developed. Companies processing raw materials such as manufacturing of steel and aluminium – the most common inputs into the body of a car – can similarly utilise emerging standards and definitions for their industry to map their eligible assets, projects and activities against a prospective labelled bond issuance. Whatever the label adopted, issuers will need to show the requisite level of ambition (i.e. alignment with sector-specific, Paris-aligned decarbonisation pathways) and action – not only pledges – as characterised in emerging guidance and standards in the market, such as the Climate Bonds Transition Finance Principles.[27]

Given the combination of required investment to rapidly transition the auto industry to net zero, the broad policy support, and strong investor demand for green bonds, we expect issuers from across the automotive value chain to help bring further depth and liquidity to the green bond market in the next few years.[28]

9. Conclusion

During the second half of 2020, USD178bn worth of green bonds were added to the Climate Bonds Green Bonds Database, almost double that of H1. Green bonds were issued in 24 currencies, and almost half (46%) were EUR denominated.

H2 provided the strongest evidence to date that green bonds can offer value to both issuer and investor. Qualifying green bonds in EUR and USD again performed well compared to vanilla peers during book building. This research highlights multiple examples of bonds with decent primary dynamics translating into the greenium and tightening further in the immediate secondary market. We would expect this to persist as sources of demand continue to grow.

Germany's twin bond structure provided the dream case study for demonstrating that there can be pricing benefits for sovereign green bonds. Following this example, governments around the world should be encouraged to prioritise green expenditure knowing it is relatively cheaper and investors should commit more capital to green mandates.

It is encouraging to see a broader range of issuers committing to the green bond market, from the non-financial sector and an increasing number of sovereigns. A larger pool of issuers will make it more

practicable for investors to achieve a well-diversified portfolio and facilitate more dedicated mandates. In the auto sector there is enormous potential for growth given that the large manufacturers are committing to low carbon transition strategies and are already active bond issuers. The tight pricing that we have seen in green auto bonds in H2 2020 suggests that there is unmet demand.

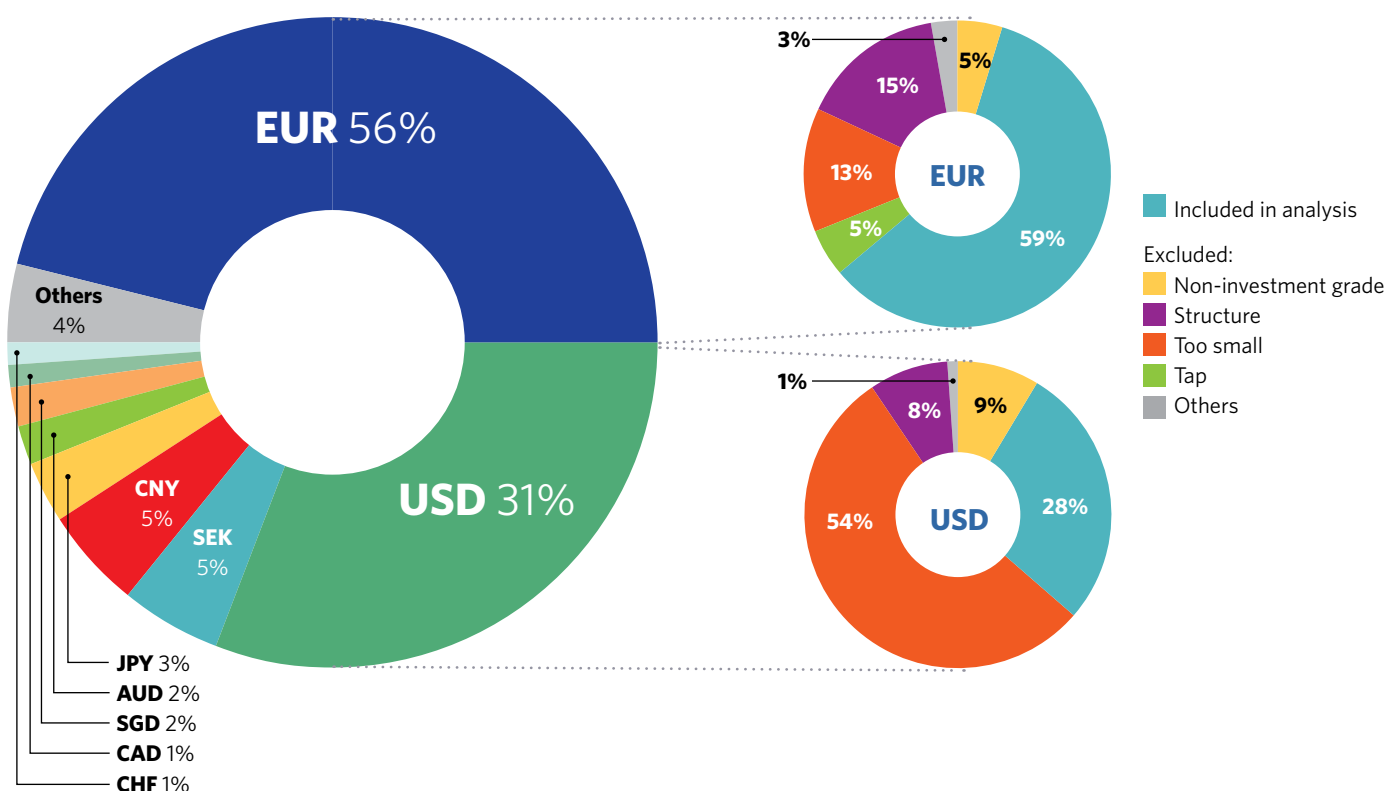**The tighter pricing we have observed from our analysis suggests that more supply of green bonds is needed from all sources.** The COVID-19 pandemic has highlighted the role the investment community can play in a sustainable and green recovery and the policy narrative has placed a strong emphasis on building back better. In late September, Chinese President Xi Jinping announced a target for China to become carbon neutral before 2060 following dozens of other countries that have pledged similar goals. China is already the source of the second largest amount of green bonds (after the USA) with cumulative issuance of USD130bn and this commitment will likely require multiples of that investment.[29] The EU has committed to reach net zero by 2050 and is combining this ambition with a digital transition and post COVID-19 recovery. In mid-September, European Commission President Ursula von der Leyen confirmed EU plans to issue EUR225bn in green bonds

over the next few years. In late October, Japan's new Prime Minister Suga Yoshihide announced its ambition to be carbon neutral by 2050.

We expect growth out of the US given the Biden Administration's commitment to tackle climate change. His administration has already demonstrated its determination by re-joining the Paris Agreement, and with the appointment of a high profile, experienced team. John Kerry has been given the job of Special Envoy on Climate Change leading the international side, while Gina McCarthy is the first White House National Climate Advisor concentrating on domestic policy.

Such commitments could galvanise a substantial shift into green bonds by both issuers and investors. Issuers will be inclined to align themselves with these developments by transforming their operations and entities into climate compatible ones, and investors will be encouraged to commit funds to green investment strategies if there is a steady supply of available paper. We note that China, Japan, and the USA, three of the four largest issuers of sovereign bonds, have yet to commit to issuing green sovereign bonds.[30]

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

In early December, the Climate Bonds Database breached the USD1tn milestone. While other data sources had already called this benchmark, the Climate Bonds Database only includes bonds with 100% of net proceeds dedicated to green assets or projects aligned with the Climate Bonds Taxonomy.[31] The USD1tn mark is a symbolic achievement, but to put it into context, the OECD estimates that the required investment for infrastructure alone is at least USD6.3tn a year.[32] Meanwhile, the IEA highlighted that total cumulative spending on renewable energy and energy efficiency to 2030 should increase to USD13.5tn.[33]

Increased supply is urgently required and anticipated. At Climate Bonds, we forecast 2021 to produce a tenth consecutive green finance record with a figure ranging from a low to high USD400bn-USD450bn in global green bonds, loans and Sukuk. Social and sustainability bonds are expected to deliver USD250-300bn on top of that.

This analysis is based on a limited number of green bonds, chosen according to the parameters outlined on page 29. Green bonds issued in other currencies, structures, formats, and sizes may perform differently from those discussed in this paper.

We started monitoring green bond pricing in 2016, and after four years (the end of 2020), we had looked at 367 securities. As the profile of green bonds has evolved in the intervening period, pricing dynamics have also been affected. We 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 bond priced between July 01 and September 30	Number of bonds	Average Coupon (par weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
Sparebanken Vest Boligkreditt AS 0.01% 28/06/2027 (CO)	1	0.01%	7	0.5	01-Jul
SpareBank 1 Boligkreditt AS 0.01% 22/09/2027 (CO)	1	0.01%	7	1	15-Sep
BPCE SFH 0.01% 10/11/2027 (CO)	1	0.01%	7	0.6	02-Sep
NE Property BV 3.38% 14/07/2027	1	3.38%	7	0.5	07-Jul
CTP BV 2.13% 01/10/2025	1	2.13%	5	0.65	24-Sep
BBB Real Estate 6-7 Years	3	1.72%	6.7	0.55	Jul-Aug
Berlin Hyp AG 0.01% 02/09/2030 (CO)	1	0.01%	10	0.5	21-Sep
Covered Bonds 10 Years	2	0.01%	10	1	Sep
Mediobanca Banca di Credito Fin. SpA 1% 08/09/2027 (SP)	1	1%	7	0.5	01-Sep
Commerzbank AG 0.375% 09/01/2027 (SP)	1	0.38%	7	0.75	24-Aug
Digital Dutch Finco BV 1% 15/01/2032	1	1.00%	12	0.75	14-Sep
American Tower Corp 1% 02/09/2020	1	1.00%	12	0.65	02-Sep
Terna Rete Elettrica Nazionale SpA 0.75% 24/07/2032	1	0.75%	12	0.5	17-Jul
National Grid Elect. Transmission 0.823% 07/07/2032	1	0.82%	12	0.75	02-Jul
Royal Schiphol Group NV 0.875% 08/09/2032	1	0.88%	12	0.5	01-Sep
Ryanair DAC 2.875% 15/09/2025	1	2.875%	5	0.85	08-Sep
Daimler AG 0.75% 10/09/2030	1	0.75%	10	1	03-Sep
Volkswagen International Finance NV 0.875% 22/09/2028	1	0.88%	8	1.25	16-Sep
Volkswagen International Finance NV 1.25% 23/09/2032	1	1.25%	12	0.75	16-Sep
Nissan Motor Co. 3.201% 17/09/2028	1	3.201%	8	0.75	11-Sep
ERG SPA 0.5% 11/09/2027	1	0.50%	7	0.5	04-Sep
National Grid Plc. 0.553% 18/09/2029	1	0.55%	9	0.5	11-Sep
Talent Yield Euro Ltd 1% 24/09/2025	1	1%	5	0.5	17-Sep
State Grid Overseas Inv. 0.797% 05/08/2026	1	0.797%	6	1	29-Jul
Global Switch Finance 1.375% 07/10/2030	1	1.375%	10	0.7	30-Sep
Koninklijke KPN NV 0.875% 14/12/2032	1	0.875%	12	0.6	07-Sep
Kreditanstalt fuer Wiederaufbau 0% 15/09/2028	1	0%	8	3	21-Jul
Kreditanstalt fuer Wiederaufbau 0% 17/09/2030	1	0%	10	3	27-Aug
Landwirtschaftliche Rentenbank 0% 22/09/2027	1	0%	7	1.75	15-Sep
Finnvera Plc 0% 15/09/2027	1	0%	7	1	08-Sep
Kommunekredit 0.125% 26/09/2040	1	0.125%	20	0.5	27-Aug
Regional Governments 20-Years	3	0.08%	20	0.5	Jul-Sep

Q4 Green bond priced between October 01 and December 31	Number of bonds	Average Coupon (par weighted)	Maturity (Years)	Deal Size EURbn	Pricing date
Mizuho Financial Group Inc 0.21% 07/10/2025	1	0.214%	5	0.5	01-Oct
Sumitomo Mitsui Financial Group 0.303% 28/10/2027	1	0.303%	7	0.5	28-Oct
Banque Federative du Credit Mutuel SA 0/1% 08/10/2027 (SP)	1	0.100%	7	0.75	01-Oct
Credit Mutuel Arkea 0.01% 28/01/2026 (SP)	1	0.010%	6	0.5	21-Oct
Kuntarahoitus Oyj 0% 14/10/2030	1	0.0%	10	0.5	06-Oct
Instituto de Credito Oficial 0% 30/04/2026	1	0.0%	6	0.5	21-Oct
Land Hessen 0% 08/11/2030	1	0.0%	10	1	02-Nov
Societe Du Grand Paris EPIC 0.7% 15/10/2060	1	0.7%	40	3	07-Oct
SSA 31-Years	2	0.8%	40	1.5	Oct/Nov
Societe Du Grand Paris EPIC 0% 25/11/2030	1	0.0%	10	3	07-Oct
Province of Ontario 0.01% 25/11/2030	1	0.01%	10	2.5	17-Nov
Bundesobligation 0% 10/10/2025	1	0.0%	5	5	04-Nov
UPM-Kymmene Oyj 0.13% 19/11/2028	1	0.125%	8	0.75	12-Nov
BBB Non-Financial Corporate 8-Years	2	0.37%	8	0.625	05&25-Nov
SFIL SA 0% 23/11/2028	1	0.0%	8	0.5	13-Nov
KfW 0% 15/12/2027	1	0.0%	7	3	13-Oct
TenneT Holding BV 0.5% 30/11/2040	1	0.5%	20	0.75	16-Nov
TenneT Holding BV 0.13% 30/11/2032	1	0.125%	12	0.6	16-Nov
BBB Utilities 12-Years	3	0.458%	12	0.5	Oct
Vinci SA 0% 27/11/2028	1	0.0%	8	0.5	18-Nov
Cie General Des Establissement (Michelin) 0% 26/10/2020	1	0.0%	8	0.5	02-Nov
Ontario Teachers' Finance Trust 0.05% 25/11/2030	1	0.05%	10	0.75	19-Nov
Province of Quebec 0.0% 29/10/2030	1	0.00%	10	2.25	29-Oct
Svenska Handelsbanken AB 0.01% 02/12/2027 (SNP)	1	0.01%	7	0.5	25-Nov
Nykredit Realkredit AS 0.25% 13/01/2026 (SNP)	1	0.25%	6	0.75	12-Nov
Stora Enso Oyj 0.63% 02/12/2030	1	0.625%	10	0.5	25-Nov
Telia Company AB 0.125% 27/11/2030	1	0.125%	10	0.5	20-Nov
FLUVIUS System Operator CVBA 0.25% 02/12/2030	1	0.25%	10	0.6	25-Nov
A-BBB Utilities 10 Years	2	0.25%	10	0.5	Oct/Nov

USD summary statistics of bonds used for comparison

Bonds sharing similar characteristics to green bonds in our sample

Q3 Green bond priced between July 01 and September 30	Number of bonds	Average Coupon (par weighted)	Maturity	Deal Size USDbn	Pricing date
Coca-Cola Femsa SAB de CV 1.85% 01/09/2032	1	1.85	12	0.705	26-Aug
Mars Inc. 1.625% 16/07/2032	1	1.625	12	0.7	13-Jul
Johnson Controls International plc 1.75% 15/09/2030	1	1.75	10	0.625	08-Sep
Roper Technologies Inc. 1.75% 15/02/2020	1	1.75	11	1	18-Aug
Saudi Electricity Global Sukuk Co 5 1.74% 17/09/2025	1	1.74	5	0.65	10-Sep
QIB Sukuk Ltd. 1.95% 27/10/2025	1	1.95	5	0.75	20-Oct
Saudi Electricity Global Sukuk Co 5 2.413% 17/09/2030	1	2.413	10	0.65	10-Sep
Dubai DOF Sukuk Ltd. 2.763% 09/09/2030	1	2.763	10	1.5	02-Sep
ENN Energy Holdings Ltd 2.625% 17/09/2030	1	2.625	10	0.75	10-Sep
State Grid Overseas Inv. 1.625% 05/08/2030	1	1.625	10	1.15	29-Jul
Verizon Communications Inc 1.5% 18/09/2030	1	1.5	10	1	16-Sep
Cox Communications 1.8% 10/09/2020	1	1.8	10	0.75	10-Sep
EDP Finance BV 1.71% 24/01/2028	1	1.71	8	0.85	17-Sep
Liberty Utilities Fin 2.05% 15/09/2030	1	2.05	10	0.6	16-Sep
BBB Utilities 10-Years	3	1.7	10	0.55	Aug-Sep
MTR Corp Ltd 1.625% 19/08/2030	1	1.625	10	1.2	12-Aug
A Transport & Logistics 10-Years	2	1.9	10	0.775	Jul-Aug
China Construction Bank Corp/Hong Kong 1% 04/08/2023	1	1	3	0.5	28-Jul
Ind. & Commercial Bank of China/Hong Kong 1% 20/07/2023	1	1	3	0.8	13-Jul
China Construction Bank Corp/Hong Kong 1.25% 04/08/2025	1	1.25	5	0.7	28-Jul
Ind. & Commercial Bank of China/Hong Kong 1.2% 20/07/2025	1	1.2	5	0.8	13-Jul
Prologis LP 1.25% 15/10/2030	1	1.25	10	0.75	06-Aug
Simon Property Group LP 2.65% 15/07/2030	1	2.65	10	0.75	06-Jul
China Merchants Bank Co Ltd/Hong Kong 1.2% 10/09/2025	1	1.2	5	0.8	02-Sep
A Chinese Banks 5-Years	2	1.2	5	0.9	02-03 Sep
QNB Finance Ltd 1.625% 22/09/2025	1	1.625	5	0.6	15-Sep
CBQ Finance Ltd. 2% 15/09/2025	1	2%	5	0.5	08-Sep
Metlife Global Funding 0.95% 02/07/2025	1	0.95	5	0.75	29-Jun
New York Life Global Funding 0.95% 24/06/2020	1	0.95	5	0.5	17-Jun

Q3 Green bond priced between July 01 and September 30 Continued from page 27	Number of bonds	Average Coupon (par weighted)	Maturity	Deal Size USDbn	Pricing date
Kreditanstalt fuer Wiederaufbau 0.75% 30/09/2030	1	0.75%	10	2	18-Aug
Landwirtsch. Rentenbank 0.875% 03/09/2030	1	0.875%	10	1.5	25-Aug
European Investment Bank 0.75% 23/09/2030	1	0.75%	10	1.5	15-Sep
Supranational 10-Years	3	0.75%	10	1.6	Aug-Sep
Equinix Inc 1% 15/09/2025	1	1	5	0.7	23-Sep
BBVA Bancomer SA Texas 1.875% 18/09/2025	1	1.875%	5	0.5	15-Sep
Equinix Inc 1.55% 15/03/2028	1	1.55	8	0.65	23-Sep
American Tower Corp 1.875% 15/10/2030	1	1.875%	10	0.8	23-Sep

Q4 Green bond priced between October 01 and December 31	Number of bonds	Average Coupon (par weighted)	Maturity	Deal Size USDbn	Pricing date
Union Electric Co 2.625% 15/03/2051	1	2.625%	31	0.55	01-Oct
Berkshire Hathaway Energy 2.85% 05/15/2051	1	2.850%	31	1.5	27-Oct
Canadian Imperial Bank of Commerce 0.95% 23/10/2025	1	0.95%	5	0.5	19-Oct
Allstate Corp 0.75% 15/12/2025	1	0.75%	5	0.6	19-Nov

Methodology

This paper includes labelled green bonds issued during H2 2020. Labelled green bonds meeting the following specifications are included:

- Announcement date between 01/07/2020 and 31/12/2020

- 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 three 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. As of 31st December 2020
3. Harrison C., Muething L., and Tukiainen K. Green Bond Treasurer Survey, Climate Bonds Initiative, April 2020
4. Harrison, C., and Muething, L., Sovereign Green, Social, and Sustainability Bond Survey, Climate Bonds Initiative, January 2021
5. Primary market yields are Bundesbank reference prices from Frankfurt Stock exchange. Secondary market yields are Bloomberg's conventional ask
6. Bloomberg volatility data
7. More work needs to be done over a longer time horizon, and with a larger number of securities to determine the credibility of this data with regards to sovereign GSS bonds. Ulf G Erlandsson of Anthropocene Fixed Income Institute has written on the topic of green bond secondary market volatility by https://anthropocenefii.org/afii-research
8. This spotlight was kindly reviewed by Anastasiya Ostrovnaya, Imperial College, London.
9. https://www.ft.com/content/5f7acd74-8990-4c8a-94c6-c8dae0c2b037
10. Bloomberg Industry Classification System (BICS) is used to determine the sector of economic risk
11. There were insufficient comparable bonds to construct a yield curve for Volvo.
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27. https://www.climatebonds.net/transition-finance/fin-credible-transitions
28. Written with contributions from Krista Tukiainan and Michelle Horsfield
29. Climate Bonds Green Bond Database 01/02/2021
30. The UK is the third largest issuer of sovereign bonds and had committed to issuing a green bond
31. The minimum threshold for green projects was increased to from 95% to 100% on 1st October 2020. All bonds issued prior to that were evaluated for inclusion based on at least 95% of the proceeds being allocated to projects in compliance with the green definitions set out in the Climate Bonds Database Methodology."
32. policy-highlights-financing-climate-futures.pdf (oecd.org)
33. IEA 2015a

Suggested citation: Harrison, C., *Green Bond Pricing in the Primary Market H2 2020, Climate Bonds Initiative, March 2021*

www.climatebonds.net

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