Green Bonds: The Chartbook
Executive summary

THE STATE OF THE MARKET

- **New issuance in 2016 stands at USD 49bn YTD**, marking a record so far. However, a large share of issuance comes from Asia, namely Chinese bank transactions. Consequently, China makes up by far the largest share of new issuance YTD (USD 14.4bn compared to 2015: USD 1.3bn; see slide 10). If one excludes Chinese transactions, Green Bond issuance this year would be nearly flat yoy.

- **Corporate Green Bond issuance has slowed somewhat in 3Q16 compared to 2Q16.** Spanish utility Iberdrola was the only larger issuer in 3Q16 (see slide 5). Most notable in 2Q16 was a EUR-benchmark corporate green bond from US utility Southern Power. Other US issuers are likely to follow suit, in our view. We think grid operator Tennet is an interesting issuer: it is using Green Bonds as its major funding source, in particular for its maturity profile beyond seven years.

- **European banks are increasingly using Green Bonds:** ABN Amro has issued two Green Bonds as senior debt; Société Générale plans a 5Y senior-unsecured-positive-impact bond, its second bond already. Dutch lender Rabobank (RABOBK; Aa2/A+/AA-) plans its inaugural green bond, denominated in euro. The bank developed a green and sustainability bond framework for renewable energy projects and small and medium-sized enterprises. Dutch non-financial rating agency Sustainalytics has reviewed the framework and argues that “Rabobank’s green and sustainability framework is robust and credible”. See slide 22 for trading levels.

- **The Green Bond Principles (GBP) were revised and updated:** The International Capital Markets Association (ICMA) updated the Green Bond Principles on 16 June 2016. The GBP are voluntary process guidelines that are applied to Green Bonds and which emphasize disclosure and transparency. This is already the second review of the GBP, which were first published in 2014. The update focuses on four key areas: 1. environmental categories are expanded; 2. external assurance is extended to include a rating; 3. the use of proceeds are broadened to include Social Bonds and 4. a new resource center has been launched.

- **G20 Green Finance Synthesis Report:** The 20 largest economies (G20) aim to support the market. They published a report outlining their goals after the G20 summit in China on 5 September. The report provides a number of options to support the market such as raising awareness, supporting local Green Bond markets, reducing risk premiums and establishing cost-efficient verification and reporting. The G20 also suggest promoting the development of Green Bond indices, ratings and exchange listings. Additional options included in the report are market responsiveness and product innovation.

*transactions closed as of 21 September 2016, Source: our own analysis based on data from the Climate Bonds Initiative, Environmental Finance and Bloomberg

Cover picture © K.-U. Häßler
I CURRENT MARKET DEVELOPMENTS

II ASSET CLASSES & CURRENCIES

III GREEN BOND ISSUERS

IV TRADING LEVELS
Current market developments

Growing a resilient Green Bond market

- The volume of labeled Green Bonds currently outstanding amounts to USD 136bn (as of 20 September 2016)*
- Green Bonds are part of a USD 694bn climate-aligned bond universe**
- Green Bond issuance reached a record in 2015 (USD 41bn)
- Market continues to grow rapidly with USD 49bn in new issues YTD
- Investor demand for Green Bonds is strong; however, a pricing difference to non-Green Bonds is not existent
- At the G20 meeting in September in China, the twenty leading nations developed plans to scale up the Green Bond market and issued the G20 Finance Synthesis Report

Outstanding Green Bonds by issue year (as of 20 September 2016)*

*All numbers are based on the calculations of UniCredit Research, using public information and data from Climate Bonds Initiative (CBI), Environmental Finance and Bloomberg. Note that we excluded sustainability bonds from our calculations as they are not technically Green Bonds. Green Schuldscheine are included.

**Climate-aligned bonds are themed bonds which also include Green Bonds; Source: Climate Bonds Initiative, July 2016

Source: UniCredit Research
Green-Bond issuance peaked in July
New issuance and large transactions over the past 12 months

<table>
<thead>
<tr>
<th>4Q15</th>
<th>1Q16</th>
<th>2Q16</th>
<th>3Q16</th>
</tr>
</thead>
</table>
| **EDF** USD 1.25bn  
EDF 3.625% 10/25  
**KfW** USD 2.6bn  
EUR 1.5bn 0.125% 10/20  
USD 1bn 1.875% 11/20  
**ING** USD 1.25bn  
USD 800mn 2% 11/18  
EUR 500mn 11/20 | **Shanghai Pudong Bk** USD 5.2bn  
SHANPU CNY 20bn 2.95% 01/19  
SHANPU CNY 15bn 3.2% 03/21  
**Industrial Bank** USD 1.5bn  
INDUBK CNY 10bn 2.95% 01/19  
**Apple** USD 1.5bn  
AAPL USD 1.5bn 2.85% 02/23  
**Ned. Waterschapsbank** USD 1bn  
NEDWBK 2.375% 03/26 | **Southern Power** EUR 1.1bn  
SO 1% 6/2022  
SO 1.85% 6/2026  
**Iberdrola** EUR 1bn  
IBESM 1% 4/2026  
**Tennet** EUR 1bn  
TENNET 1% 6/2026  
TENNET 1.875% 6/2036  
**Deut. Kreditbank** EUR 500mn  
DKRED 0.625% 6/2021 | **Bank of China** USD 3bn  
BCHINA (5 issues in September)  
**Asian Dev. Bank** USD 1.3bn  
ASIA 1% 8/2019  
ASIA 1.75% 8/2026  
**Iberdrola** (Utility) EUR 700mn  
IBESM 0.375% 9/2025  
**Greenko** USD 500mn  
GRENKO 4.875% 8/2023 |

Source: Climate Bonds Initiative, Bloomberg, UniCredit Research
Transactions in 2016 have exceeded our initial estimates
We revise our initial estimates to USD 65bn for 2016 from USD 50bn

New Green-Bond issuance (yearly distribution, in USD bn)

Amount issued (USD bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount (USD bn)</th>
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<tbody>
<tr>
<td>2007</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>0.08</td>
</tr>
<tr>
<td>2009</td>
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<tr>
<td>2010</td>
<td>9</td>
</tr>
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<td>2011</td>
<td>1</td>
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<tr>
<td>2012</td>
<td>2</td>
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<tr>
<td>2013</td>
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<td>2014</td>
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<td>2015</td>
<td>41</td>
</tr>
<tr>
<td>2016</td>
<td>49</td>
</tr>
<tr>
<td>YTD</td>
<td></td>
</tr>
</tbody>
</table>

New Green-Bond issuance (quarterly distribution, in USD bn)

Amount issued USD bn

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Amount (USD bn)</th>
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<tbody>
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<td>9</td>
</tr>
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<tr>
<td>1Q16</td>
<td>16</td>
</tr>
<tr>
<td>2Q16</td>
<td>15</td>
</tr>
<tr>
<td>3Q16</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: Climate Bonds Initiative, Bloomberg, UniCredit Research
Green Bonds: a timeline
Market development and key events

- **European Investment Bank** issues the first green bond (CAB)
- **World Bank** issues its first green bond
- **International Finance Corporation** (IFC) issues its first green bond
- **Nordic Investment Bank** (NIB) issues its first green bond
- The state treasury of California becomes the **first US investor** in green bonds (World Bank green bond)
- **Swedish Government Agencies** join the green bond market
- **Corporate Green Bonds** gain traction
- New version of **Green Bond Principles** (GBP) published
- German Hyp issues first **Green Covered Bond**
- **Asian banks** drive market growth; Nordex, Tennet, Friesland Campina issue inaugural **Green Schuldscheine**

Source: Climate Bonds Initiative, UniCredit Research
I CURRENT MARKET DEVELOPMENTS

II ASSET CLASSES & CURRENCIES

III GREEN BOND ISSUERS

IV TRADING LEVELS
Financial institutions dominate Green-Bond issuance in 2016

Banks and supras are the largest issuers this year
New issuance by sector in 2016 YTD

- Banks dominate new issuance in 2016, led by China (Industrial Bank and Shanghai Pudong Development Bank)

Green Bonds are moving from a supra & agency market to a segment driven by financials & utilities

The World Bank (IBRD), the European Investment Bank (EIB) and German agency KFW are the largest single-name green bond issuers

The second-largest issuer group are corporates, led by Toyota and the utilities EDF, Engie and Iberdrola

Source: UniCredit Research
Asia-Pacific is the most important region in 2016

**Geographic distribution**

- **2016: EMEA ranks No. 3**
  - Green Bonds issued by region in 2016 YTD
  - Banks dominate new issuance in 2016, led by China (Industrial Bank and Shanghai Pudong Development Bank)
  - EMEA issuers make up the second-largest group in 2016 YTD, ahead of the US
  - South America is catching up

- **2016: United States rank No. 3**
  - Green Bonds by nationality issued in 2016 YTD*
  - US computer company Apple leads the way for corporate green bonds in 2016
  - Dutch issuers rank fourth in 2016 on the back of transactions from grid operator TenneT, agency Nederlandse Waterschapsbank and bank ABN Amro

* SNAT= Supranationals

Source: UniCredit Research
EUR and USD bonds with IG rating dominate the overall market

Supranationals are the foundation – corporates are entering the market

- The market consists largely of EUR and USD bonds
  Outstanding volume by currency (total outstanding bonds)

- Euro and US dollar: issuers from Europe and the US dominate the green bond market; the currency split reflects this
- The Renminbi (CNY) makes up 11%, due to large bank bonds

Green Bonds are an investment grade segment
Outstanding Green Bonds by credit rating

- Supranationals are the foundation of the Green Bond market; all have an investment grade rating
- Non-IG-rated issuers include US utility Terraform, Brazilian food processor BRF and Banco Nacional de Costa Rica; non-rated issuers include wind turbine makers Nordex and Vestas

Source: UniCredit Research
I CURRENT MARKET DEVELOPMENTS

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IV TRADING LEVELS
Financial sector issuance increases in 2016

Green Bonds by sector: annual distribution as a percentage

- Supranations
- Local & Regional Govn’ts
- Automotive
- Government Agencies
- Banks
- Consumer Products
- Utility
- Real Estate
- Other

Source: Climate Bonds Initiative, Bloomberg, UniCredit Research
## Global issuers in 2016

### Transactions at a glance

<table>
<thead>
<tr>
<th>Issuer</th>
<th>Latest issue date</th>
<th>Issuer type</th>
<th>Second-party opinion</th>
<th>Cumulated 2016 issues (USD)</th>
</tr>
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<tbody>
<tr>
<td>EUROPEAN INVESTMENT BANK</td>
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<td>NEW DEVELOPMENT BANKS BRICS</td>
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</table>

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<tbody>
<tr>
<td>ONTARIO</td>
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<td>CITY OF GOTHENBURG</td>
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<td>Cicero</td>
<td>117,132,000</td>
</tr>
<tr>
<td>SAN DIEGO CA UNIF SCH DIST</td>
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<td>AMERICAN MUNICIPAL POWER</td>
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<td>RAMSEY CNTY MN</td>
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<td>Utility</td>
<td>Vigeo</td>
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<tr>
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<td>Utility</td>
<td>Deloitte</td>
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<td>TENNET HOLDING BV</td>
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<td>CHINA ENERGY CONS</td>
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<td>ALLIANDER</td>
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## Global issuers in 2016

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<tr>
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<th>Issuer type</th>
<th>Second-party opinion</th>
<th>Cumulated 2016 issues (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYUNDAI CAPITAL SERVICES</td>
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<td>SUZANO PAPEL E CELULOSE</td>
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<td>Forest &amp; Paper Products Manufacturing</td>
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<tr>
<td>SODRA SKOGSAGARNA</td>
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<td>5/26/2016</td>
<td>Real Estate</td>
<td>CICERO</td>
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</tbody>
</table>

Source: Climate Bonds Initiative, Bloomberg, UniCredit Research
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</thead>
<tbody>
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<td>SHANGHAI PUDONG DEV BANK</td>
<td>7/18/2016</td>
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<td>BANK OF QINGDAO CO LTD</td>
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<td>EY</td>
<td>599,640,000</td>
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<td>ABN AMRO BANK NV</td>
<td>5/31/2016</td>
<td>Banks</td>
<td>Oekom</td>
<td>560,450,000</td>
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<td>BANCO NACIONAL DE COSTA RICA</td>
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<td>WESTPAC BANKING CORP</td>
<td>6/3/2016</td>
<td>Banks</td>
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<tr>
<td>AXIS BANK</td>
<td>5/27/2016</td>
<td>Banks</td>
<td>KPMG</td>
<td>362,871,900</td>
</tr>
<tr>
<td>TURKIYE SINAI KALKINMA BANKASI AS</td>
<td>5/18/2016</td>
<td>Banks</td>
<td>Sustainalytics</td>
<td>300,000,000</td>
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<tr>
<td>CREDIT AGRICOLE CIB</td>
<td>6/24/2016</td>
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<td>Sustainalytics</td>
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<td>SBAB BANK AB</td>
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<td>234,264,000</td>
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<tr>
<td>BANK OF CHINA LTD/ NY</td>
<td>7/12/2016</td>
<td>Banks</td>
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<tr>
<td>BAJAJ FINANCE LTD</td>
<td>7/14/2016</td>
<td>Banks</td>
<td>None</td>
<td>1,493,300</td>
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<tr>
<td>CREDIT AGRICOLE SA</td>
<td>6/29/2016</td>
<td>Banks</td>
<td>Sustainalytics</td>
<td>1,008,480</td>
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</table>
The GBPs recommend an external review to confirm the alignment of Green Bonds with the key features of the GBPs

- **Consultant Review:** An issuer can seek advice from consultants and/or institutions with recognized expertise in environmental sustainability or other aspects of the issuance of a Green Bond, such as the establishment/review of an issuer’s Green Bond framework. “Second opinions” may fall into this category.

- **Verification:** An issuer can have its Green Bond, associated Green Bond framework, or underlying assets independently verified by qualified parties, such as auditors. In contrast to certification, verification may focus on alignment with internal standards or claims made by the issuer. Evaluation of the environmentally sustainable features of underlying assets may be termed verification and may reference external criteria.

- **Certification:** An issuer can have its Green Bond or associated Green Bond framework or Use of Proceeds certified against an external green assessment standard. An assessment standard defines criteria, and alignment with such criteria is tested by qualified third parties / certifiers.

- **Rating:** An issuer can have its Green Bond or associated Green Bond framework rated by qualified third parties, such as specialised research providers or rating agencies. Green Bond ratings are separate from an issuer’s ESG rating as they typically apply to individual securities or Green Bond frameworks / programmes.

**External review providers used**

*By outstanding volume*

- **Cicero (Norway):** 25%
- **Vigeo (France):** 11%
- **Oekom (Germany):** 6%
- **DNV GL (Norway):** 3%
- **Sustainalytics (NL):** 6%
- **Other:** 2%
- **None:** 46%

*Market share by deal volume in 2014, 2015 and 2016; note that the EIB does not use external reviewers.*
I CURRENT MARKET DEVELOPMENTS

II ASSET CLASSES & CURRENCIES

III GREEN-BOND ISSUERS

IV TRADING LEVELS
Agencies & supras: yield levels of Green Bonds on the issuer curve
Eurobond ASW spreads of the largest Green-Bond issuers

- EIB and KFW are the two largest and most liquid EUR Green Bond issuers
- Both established distinct Green Bond curves, which trade in line with outstanding non-green issues in this tight yield environment
- NRW.BK Green Bonds also trade on the issuer's curve
- The outstanding NEDWBK 1% 9/2025 is trading more expensively than non-Green Bonds on the issuer's curve
Utilities: yield levels of Green Bonds on the issuer curve
Eurobond ASW spreads of the largest Green-Bond issuers

- Utilities Green Bonds are trading in line with the issuer's senior curves
- Interestingly, TENN is using Green Bonds as its major funding source to extend its maturity profile beyond seven years
- EDF issued the first-ever benchmark corporate Green Bond in 2013. Its latest Green Bond, denominated in USD, is mostly intended for the construction of wind projects in the US. With an issue size of USD 1.25bn, it marks the largest USD corporate Green Bond

Source: iBoxx as of 20 September 2016, UniCredit Research
Several banks in Europe have issued or plan to issue Green Bonds as senior debt, more recently Rabobank and Berlin Hyp

Financials Green Bonds are trading mostly in line (INTNED; ABNAV) to slightly inside (SOCGEN) the curves of outstanding seniors

Financials investors prefer Green Bonds due to their additional benefits (i.e. issuers provide a more detailed use of the proceeds)
### Your contacts

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Corporate & Investment Banking
UniCredit Bank AG, Munich
as of 22 September 2016
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