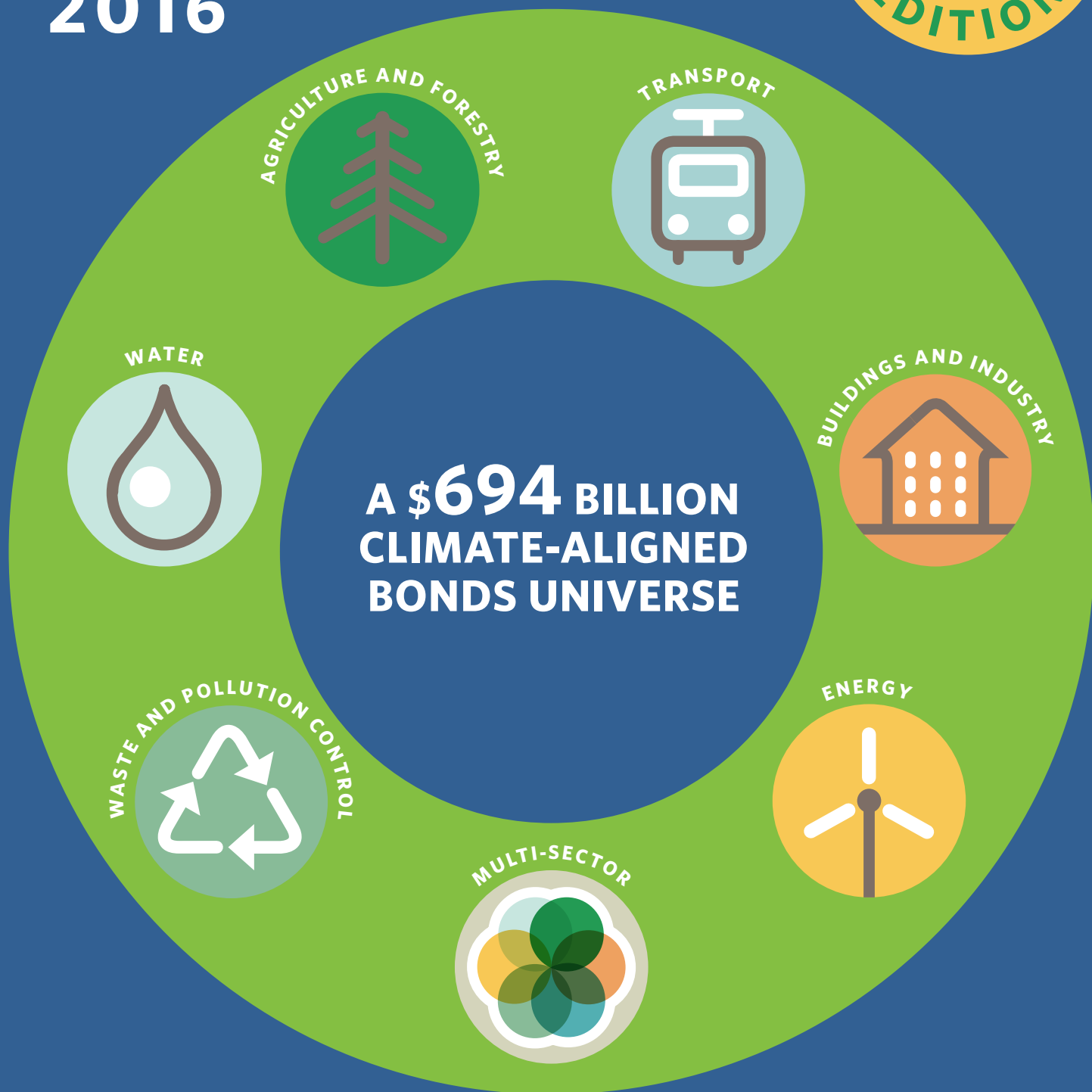


BONDS AND CLIMATE CHANGE

THE STATE OF THE MARKET IN 2016



Climate Bonds INITIATIVE

HSBC

SITAWI
FINANÇAS do BEM

Prepared by Climate Bonds Initiative.

Commissioned by HSBC.

Reviewed by SITAWI

A \$694bn Climate-Aligned Bond Universe

Our research estimates that there are \$694bn of climate-aligned bonds outstanding, an increase of \$96bn on last year's report.

This is our 5th annual State of the Market report. The report, commissioned by HSBC, discovers and quantifies bonds that are being used to finance low carbon and climate-resilient infrastructure: climate-aligned bonds. This includes labelled green bonds with use of proceeds defined and labelled as green, as well as a larger universe of bonds financing climate-aligned assets that do not carry a green label. Together, these make up our 'climate-aligned' bond universe.

The \$694bn is made up of approximately 3,590 bonds from 780 issuers across our climate themes: Transport, Energy, Buildings & Industry, Water, Waste & Pollution Control and Agriculture & Forestry. It includes \$118bn of labelled green bonds.

The \$96bn increase on last year is from:

- \$94bn new bonds from existing issuers
- Plus: \$85bn from new issuers
- Minus: \$83bn matured bonds and issuers that have dropped out

Methodology

To find unlabelled bonds, we screened Bloomberg issuer data and reviewed over 1,700 issuers to identify those with over 95% of revenue derived from climate-aligned assets; thus all of our unlabelled issuers are pureplay companies. We included all bonds from these issuers issued after 1 Jan 2005, the year the Kyoto Protocol was ratified, and before 31 May 2016.

Our screening criteria are based on work undertaken through the Climate Bonds Standard. Our screening process is not always able to apply the full Criteria due to insufficient granularity of information.

The Criteria are continually expanding to include new sectors and updated based on emerging research. This evolution means that some issuers drop out and others fall into the database. We have also updated our research process to improve the data in our climate-aligned universe.

What's new?

This year we carried out more detailed research in three areas:

- 1. US municipal bond market:** we searched through 1,000 individual bond prospectuses from the past two years to catalogue climate-aligned US municipal bonds (page 16).
- 2. Chinese unlabelled green bond market:** we checked our data against data shared by the China Energy Conservation & Environmental Protection (CECEP) and China Central Depository & Clearing Co. (CCDC) (page 17).
- 3. Water utilities:** we looked to see which water bonds could meet the Climate Bonds Water Criteria (page 10).

\$694 billion is the beginning-labelling is key to growth

While the \$694bn provides a good picture of current climate-aligned investment in the bond market, even this does not show the full potential for future labelled green bond growth. Labelled green bonds are primarily issued by non-pureplay companies whereas the 83% of the climate-aligned universe that is unlabelled comes from pureplay issuers only. The labelling of green bonds is therefore essential to shift fixed income investment towards climate change solutions.

Institutional investors play a crucial role

At the 2015 COP21 in Paris, 188 Parties presented their national plans to try to keep global temperature rise this century below 2 degrees Celsius.

These plans will require a mix of public and private sector capital - especially the \$100tn institutional investor sector. Fortunately, at the same COP, institutional investors representing \$11.2tn undertook to work to grow a green bonds market³; and the insurance industry re-iterated its commitment to increasing by 2020 by a factor of 10 its climate smart investments. The Bank of England's Prudential Regulation Authority has also recommended green bonds as a climate-related investment opportunity for UK insurance firms⁴. Finally, there is growing interest in climate-aligned investment from PRI signatories (1,525 to date, with \$60tn under management) and from other investor groups.

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Climate opportunity

While a \$694bn universe is encouraging, it is small in the context of what is required to remain within a 2-degree scenario. According to the International Energy Agency (IEA), cumulative investment of \$53tn is required by 2035 in the energy sector alone while New Climate Economy estimates that \$93tn of investment is required across the whole economy by 2030¹.

To put this in context, the global bond market currently stands at approximately \$90tn². The bond market is therefore an essential tool to finance the transition to a low-carbon economy. The growing green bond market will continue to be an important part of this transition but it is not the whole picture - there are a range of unlabelled climate investment opportunities in the bond market which are captured in this report.

Notes:

- The total 'climate-aligned bond universe' includes both labelled green bonds and unlabelled bonds.
- \$ refers to USD unless otherwise stated.
- YTD = year-to-date

1. <http://2014.newclimateeconomyreport/finance/>
2. http://www.bis.org/publ/qtrpdf/r_qt1606_charts.pdf
3. http://www.climatebonds.net/files/files/Paris_Investor_Statement_9Dec15.pdf
4. <http://www.bankofengland.co.uk/pru/Documents/supervision/activities/pradefra0915.pdf>

Labelled green bonds account for 17% of our climate-aligned bond universe

\$118bn

LABELLED GREEN BONDS

\$576bn

UNLABELLED CLIMATE-ALIGNED BONDS

Key Takeaways

- The climate-aligned bond market amounts to \$694bn outstanding
- Labelled green bond market stands at \$118bn outstanding (17% of total)
- \$576bn outstanding is currently not labelled as green but is climate-aligned
- At 67%, low-carbon transport is the dominant theme
- It's a long dated market: 70% of bonds have tenors of 10 years or more

Overview of the Climate-Aligned Bond Universe

The \$694bn climate-aligned universe is made up of six climate themes that will enable a transition to a low carbon and climate-resilient economy.

Transport is the largest theme in the universe, making up 67% of all bonds outstanding (more on page 8). Energy is the second largest, accounting for 19% of the amount outstanding.

Between them, Water, Buildings & Industry, Waste & Pollution Control and Agriculture & Forestry make up 6% of the universe.

The 'multi-sector' theme, which accounts for 8% of the universe, is made up entirely of labelled green bonds that each finance a range of projects and assets across the six themes and can therefore not be allocated to a single theme.

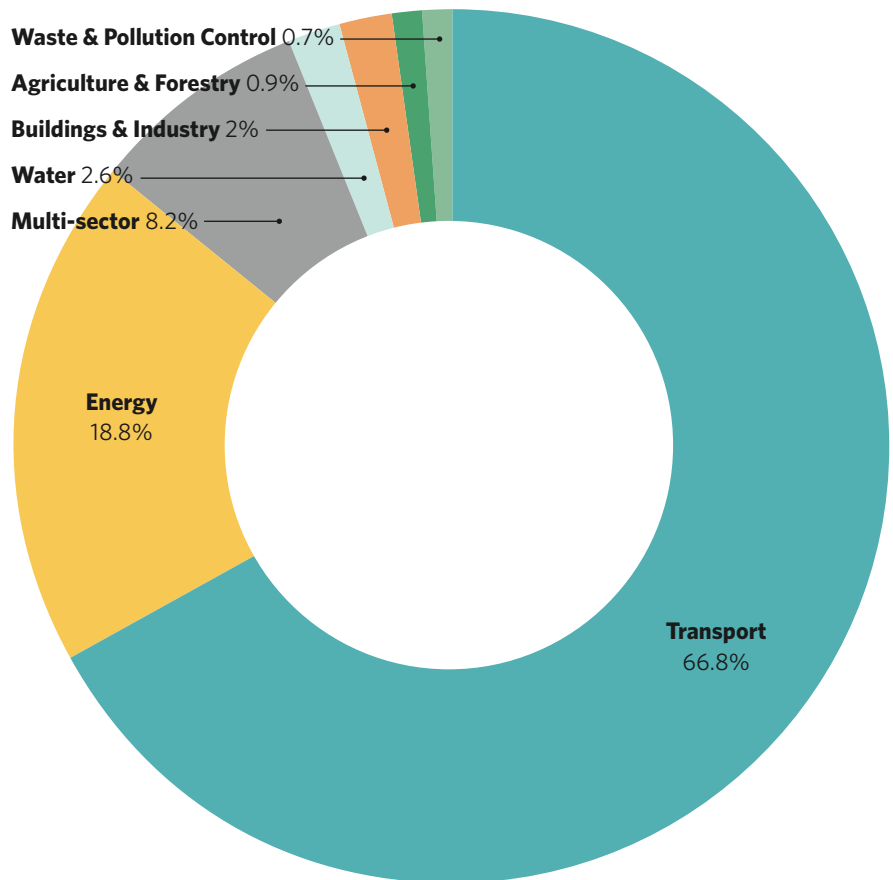
Scaling up investment

In order to remain within a 2-degree world, bonds will be an essential tool in scaling up investment across all themes. But it's important to note that bonds have been utilised more in some sectors than in others. This is based on the maturity of the technology and the suitability of assets to bond financing. Rail assets, for example have been financed using bonds for decades (hence their large presence in our data), while relatively few bonds are issued by companies within the agriculture and forestry sector. As renewable energy technologies mature, we expect to see more bonds from the Energy theme.

78% of the climate-aligned universe is investment grade

Investment grade issuance is classified as BBB- or higher. The largest ratings band is AA, which makes up 37% of the bonds outstanding and includes large rail entities such as China Railway Corp, the UK's Network Rail and French state-owned rail company SNCF. This is different to the labelled green bonds market (see page 6-7) where 43% of issuance falls within the AAA rating category.

Transport and Energy are the largest climate themes



The transport theme accounts for 70% of the investment grade segment of the universe - just above its overall proportion of the universe. Energy accounts for 15% of investment grade bonds, slightly under its overall proportion of the climate-aligned universe. 85% of the multi-sector theme is investment grade with the remaining 15% unrated.

The high-yield (BBB- or lower) segment is currently small making up less than 6% of the universe.

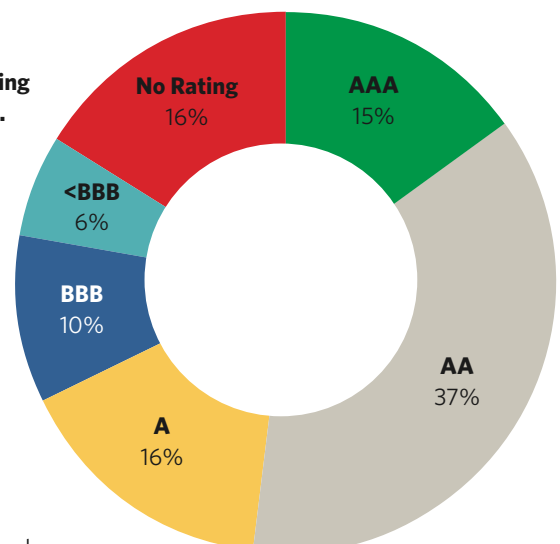
As a comparison - high-yield bonds made up approximately 21% of issuance in the US corporate bond market in 2015⁵.

The average coupon within the high-yield segment of the climate-aligned bond market was 6.9%, whilst in the investment grade segment, the average coupon was approximately 3.7%.

16% of outstanding climate-aligned bonds do not have a rating.

Some of these are from small issuers which, if rated, would likely be sub-investment grade while others, such as the USA's Overseas Private Investment Corp, would likely fall into a high rating band.

78% of the universe is investment grade



5. <http://www.sifma.org/research/statistics.aspx>

There is a broad spread of currencies

35% of bonds are denominated in Chinese RMB, the vast majority of which are onshore bonds. Less than \$0.5bn of the \$239bn outstanding were 'dim sum' bonds; i.e. RMB bonds issued offshore.

Chinese-based issuers also issued approximately \$2bn in USD-denominated bonds on offshore exchanges.

The majority of issuance is from government entities

As in previous years, over 60% of bonds outstanding was issued by a government entity - local governments, multilateral development banks, agencies or state-owned entities. This group of issuers includes the largest issuer in the universe- China Railway Corp as well as Network Rail, the EIB, EUROFIMA and the New York Metropolitan Transportation Authority.

The majority have tenors longer than 10 years

Approximately 70% of bonds in the climate-aligned universe have tenors of 10 years or greater. This is in contrast to the labelled green bond market where 50% have tenors between 5-10 years (page 6).

In the climate-aligned universe, ratings bands are fairly consistent across each tenor range although AA bonds make up the majority of bonds with tenors greater than 10 years.

The majority of bonds are larger than \$100m

Over 68% of bonds issued are between \$100m and \$500m in size. The average bond size within the unlabelled climate-aligned universe was \$196m. Over 44% of the bonds issued were greater than \$200m in size, indicating plenty of benchmark size investment opportunities available to investors.

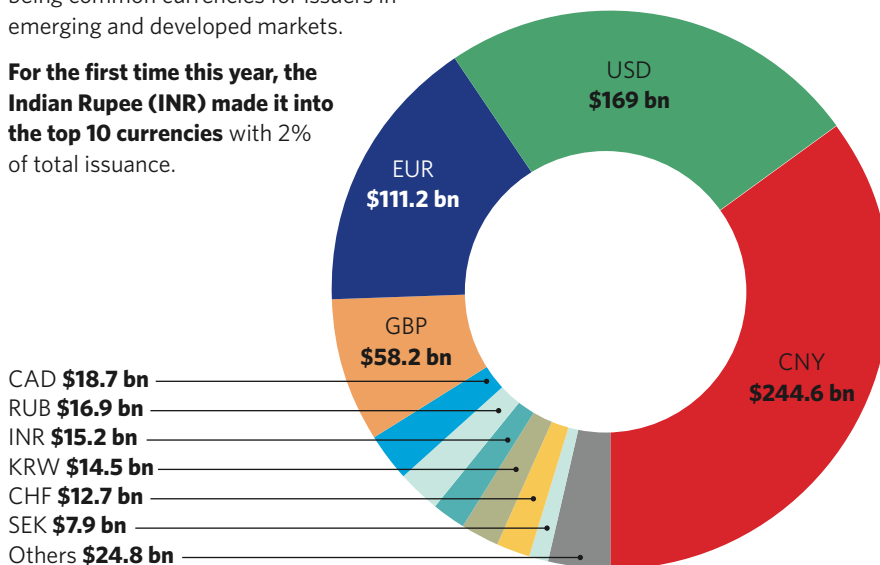
Bond size thresholds for indices vary between index types and currencies. Typically, thresholds are around \$200m.

In general, bonds within the transport theme tended to be the largest, with an average issuance size of over \$400m while the average bond in the energy theme is \$135m.

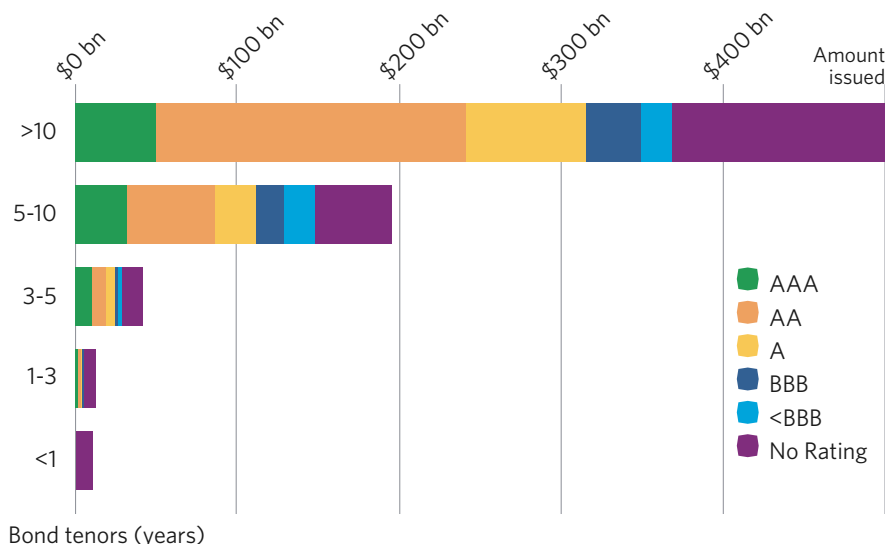
The other two largest currencies are USD (23%) and EUR (16%), both being common currencies for issuers in emerging and developed markets.

For the first time this year, the Indian Rupee (INR) made it into the top 10 currencies with 2% of total issuance.

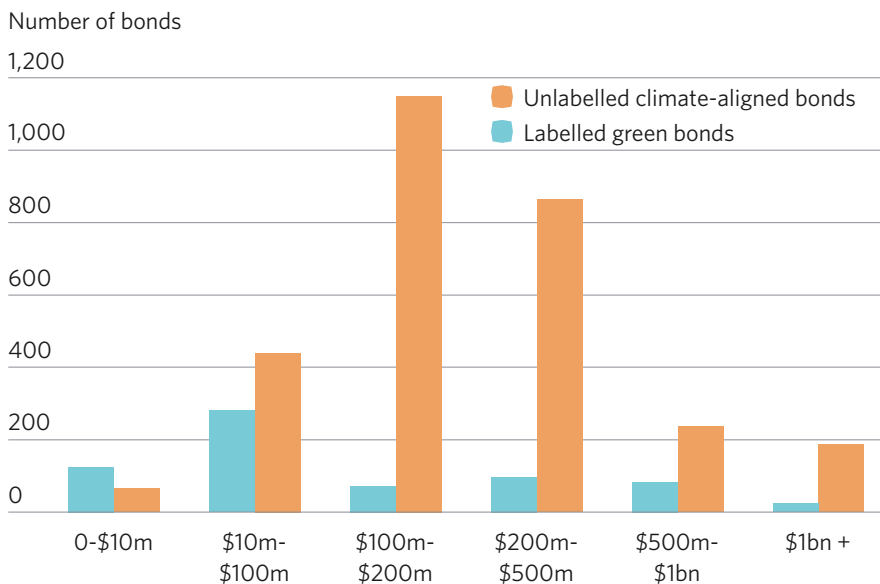
The universe is made up of a broad range of currencies



The majority of bonds have tenors of 10 years or more



The majority of climate-aligned bonds are between \$100m and \$500m in size



Labelled Green Bond Issuance is Growing

The labelled green bond market continues to grow year-on-year and currently amounts to over \$118bn outstanding.

Labelled green bonds are bonds with use of proceeds earmarked to finance new and existing projects with environmental benefits. **Green bonds make up 17% of our \$694bn climate-aligned universe**, up from 11% in our 2015 report*.

A green bond label is a signalling or discovery mechanism for investors. It enables the identification of climate-aligned investments with limited resources for due diligence. By doing so, a green bond label reduces friction in the market, thereby facilitating growth in climate-aligned investments.

Green bond indices have also greatly contributed to reducing friction by giving investors a means to evaluate performance and assess risk. Labelled Green Bond Indices include: S&P Dow Jones, Solactive, Barclays MSCI and Bank of America Merrill Lynch.

2015 was another record year for the labelled green bond market, with over \$42bn issued. 2016 is set to reach new heights with over \$28bn issued up to the end of May 2016. We estimate that 2016 issuance could reach \$100bn.

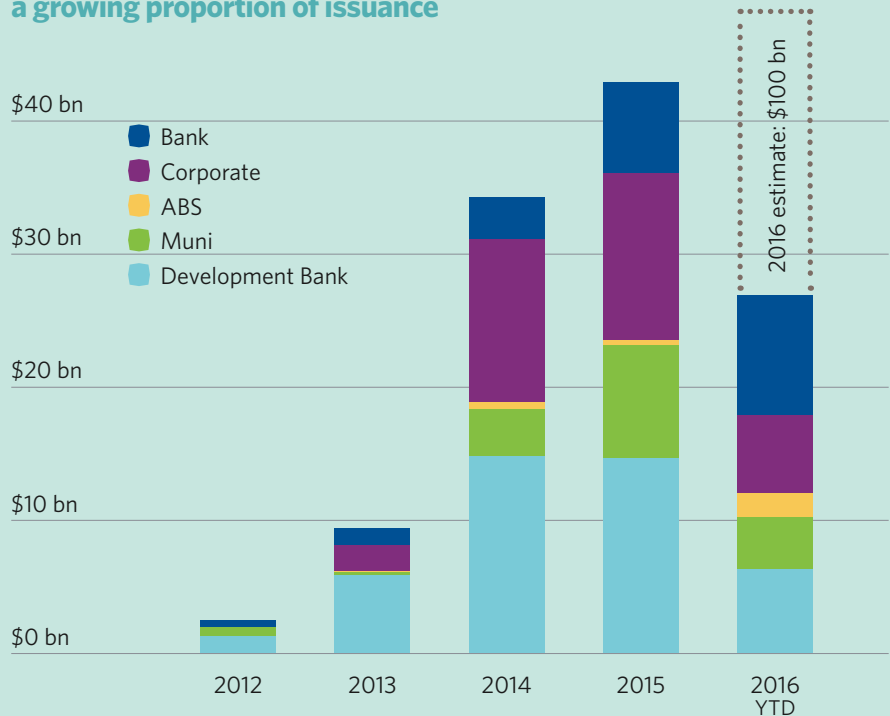
Development bank issuance has increased year-on-year and new issuers have joined the market. While the proportion of development banks as a percentage of the market has decreased since the first corporate green bonds were issued, development banks remain large issuers and are important in meeting demand for AAA-rated bonds.

The European Investment Bank (EIB) has issued the largest amount of green bonds to date (over \$17bn) and was the largest issuer of green bonds in both 2014 and 2015.

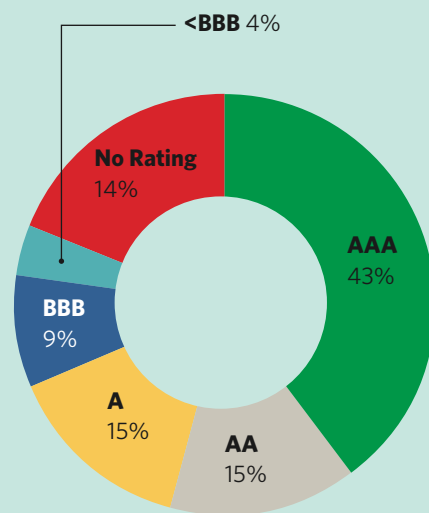
Development banks have also played an important role, more recently, as cornerstone investors for labelled green bonds. For example, KfW has an explicit mandate in Europe while IFC has taken large investments in India's PNB Housing Finance green bonds.

* Note: Labelled green bond figures may differ from other databases due differences in: inclusion criteria, exchange rates and cut-off dates

Corporate and muni bonds make up a growing proportion of issuance



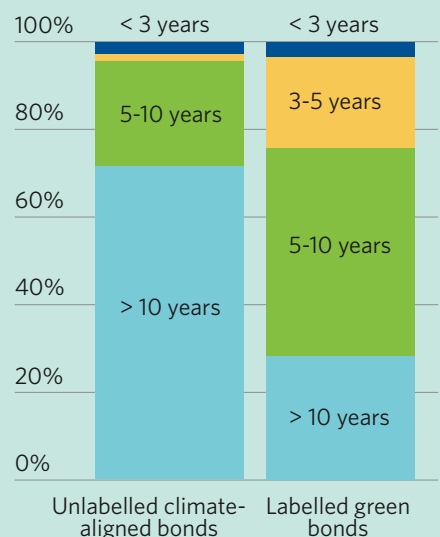
82% of the labelled green bond market is investment grade



Corporate bond and commercial bank bond issuance continues to grow. We expect this trend to continue, with new issuers entering the market each year. Over 45 different corporate and bank issuers issued green bonds in 2015, up from just over 30 in 2013 and fewer than 10 in 2012.

The first municipalities issued green bonds in 2012, but it took until 2014 for labelled green bonds to come from the US muni

Labelled green bond tenors are shorter than unlabelled climate-aligned bonds



market. We have since seen increasing issuance from municipalities and cities both inside and outside of the US and we expect to see more; this is covered in more detail on page 16.

The average tenor of labelled green bonds is between 5-10 years. This is in contrast to unlabelled climate-aligned bonds where long tenors are more common, with 70% having tenors of 10 years or more. This is due to the

dominance within the climate-aligned universe of large state-backed entities in the rail sector where investment horizons are long.

43% of the bonds outstanding fall into the AAA credit ratings band, primarily due to large development banks such as the World Bank, IFC and the EIB.

A broad range of use of proceeds

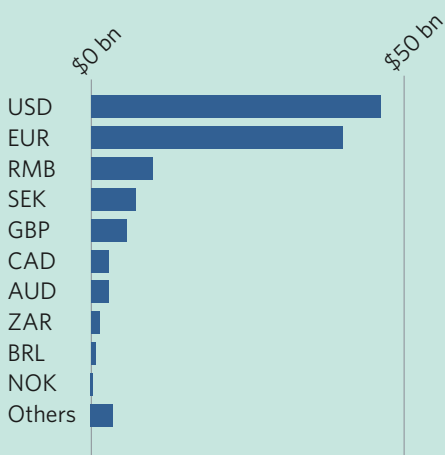
Labelled green bonds are used to finance projects in a range of themes, with Energy and Buildings & Industry being the largest. Multi-sector makes up 49% of the market and comprises bonds with a mixed use of proceeds for a variety of projects. While we do not have project level data for each of the multi-sector bonds, we estimate that the Energy and Buildings & Industry themes make up an equal proportion of their use of proceeds, with 15% each.

Transport is a relatively small theme in the labelled bond market when compared to its large share in the climate-aligned universe as bonds solely for transport projects are a more recent feature of the green bond market. Toyota's 2014 ABS, which financed loans for electric and energy efficient vehicles, was the first green bond solely for transport. Since then we have seen the entry of transit authorities such as Transport for London in 2015 and, in 2016, the large New York Metropolitan Transportation Authority.

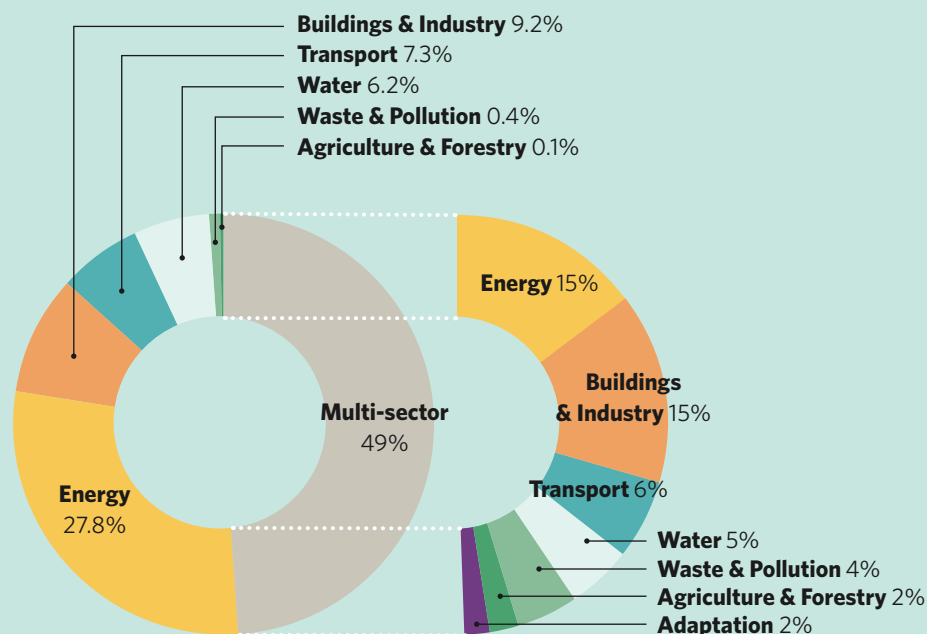
USD and EUR currencies make up over 80% of issuance. This is in contrast to the climate-aligned bond market, where the currency spread is more balanced and includes a greater number of emerging market currencies. There are 25 currencies represented in the labelled green bond market.

We expect to see more RMB issuance as the Chinese government aims to make China the largest source of issuance

USD and EUR denominated bonds make up 80% issuance



The green bond market covers a wide range of sectors



(see page 17). Thus far, 2016 has been a bumper year for Chinese issuers with Shanghai Pudong Development Bank issuing two of the largest green bonds ever (at \$2.3bn and \$3bn), making **China the largest issuing country in 2016 ytd.**

Standards can help to boost the market

The rapid growth in the green bond market over the past 3 years has been met with questions around the environmental claims of these bonds. In the absence of clear and widely accepted definitions around what is green, many investors have raised concerns about 'greenwashing', where bond proceeds are allocated to assets that have little or uncertain environmental value. This can both shake confidence in the market and hamper efforts to finance a transition to a low carbon economy.

The Green Bond Principles (GBP), external reviews or opinions and the Climate Bonds Standard scheme are tools to address greenwashing.

The GBP were launched in 2014 by a group of banks to bring clarity to the processes and transparency associated with green bonds. The four voluntary principles primarily relate to the process of issuance, disclosure and reporting, while the questions of 'what is green' is addressed by third parties.

Bonds that have received an external review make up approximately 60% of the labelled green bond market - this has remained relatively constant year on year.

External reviews play an important role in the market and could be reinforced further with more consistent standards.

The Climate Bonds Standard Board oversees criteria development and certification for the labelled green bond market. It convenes scientists, investors and other specialists in expert committees, to develop criteria for assets and projects that can be financed with green bonds. The benefit of the Standard is that it provides clear, science-based criteria on what is green. The Standard is aligned with the requirements of the GBP.

Throughout this report, we have detailed the current progress of specific Criteria development for the Standard - this can be found in the overview of each theme on pages 8-13.

59% - 66% of green bonds have received an external review





Transport

\$464bn outstanding

1,605 climate-aligned bonds

148 issuers

Largest issuer: China Railway Corp

Rail dominates the transport theme, making up 93% of the overall amount outstanding.

Transport remains the largest theme in the climate-aligned universe. Rail bonds make up the vast majority of issuance but a diverse range of other sectors are also represented.

China Railway Corporation is the largest bond issuer (\$194bn) and has been responsible for the huge expansion of high speed rail in China. China now has more high speed rail than the rest of the world combined, transporting more than 6 million people every day.

The UK's Network Rail is the second largest issuer overall (\$40.3bn) with issuance being buoyed by recent rail infrastructure modernisation. France's national rail company SNCF was another major issuer (\$34bn). American freight rail made up a significant share of rail bonds in our data; Burlington North Santa Fe (\$17.7bn), Union Pacific (\$11.9bn) and Norfolk Southern Corp (7.5bn) were the three largest freight rail bond issuers.

Transportation authorities account for a large source of bond issuance. These are distinct from rail companies as they are government bodies that may provide multiple forms of public transit; such as bus rapid transit or metro. London's TfL is the largest with \$4.8bn outstanding, New York's Metropolitan Transportation Authority (MTA) was also a major issuer (\$3.6bn).

A range of other unconventional transport bonds also exist. The theme contains a number of bonds from smaller issuers which form an interesting constituent of the transport bond market. For example, bicycle manufacturers Ideal Bike and Sun Race Sturmey-Archer or Chaowei which develops batteries for electric bikes.

Climate Bonds Standard

The Criteria for Low-Carbon Transport were finalised in 2016.

They set out which projects are applicable for certification based on whether or not they are compatible with an emissions trajectory that limits global temperature rises to 2 degrees. Applicable assets are:

- Public passenger transport,
- Private light-duty and heavy goods vehicles that are electric, hybrid or alternative fuel,
- Dedicated freight railway lines and supporting infrastructure.

Fossil fuels, in particular coal, form a major part of rail freight. In recognition that coal freight may be required to make railways economically feasible during the transition to a low carbon economy, the Criteria allow up to, but not exceeding, 50% of eligible rail freight and infrastructure to be used to transport coal.

Electric and energy efficient vehicles are a burgeoning source of climate-aligned bonds. Electric car manufacturer Tesla Motors is a major issuer with \$2.9bn issued to fund its electric car business.

Tesla is the only auto manufacturer in our climate-aligned dataset which has not issued a labelled green bond. This is because most auto manufacturers produce a diverse range of vehicles, only a few of which meet our criteria.

Labelled green bonds (\$8.6bn outstanding)

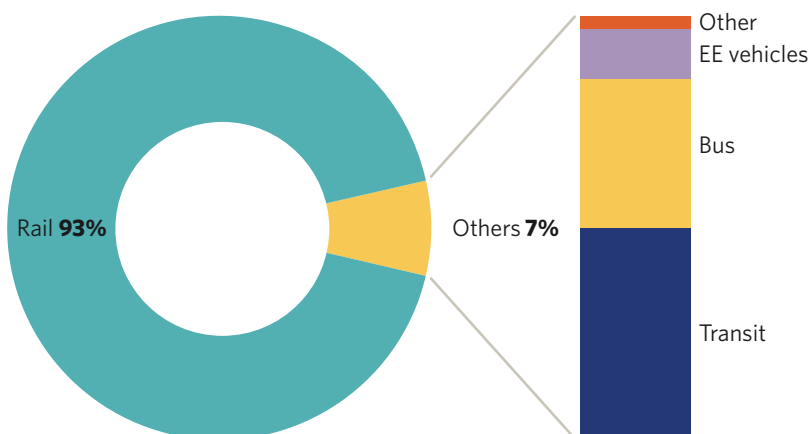
The US municipal market was an area for growth in green transport bonds. Since our last report there have been several large transport-related labelled green bonds. Notably New York MTA issued a \$782m green bond certified under the Climate Bonds Standard in February 2016. The bond finances rail infrastructure in New York City and proved a great success, especially with local retail investors.

Washington State's Puget Sound issued the largest municipal green bond of 2015, which totalled \$943m, for the Seattle regions public transit investments. Puget Sound received a second review from Sustainalytics, a key move in the US muni market where second reviews are not a common feature.

Auto manufacturers are a small but growing area for labelled green bonds. Toyota came to market with a green ABS to finance leases and loans for new low carbon vehicles in 2014 and have issued two labelled green bonds since then. In 2016, Hyundai issued a \$500m green bond for hybrid and electric vehicles, while Chinese car manufacturer Geely issued a green bond for the manufacture of hybrid London taxis.

Currently, some vehicles included in labelled green bonds issued by auto manufacturers would not be eligible under the Climate Bonds Standard but have been included in the report as they represent current best practice within the sector.

Rail makes up 93% of the transport theme





Energy

\$130bn outstanding

1,120 climate-aligned bonds

400 issuers

Largest issuer: Hydro-Québec

With global energy demand rising, energy is at the forefront of the transition to a low-carbon and climate-resilient economy. Energy is the second largest theme in the climate-aligned universe, with \$130bn outstanding.

This theme is made up of a diverse range of renewable energy assets. While bonds have been used to finance mature technologies such as hydropower for decades, there is increasing issuance for newer technologies.

Wind and solar specific bonds make up 29% of the theme; they also contributed to the 'mixed renewable energy' segment.

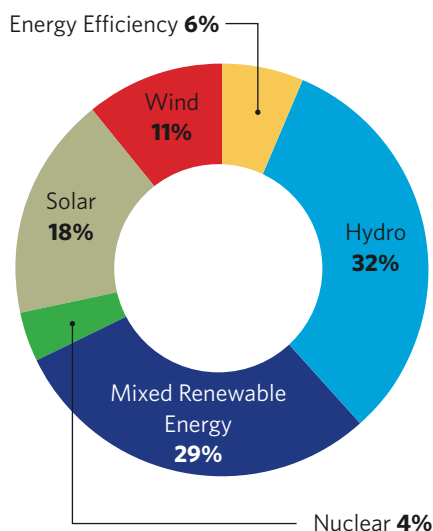
The solar sector is dominated by large solar pureplays: such as SolarCity, SunPower and SolarWorld. Also included are large project bonds issued by Solar Star (\$1.3bn) and Topaz Solar (\$1bn). SolarCity is the largest solar issuer in our dataset and is also a labelled green bond issuer. It is the largest solar rooftop contractor in the US, selling about one third of total residential solar installations.

Conventional energy companies are also developing renewable assets through bond financing. For example, our largest wind issuer is Huaneng Renewables (a subsidiary of Huaneng Group), one of the largest coal-based electric utility enterprises in China. Voltalia Energia issued one of the few recent project bonds; a \$122m BRL-denominated bond in March 2016. This 19 year bond finances a wind development in Sao Miguel do Gostoso, Brazil. It comprises four wind farms totalling an installed capacity of 108 MW.

It should be noted that nuclear has been included in our data (4% of outstanding climate-aligned energy bonds), due to its potential fit within a low-carbon economy. However, we recognise there are controversies associated with this technology.

Hydropower makes up 32% of this theme. Large hydropower plants are controversial due to the methane leakage that can take place when areas are flooded to create reservoirs. These type of emissions seem to be particularly high in tropical zones, and for this reason, we have excluded hydropower projects with reservoirs in these areas from our dataset. Inclusion in future reports will depend on the outcome of ongoing discussions as part of the development of the Hydropower Criteria of the Climate Bonds Standard (see box).

Solar and wind account for approx. 30% of the energy theme



60% of the Energy theme is investment grade. A large amount of bonds (32%) fall into the A ratings category, due in part to large hydropower companies such as Hydro-Québec. Within the 'mixed renewable energy' segment, a third of outstanding bonds have received an AAA rating. Within the hydropower sector, 88% of bonds are issued by sovereign entities. This is in contrast to the solar and wind sub-categories, where it's only 8%.

36% of outstanding solar bonds and 60% of wind bonds have a tenor of 10 years or more. 70% of issuance was in USD (\$41.8bn), RMB (\$23.3bn) and EUR (\$23.2bn), with bonds being issued in 21 different currencies.

Climate Bonds Standard

Criteria for wind, solar and geothermal have been released and are available for Climate Bond Certification.

Other criteria in this theme are currently in development, including:

Bioenergy: Draft Criteria have received public comments; these are being reviewed prior to submission to the Standards Board for approval.

Marine Energy: Work commenced April 2016 and includes wave and tidal power.

Hydropower: Work commenced under the Water Criteria development process and is currently being developed further to capture hydro-specific factors.

Labelled green bonds (\$33bn outstanding)

The majority of labelled green bonds have been linked to renewable energy projects. The green bond market first developed with renewable energy and energy efficiency projects and they remain well understood in the investor community. German development bank KfW is one the largest green bond issuers in the energy theme, with over \$8bn issued for renewable energy projects.

There are a range of issuer types in this theme, including energy utilities, banks with energy assets on their loan books and asset backed issuances. Some of the early issuers (such as EDF), have returned to the green market after the success of their initial green issuance.

In 2016, the Asian Development Bank facilitated the issuance of the first green bond from the Philippines. This took the form of a 75% guarantee for a \$225.7m green bond from AP Renewables. The use of proceeds financed geothermal projects and received Climate Bonds Certification.



Water

\$18bn outstanding

153 climate-aligned bonds

84 issuers

Largest issuer: Anglian Water

Water-related assets make up a significant share of the capital investments in both developed and emerging economies.

As the global climate changes, drought, floods and other extreme weather conditions are likely to increase in frequency and severity, putting pressure on water utilities. Water infrastructure that is able to cope with more extreme and unpredictable weather patterns is an important investment for the future.

Despite their importance, identifying climate-aligned water bonds remains challenging, thus they account for a small proportion of the climate-aligned universe. We do not consider water bonds to be 'green by default'. To be included, infrastructure needs to be climate-resilient. This requires thorough disclosure; a feature that is not yet common across water utilities and

authorities.

Bonds have been split up into a number of subsectors. Water treatment focussed on bonds used to fund waste and drinking water upgrades, which are particularly popular in the municipal bond market.

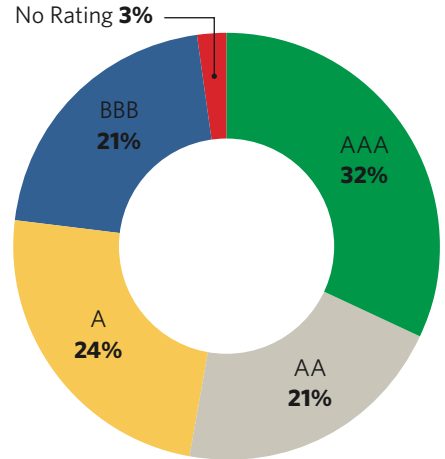
Flood protection included investment in levees, storm sewers, sea walls and other flood defences. Bonds from Dutch bank Nederlandse Waterschapsbank were put in this subsector as its bonds were partly used to fund a scheme set up by the Dutch government to upgrade water management and flood protection in anticipation of future climate shifts.

The smallest subsector was conservation and restoration focussing on the restoration of natural water and the conservation of water supply. For example, Cadiz issued a water recovery and storage project in the Southern Californian desert.

More general water authority adaptation upgrades were included under the umbrella of climate resilience.

UK-based Anglian and Severn Trent Water Authorities' bonds were included in the theme for their efforts to implement detailed and extensive climate adaptation plans. We researched a large number of water authorities, but most did not provide enough specific disclosure on climate adaptation to be included. However, we note that they are potentially making investments that would qualify if disclosed.

Climate-aligned water bonds tend to be low risk, investment grade bonds



Labelled green bonds (\$7.4bn outstanding)

There have been several labelled green water bonds out of the US. An early issuer was DC Water, who came to market with a second review from Vigeo and have subsequently returned to the market in 2015 with a \$100m issuance.

Many labelled green water bonds have been issued by state level water authorities in the US - though no other have a second review.

Authorities with green bonds include Massachusetts Clean Water, Indiana, New York, St Pauls, Connecticut and New Jersey. The common concern with the labelled US municipal green bonds is the low levels of disclosure on climate resilience in the water authorities' overall investment plan. If this disclosure is missing and there is no review from an independent party, it is difficult to determine how aligned these green bonds are.

One bond which stands out in this regard is the 2016 San Francisco Public Utilities Commission's \$240m green bond for water. It was certified under the Climate Bonds Standard. Recent droughts have put water issues at the top of the agenda in California and certified green water bonds are part of the financing solution.

Climate Bonds Standard

This year sees the development of the new Water Climate Bonds Criteria

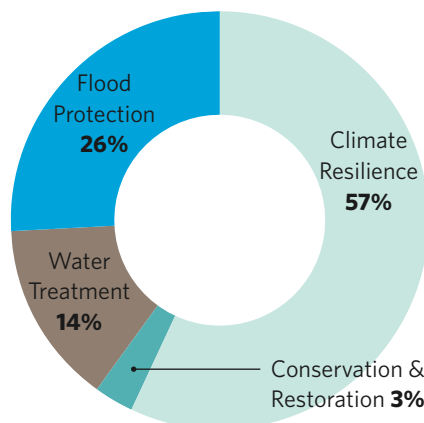
which provide a clear definition of which investments are consistent with improving the climate resilience of water assets. These criteria will help bond investors quickly determine the environmental credentials of water-related bonds.

In a nutshell, the Water Criteria encompass investments in engineered water infrastructure for water collection, treatment and distribution.

Investment can be certified under the Climate Bond Standard if they:

- Deliver greenhouse gas mitigation
- Promote adaptation to climate change
- Facilitate increased climate resilience in the social, economic and environmental systems that underpin and are affected by water assets

Use of proceeds





Buildings & Industry

\$14bn outstanding

113 climate-aligned bonds
66 issuers
Largest issuer: Unibail-Rodamco

The Buildings & Industry theme chiefly comprises bonds used to fund low-carbon buildings (LCB).

The Buildings & Industry theme captures bonds financing improvements in energy efficiency in buildings or products.

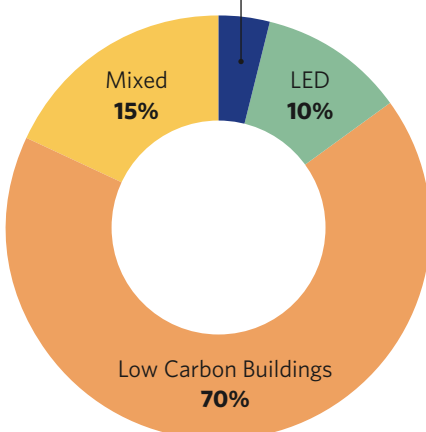
67% of bonds in this theme are linked to LCB, 79% of which are labelled green bonds (see box). The largest issuer in this theme was Unibail-Rodamco, Europe's largest listed real-estate company (all issuance was labelled green bonds). The French property developer Société Foncière Lyonnaise, which has 100% of its property portfolio BREEAM-certified, was the second largest issuer.

To identify unlabelled green bonds linked to green buildings, we used LEED & BREEAM certification schemes as key criteria. We also included REITS (Real Estate Investment Trusts) and companies with more than 95% of their revenue generating assets certified at BREEAM Good or above or at LEED Gold or above. In our analysis, nearly half of the outstanding LCB bonds have tenors of 5 years or more.

While the theme also includes manufacturers of products and technologies that improve energy efficiency (LED lighting, insulation etc.), such bonds remain difficult to capture in our methodology as

70% of the theme is represented by LCB

Energy Efficiency 5%



products tend to be made by diversified manufacturers whose range of products make them ineligible for inclusion. The few that are included are manufacturers of LED lighting such as Acuity Brands Lighting and Everlight Electronics.

Due to a tightening of our criteria this year, the size of the theme has decreased by around \$8bn. The majority of this is due to LG Electronics dropping out; it was included in previous reports for its high percentage of products that met Energy Star ratings in comparison with its peers. LG Electronics and others were not included in the universe as energy efficient products have become more standard in the consumer markets and best practice is no longer easy to identify. This could be a future area of work.

We also hope that future reports will include bonds linked to industrial energy efficiency - this will be driven by the work of the Climate Bonds Standard.

Climate Bonds Standard

The Climate Bonds Criteria for LCB were released in 2015 and focus on the energy efficiency upgrades of commercial and residential buildings, as well as efficiency upgrades.

Assets are eligible if their energy efficiency is in the top 15% of comparable buildings in the same city, or if the investment would lead to very significant increases in energy efficiency. To expand the roll-out of certified bonds, we are working with partners to establish these 15% thresholds for each city.

However, determining the energy efficiency of buildings remains challenging, due to data availability. For this reason, the Criteria also allow for certification of buildings assets that meet approved building codes. These serve as proxies for this 15% threshold and include BREEAM and LEED.

Industrial Energy Efficiency out soon

A Technical Working Group to develop Climate Bonds Criteria for industrial energy efficiency will be launched in summer 2016.

Labelled green bonds (\$11bn outstanding)

79% of bonds in this theme are labelled green bonds, the majority of which are financing LCB.

Vasakronan issued the first corporate bond linked solely to LCB in 2013. They have continued to issue green bonds as others have joined the market, including Unibail-Rodamco (and its subsidiary Rodamco Sverige) which is the largest issuer to date with \$1.8bn currently outstanding.

Australia's ANZ Bank was the first to issue a bond certified using the Climate Bonds LCB Criteria in May 2015. A number of others have followed including ABN AMRO (Netherlands), Axis Bank (India), Westpac (Australia) and Obvion (Netherlands).

It is not just corporates that are issuing green bonds. US munis have more recently entered the market with bonds to improve the energy efficiency of academic institutions such as Massachusetts Institute of Technology and University of Texas.

The \$11bn of labelled green bonds represented in this theme does not capture multi-sector bonds with an energy efficiency component to them. Over 94% of bonds in the Multi-sector theme (see page 12) have an energy efficiency or LCB component to them, although it is hard to estimate what is actually allocated on such projects. This includes World Bank green bonds where Buildings & Industry projects include an energy efficient light bulb exchange scheme in Mexico and energy efficiency programs in paper, cement and manufacturing industries in China.

We expect to see more bonds issued to finance industrial efficiency projects once Criteria on such projects become clearer. The Climate Bonds Initiative's Criteria development should help to clarify issues and boost issuance.



Waste & Pollution Control

\$4.8bn outstanding

58 climate-aligned bonds

27 issuers

Largest issuer: Covanta

The Waste & Pollution Control theme captures bonds linked to recycling, resource recovery and waste to energy (WTE).

It is the smallest theme in this year's report. This is partly due to how we split the themes up, with, for example, wastewater treatment going into the water theme. It is also because large bond issuers linked to waste disposal make use of a diverse range of waste disposal methods (including landfill without gas capture) which are excluded in our criteria.

36% of the outstanding issuances are linked to WTE projects. These projects

Climate Bond Standard

There are currently no clear inclusion areas for waste and pollution assets in any other recognised green bond guidelines. This makes it more challenging for issuers and investors. However, development of Climate Bonds Standard Criteria for waste management assets and projects is scheduled to begin in summer 2016.

have varying reputations in different markets. In Europe, where projects tend to be newer, they are seen as 'green' whereas in the US, projects are older and are often seen as dirty. This makes it difficult to develop inclusion criteria for this report, as the age of the plant and the technology used is key to determining its environmental credentials; this information is often not available.

We have, however, included all WTE-linked bonds we found as our cut-off date is 2005. It is likely that bonds being issued after this date will be linked to newer technologies. **In our analysis, nearly half of the outstanding WTE bonds have tenors of 10 years or more.**

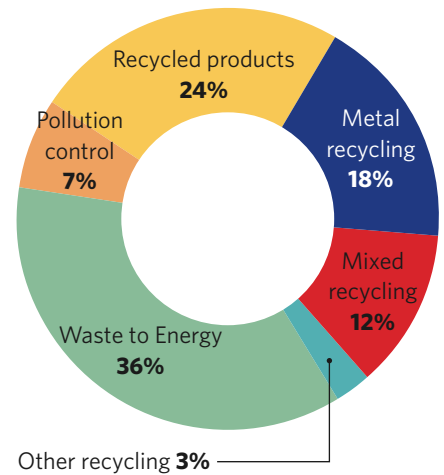
The other main use of proceeds is for pure-play recycling companies dealing with metal, paper or products. Issuers include Canadian company Cascades which manages recyclable material and manufactures recycled packaging.

After a careful analysis of last year's database, Klabin, the Brazilian paper manufacturer and recycling company dropped out as it had less than 95% of its revenue climate-aligned. In the future, we will look for progress on the increase of its renewable energy assets, on the recycled content percentage and on its disclosure.

Labelled green bonds (\$0.5bn outstanding)

There are two labelled green bonds in this theme: French waste management company Paprec issued a \$500m green bond in 2015 to finance its recycling plants while US municipality Ramsey County issued a \$17m bond for WTE facilities.

More than a third of the use of proceeds in this theme are linked to WTE projects, while another third are linked to recycling



Multi-sector

\$57bn outstanding

390 labelled climate-aligned bonds

60 issuers

Largest issuer: EIB

This sector is comprised entirely of labelled green bonds with mixed use of proceeds.

The theme includes all the multilateral development banks, such as the European Investment Bank (EIB), World Bank and IFC, whose green bonds finance a range of projects across our themes. The EIB is the largest issuer in the theme and the largest issuer of labelled green bonds to date with over \$15bn currently outstanding.

The multi-sector theme also includes bonds issued by corporations and municipalities with mixed use of proceeds. This includes bonds issued by banks to finance a range of renewable energy and energy efficiency projects as well as bonds issued by cities and municipalities to finance transport and energy infrastructure.

Exact allocation of proceeds is hard to estimate as data is not available. However, **over 90% (by number) of all bonds issued have either renewable energy, energy efficiency or both**

defined as eligible projects while 60% of bonds have defined Agriculture & Forestry projects as eligible. The proportion actually allocated to smaller themes such as Agriculture & Forestry remains uncertain. For example, World Bank green bonds have agriculture and forestry projects defined as eligible but reporting shows relatively few agriculture and forestry projects compared to others.

Note: No bonds in this theme have been included in other themes; no double counting has taken place.



Agriculture & Forestry

\$6.2bn outstanding

141 climate-aligned bonds

17 issuers

Largest issuer: WestRock

Deforestation and agriculture are one of the largest contributors to greenhouse gas emissions. Stopping deforestation must be a key part of a global emissions reduction plan.

This is currently a small theme, making up less than 1% of the total climate-aligned universe but investment in sustainable land use, forestry and agriculture is critical to remaining within a 2-degree scenario.

It is unclear at the moment what role bonds will play in this sector - bonds are not commonly issued by companies within the agriculture and forestry sector (out of all companies in the agriculture, forestry and farming sectors - fewer than 10% have issued bonds). Of the bonds in our dataset, the vast majority are from paper and pulp companies with FSC-certified forests and chain of custody certification.

Forest Bonds - future or fantasy?

Forest bonds have long been discussed as a potential financing instrument but we have yet to see serious issuance. A core issue is that bonds are usually issued to finance infrastructure that will generate revenue. However in the forestry space, discussions relate to the use of bonds to avoid deforestation, where revenue streams are not obvious.

The Commission on Climate and Tropical Forests estimates that \$30bn p.a⁶ is required to halve deforestation. The challenge remains getting solid cash flows in place to support a bond.

Several new issuers were added to the theme this year, including American paper company WestRock for its fully FSC certified paper products. WestRock was the largest issuer in the theme, followed by the Swedish state-owned forestry company Sveaskog.

Climate Bonds Standard

The Land Use Technical Working Group was convened by the Climate Bonds Initiative in 2014.

It brings together international experts in the agriculture and forestry space to develop robust criteria for sustainably-managed forests, agriculture and other lands.

Phase 1 of the Land Use Criteria has been released for public consultation and is now in the final stages of review prior to submission to the Climate Bonds Standard Board for approval. These Criteria focus on the mitigation opportunities of land use assets and projects.

Phase 2 Criteria are currently under development. These will focus on climate adaptation and resilience impacts of those assets and projects.

6. <http://www.climateforestscommission.org/>

Future Themes

We are constantly improving our discovery tools for this report. Through the Climate Bonds Standard, we intend to expand our Criteria to cover new sectors in the climate-economy. This will ensure we keep up with latest developments in technology and the bond market. As such, there are a number of areas which we hope to be able to include in future reports. These include:



Marine

The Marine Criteria straddle several sectors, including energy (e.g. tidal and wave), transport (marine shipping and transportation) and fisheries (sustainable fisheries). It also covers marine infrastructure such as coastal management against flooding and erosion. Criteria are likely to be developed and finalised by the end of 2016.



Information, Communications & Technology

Though ICT may not seem like a green industry, it has the potential to reduce our GHG emissions significantly. Greater connectivity can negate the necessity for international travel. Also, improved technological processes can facilitate greater efficiency through power management and improved resource and process efficiency.

Though no corporate bonds were found in this sector, a small number of ICT

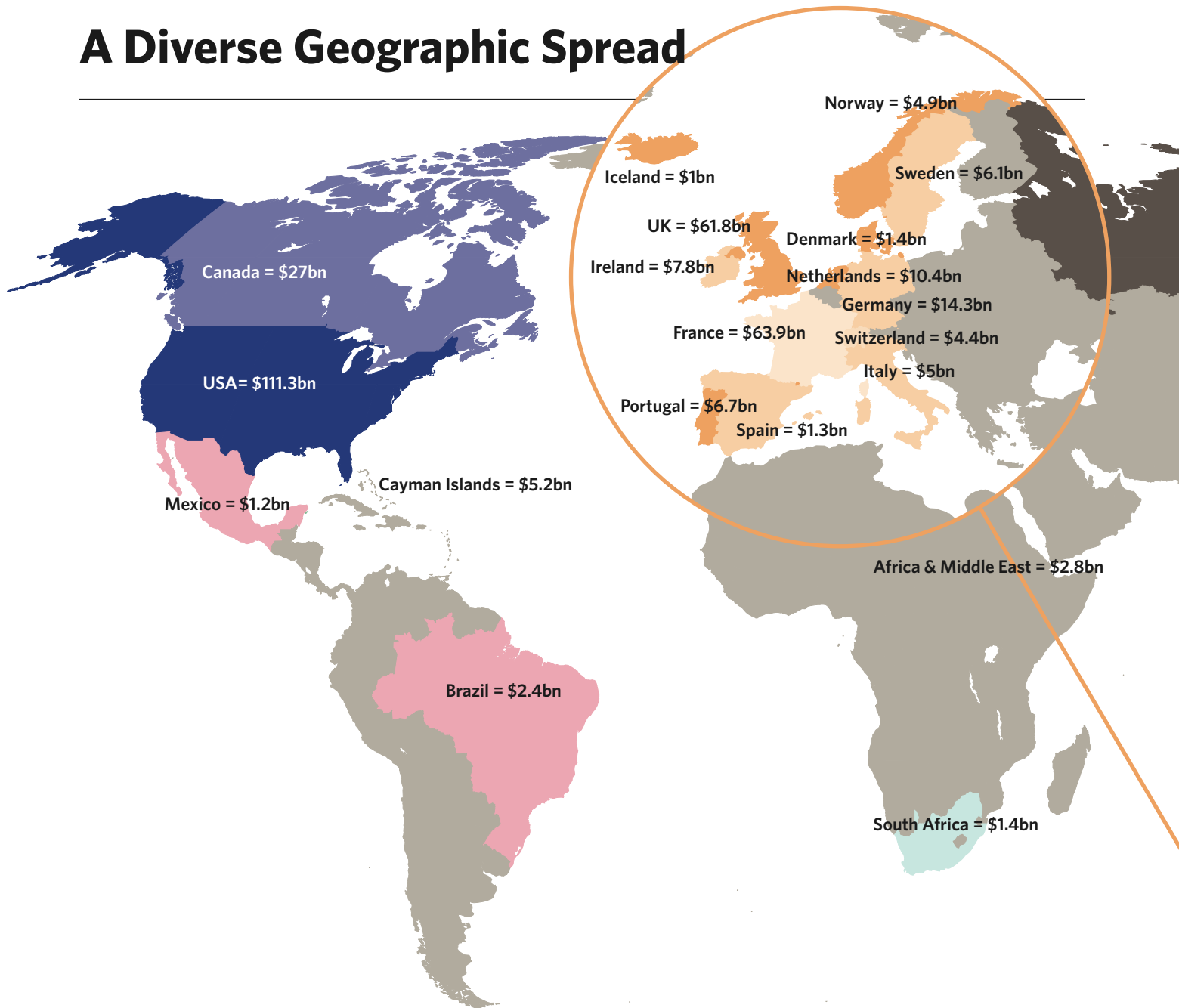
bonds were found when carrying out our research in the US municipal bond market. The bonds had a total value of \$26m and were used to lay fibre optic cables and improve broadband connectivity. Due to lack of standards they were not included in the main data but are a sign of a growing potential of development in this market and the importance of developing standards in this area.



Industrial Energy Efficiency

Climate Bonds Criteria are currently being developed for Industrial Energy Efficiency and will attempt to build criteria for industrial energy efficiency in highly energy intensive industries, such as steel manufacturing and building.

A Diverse Geographic Spread



North America (excluding Mexico)= \$138bn

The USA is the second largest issuer country in our climate-aligned universe, making up 16% the total. Rail issuer Burlington North Santa Fe is the largest issuer from the USA, making up 17% of USA issuance alone. While issuers in the Energy theme tend to be much smaller, they are also more numerous with over 200 separate Energy issuers making up a total of \$28bn. 40% of the entire Water theme is made up of US issuers, primarily muni bonds which have been labelled as green. USA-based issuers continue to drive the **green labelled bond market with the USA being the largest single issuing country to date.**

Energy is the dominant theme for Canadian climate-aligned bonds, primarily due to Hydro-Québec which is the largest issuer in the Energy theme. Ontario became the first Canadian province to issue a labelled green bond in 2014.

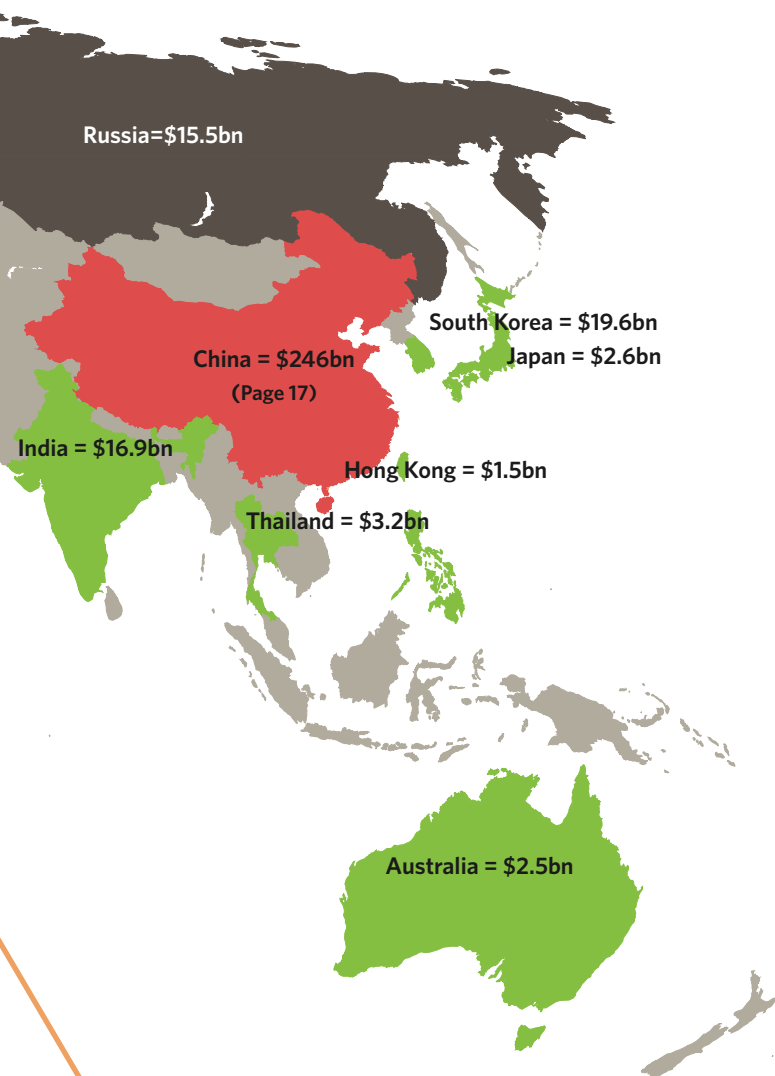
Note: Only countries with issuance of over \$1bn outstanding are represented on the map. The remaining countries are included within regional totals and amount to \$6.1bn in total. Regional development banks are also included within regional totals where appropriate.

Latin America = \$4.4bn

Latin America (including Mexico) remains small in overall numbers, making up less than 1% of the total. The majority of bonds fall into the transport and energy themes with a small proportion of Agriculture & Forestry bonds.

While the numbers are small, there is growing interest in climate finance solutions (including labelled green bonds) in Latin America. The Climate Bonds Initiative is involved in setting up Working Groups in Mexico and Brazil. A focus will be the agriculture and forestry sectors, where a large proportion of global emissions come from.

Labelled green bond issuance from Latin American issuers is small but growing. Recent bonds include a \$500m bond from Costa Rica's Banco Nacional in April 2016. While they have primarily been in the Energy theme, we expect to see future developments in the Agriculture & Forestry as definitions and criteria become clearer.



Western Europe = \$195bn

The UK and France are the largest issuing countries in Western Europe given large rail financing projects

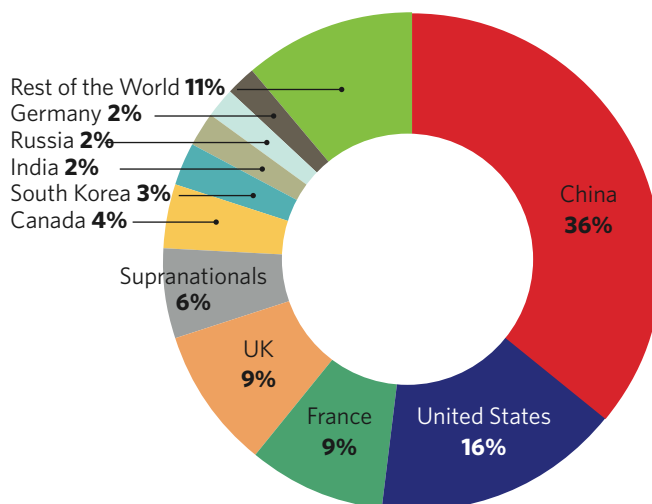
The majority of **UK** issuance has come from Network Rail for rail finance and refinancing. New rail projects in the UK include Cross Rail in London.

Issuance from **France** is dominated by state rail entity SNCF which accounts for 67% of French climate-aligned bonds. French regions have also been pioneers in the muni and city bond space, with the first ever green muni/city bonds issued by French regions in 2012 and the latest from Paris in 2015.

While Transport is the largest theme in the region, **Germany** bucks the trend in Europe with energy bonds accounting for 84% of all German climate-aligned bonds. German issuance makes up 10% of the Energy theme overall, due to large issuers (such as KfW), linked to wind and solar.

Western Europe is the largest region for labelled green bond issuance accounting for over 40%.

Top 10 countries for climate-aligned bonds



Eastern Europe = \$15.7bn

Russia accounts for largest proportion of climate-aligned bonds from Eastern Europe. The majority of these were linked to the Russian Railways who met our criteria of less than 50% of revenue coming from the transportation of fossil fuels.

Remaining Eastern European issuance is small and includes only one unlabelled climate-aligned issuer from Hungarian Enefi Energy. There have been two labelled green bonds out of Eastern Europe thus far: Nelja Energia from Estonia (for renewable energy) and Latvenergo out of Latvia.

Asia Pacific (excluding China) = \$48bn

Excluding China, the Asia region is dominated by India and South Korea

South Korea has almost equal issuance in energy and transport themes with two dominant issuers: Korea Railroad and Korea Hydro & Nuclear. In the labelled green bonds space, Hyundai issued Korea's first corporate green bond linked to energy efficient and electric vehicles in 2016.

India's significant presence in the market is due to large issuers: Indian Railways and National Hydroelectric. Both are currently in our unlabelled climate-aligned universe and until 2015, this was India's only presence in our report. However, changes in Indian policy have led to issuances of labelled green bonds from Hero Wind Energy (2015), Axis Bank (2016), Yes Bank (2016) and others. We expect to see many more in the future.

Australian issuance of unlabelled climate-aligned bonds is small and dominated by rail operator Aurizon. However, Australia has proven to be an active region for labelled bonds certified by the Climate Bonds Initiative with bonds from banks: ANZ Bank (2015), National Australia Bank (2014) and Westpac (2016).

We did not find any unlabelled climate-aligned issuance from the **Philippines**, but note that the first labelled green bond from the Philippines was issued by AP Renewables in 2016. It finances geothermal and hydro power projects.

Spotlight on Brazil: A Key Player in Global Climate Action

Brazil has an abundance of natural resources as well as a growing renewable energy industry.

It is also a key player in global climate change negotiations and with substantial low-carbon investment opportunities, Brazil has shown leadership within Latin America in terms of its COP21 commitments⁷. Green bonds could help in shifting a significant amount of capital towards the investments required to meet these achievements.

Three sectors will be critical to both Brazil's economic growth and its transition to a low-carbon and climate-resilient economy.

1. Agribusiness

As the country with the world's largest area of arable land⁸, Brazil has the opportunity to strengthen its leadership in the global agricultural market and to meet the challenges of rising global consumption, while providing affordable food for its own population.

To grow the agribusiness sector in a way that does not come at the cost of increased emissions will require the country to decrease the carbon footprint of agriculture and land use change⁹, while continuing to learn from its history of widespread deforestation¹⁰.

According to the Brazilian INDC¹¹, the agriculture sector is committed to enhancing the Low Carbon Emission Agriculture Program (ABC), via restoring 15m hectares of degraded pasturelands and improving 5m hectares of integrated cropland-livestock-forestry systems (ICLFS) by 2030.

2. Forestry and paper

Brazil is one of the world's major exporters of pulp and paper products and it is gradually expanding its wood pulp production; partly due to growing demand from Chinese producers of tissue, specialty paper and cardboard¹². This sector also has an important role in fostering carbon storage, helping the country to achieve its INDC targets.

According to the International Council of Forest and Paper Associations (ICFPA), the contribution of the forestry and land use sector represents 20% to 25% of mitigation expected in global INDCs. There is also a large industry effort to ensure the recovery of devastated areas through plantation forests in Brazil. An example is the recovery of the Atlantic Forest: 40,000 hectares recovered in 2015 with an aim to reach a total of 15m hectares by 2050¹³. This industry is also well placed to address climate change as Sustainable Management certifications (such as FSC) become more prevalent - along with the increase of recycled content in manufactured paper products.

The combination of a low-value currency and strong demand can also stimulate more green bonds issuances in this sector.

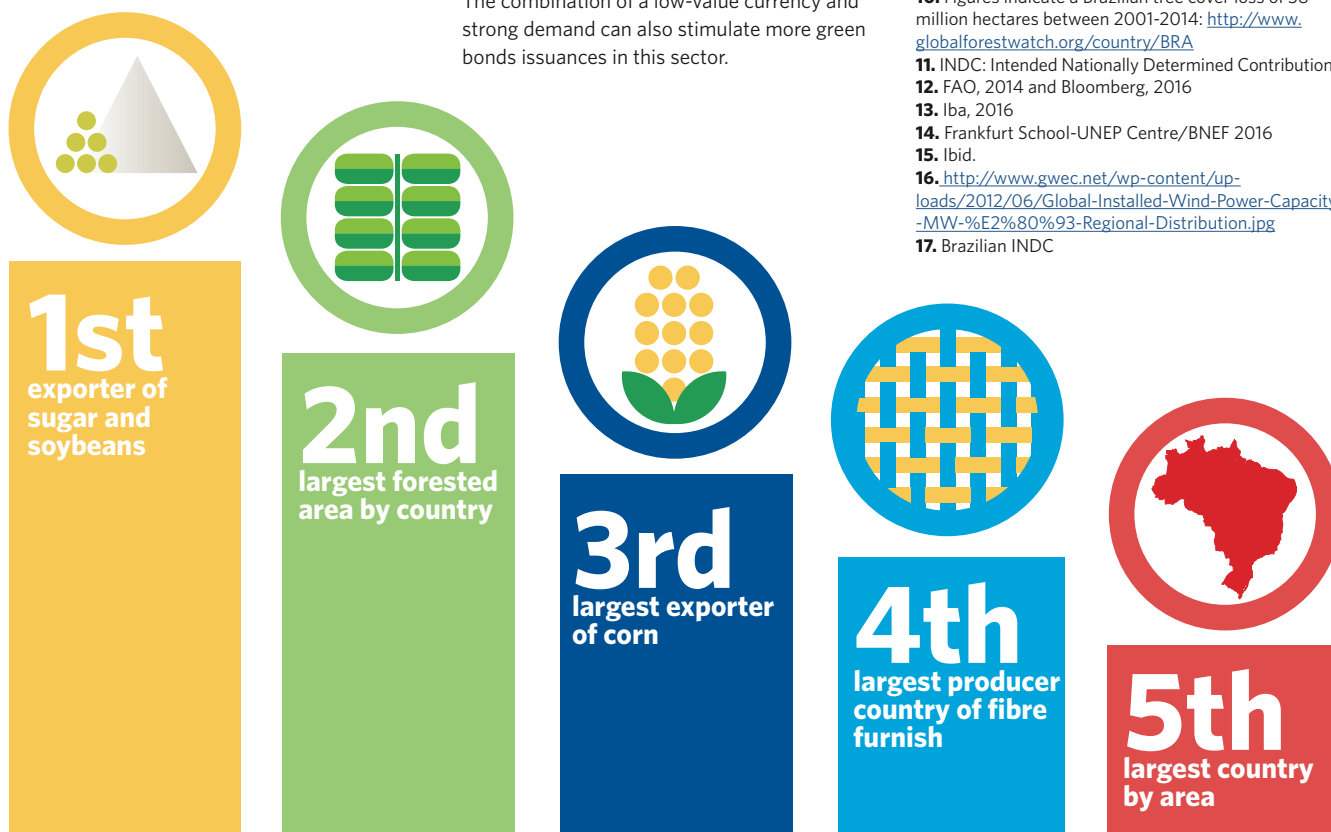
3. Renewable energy

Last year, \$7.7bn was invested in new renewable energy assets in Brazil¹⁴ and investment in renewable energy (excluding large hydro) is expected to increase. Competition in the solar PV industry is rising - 2.2GW was contracted via auctions, where the average price was BRL 297.37 per MWh ([\\$77.24/MWh](#))¹⁵.

Brazil is also major player in global wind markets with almost 9GW of installed capacity (number 10 for installed capacity in the world¹⁶), and attracting approximately \$2.4bn annually for new build. Within this context, Brazil's INDC is committed to increasing the share of wind, biomass and solar to at least 23% of the national power supply as well as to increase energy efficiency in the electricity sector by 10% by 2030¹⁷.

According to the World Bank, almost one-fifth of the energy efficiency goal can be achieved by implementing new street lighting technologies, such as LED, throughout Brazil. Further clarity around definitions and criteria for eco-efficient products, production and processes through the international Climate Bonds Standards and the Green Bond Principles could encourage more green bond issuance in this area.

- 7. Climate debate, The Economist, 2015
- 8. More than 400 million hectares: FAO
- 9. Worldwide agriculture and land use changes make up 24% of global emissions: <http://newclimateeconomyreport/2014/land-use/>
- 10. Figures indicate a Brazilian tree cover loss of 38 million hectares between 2001-2014: <http://www.globalforestwatch.org/country/BRA>
- 11. INDC: Intended Nationally Determined Contribution
- 12. FAO, 2014 and Bloomberg, 2016
- 13. Iba, 2016
- 14. Frankfurt School-UNEP Centre/BNEF 2016
- 15. Ibid.
- 16. <http://www.gwec.net/wp-content/uploads/2012/06/Global-Installed-Wind-Power-Capacity-MW-%E2%80%93-Regional-Distribution.jpg>
- 17. Brazilian INDC



The Brazilian Climate-Aligned Bond Market

We identified \$2.4bn of climate-aligned bonds outstanding (as of 31 May 2016), of which 23% are comprised of labelled green bonds. The latter were issued by entities such as BRF and more recently by Suzano.

Brazilian climate-aligned bonds in the transport sector are all linked to rail, including public transit solutions such as urban rail and metro, rail freight and related construction activities. Issuers include MRS Logística, América Latina Logística Malha Norte, SuperVia Concessionária de Transporte Ferroviário and Concessão Metroviária do Rio de Janeiro. Brazil's Logistics Investment Plan¹⁸ (PIL) indicates new rail concessions will need BRL 86.4bn in capex alone, a considerable opportunity for green bond issuance.

23% of outstanding climate-aligned bonds are issued by companies in the energy sector, including wind (for example the São Miguel do Gostoso wind farm), small-scale hydro, solar, biomass and mixed renewables (such as bonds from the issuer CPFL Renováveis).

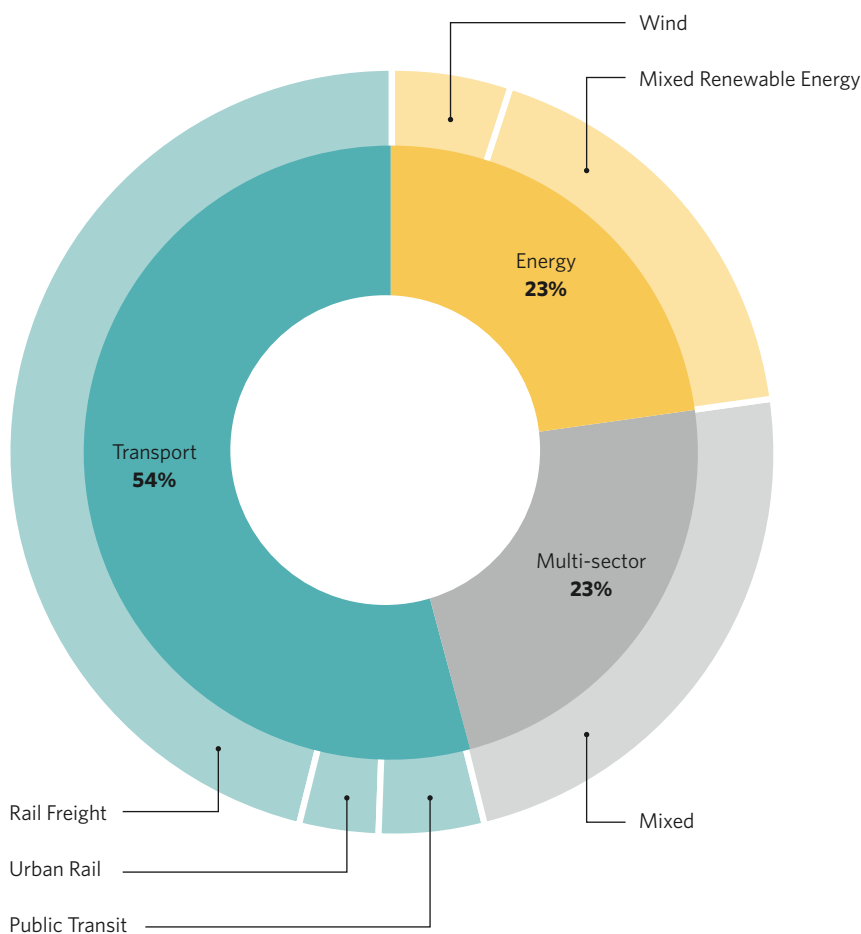
The multi-sector segment is comprised of one bond - the only labelled green bond issued in Brazil (before May 2016) by **BRF**, which is predominantly active in the food industry. The Sao Paulo-based company issued a EUR500m (\$549m) BBB-rated bond in May 2015, with a coupon of 2.75%. More than 50% of buyers were from Europe, with most of them based in Germany, France and Switzerland. The bond will fund projects aimed at reducing water and electricity consumption, while decreasing carbon emissions and waste production¹⁹.

In the Brazilian climate-aligned bond universe, 82% of the bonds issued are between USD100m and USD1bn indicating a broad spectrum of investment opportunities.

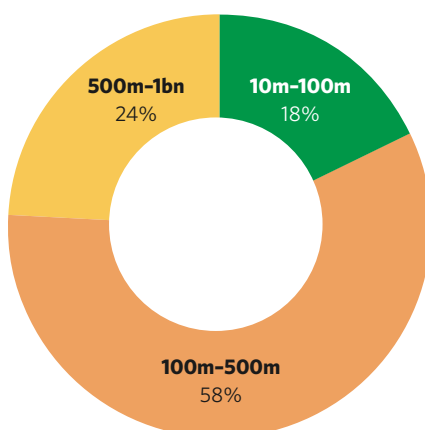
The Transport sector has the most varied bond sizes ranging from USD10m to USD1bn. The largest bonds in the universe (USD500m - USD1bn) fall into the Multi-sector and the Transport themes while the Ag&Forestry and Energy sectors have the smallest issuance bond sizes.

The climate-aligned universe provides a range of short to long term opportunities to investors. Tenors of between 5 and 10 years are the most common with 68% of the Brazilian climate-aligned bonds in this range. 28% range from 3 to 5 years whilst 4% have a maturity of less than 3 years.

More than 50% of outstanding climate-aligned bonds are dedicated to transport solutions, with rail freight being the largest climate technology in this sector



The average size of more than half of the climate-aligned bonds issued is between USD100m and USD500m



Following the cut-off date for inclusion on this report, **Suzano Papel e Celulose** (one of the biggest pulp and paper producers in Brazil), issued its debut green bond for \$500m. It received a BB+ rating and has a coupon of 5.75%²⁰. We note that earlier Suzano bonds were already included in our climate-aligned universe due to the fact that all of its forests have received FSC or PEFC certification.

Future Brazilian issuance is likely to come from issuers with a good local and global credit rating score. The majority of issuers that meet these characteristics are in agricultural, forestry and energy industries, as well as commercial and development banks, who can issue green bonds to refinance their portfolios.

¹⁸. Brazil's Ministry of Planning programme available at <http://www.logisticabrasil.gov.br/ferrovias2>

¹⁹. Bloomberg, and Latin Finance 2016

²⁰. Ibid.

Brazil's Strengths

There are 59 million metric tons of carbon stocks in Brazilian forests²¹

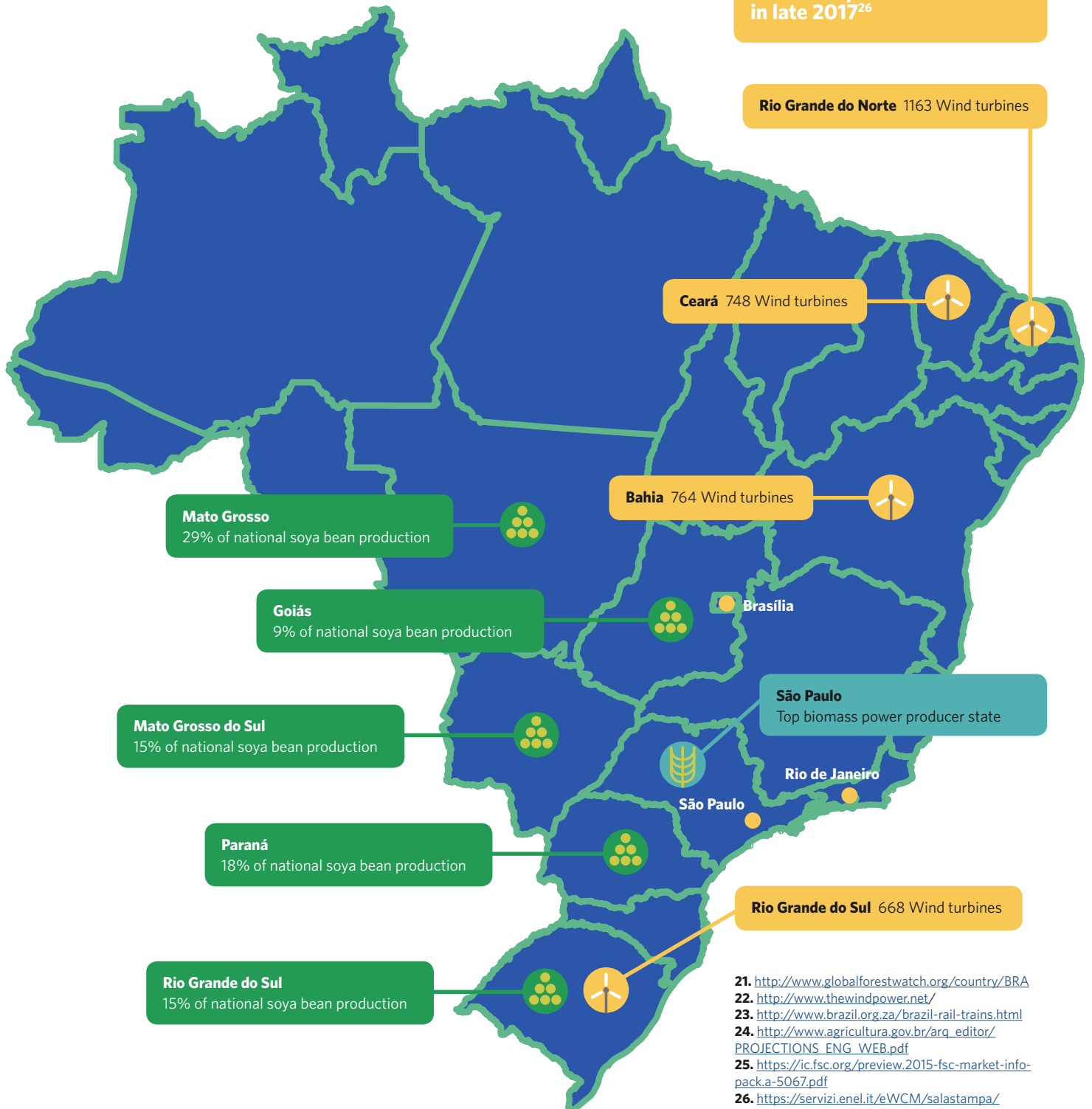
Brazil has 71% of Latin America's total wind installed capacity²²

Brazil's rail network amounts to approximately 28,500 km, which is 3,000 km more than the Earth's diameter²³

Brazilian South and Southeast regions accounted for 81% of the national timber production in 2013²⁴

There were approximately 6.3 million hectares of FSC certified forests in Brazil in 2015²⁵

254 MW will be the total installed capacity of Ituverava solar farm, Latin America's second biggest power plant, set to be operational in Brazil in late 2017²⁶



21. <http://www.globalforestwatch.org/country/BRA>
 22. <http://www.thewindpower.net/>
 23. <http://www.brazil.org.za/brazil-rail-trains.html>
 24. http://www.agricultura.gov.br/arq_editor/PROJECTIONS_ENG_WEB.pdf
 25. <https://ic.fsc.org/preview.2015-fsc-market-info-pack.a-5067.pdf>
 26. https://servizi.enel.it/eWCM/salastampa/comunicati_eng/1666068-1_PDF-1.pdf

Challenges, Opportunities and Next Steps

Challenges:

The Brazilian bond market is immature and dominated by sovereign issuance

The government bond market in Brazil is much larger than bonds issued by private-sector entities, as the charts to the right illustrate. While corporate bond issuance has risen in the last 10 years, the market remains concentrated between a few issuers. This is a barrier to green bond issuance as a small corporate bond market also means that liquidity can be low for new issuers. This could be further constrained within the green bonds market where liquidity has historically been lower than for vanilla bonds.

Political and economic backdrop

Brazil is currently experiencing challenging economic and political circumstances that could discourage international investors from buying Brazilian green bonds. Better economic stability would facilitate a shift in investment planning from shorter to longer term horizons and encourage bond issuance.

Selective Tax Breaks

Credit Bonds are regulated securitised credit. They include mostly agricultural and real estate credit, through instruments called CRA and CRI respectively, and their counterparts for financial institutions, LCA and LCI.

Brazilian retail and foreign investors don't pay income tax when buying these bonds, therefore issuers price them below market rates to capture part of the investor savings. The same tax break applies to infrastructure bonds. This has resulted in a rush by issuers to tailor their financing requirements to take advantage of these opportunities. The consequence is that Brazilian institutional investors are left out with little corporate credit to buy at market rates.

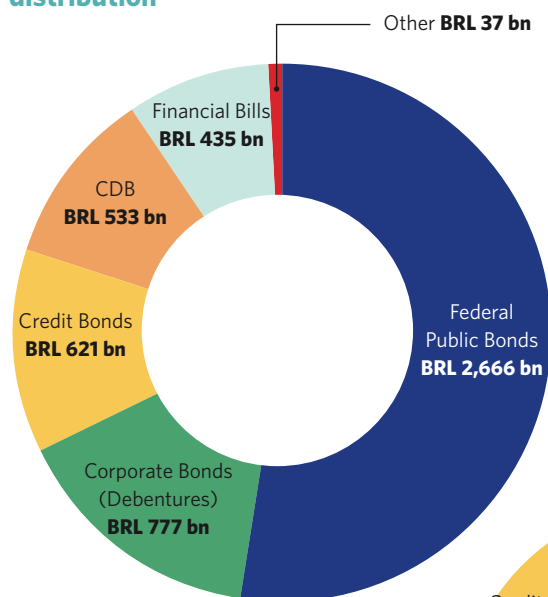
Policy and Regulatory Environment

Overcoming the current challenges and fostering further capital market development will require efforts across a broad policy landscape.

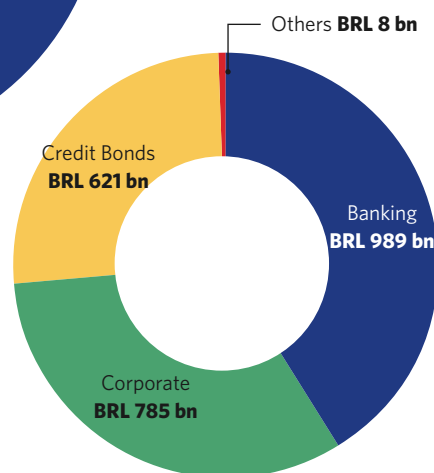
1. Capital market regulators, such as Anbima and CVM, have a fundamental role in enhancing the Brazilian capital market. This includes improving liquidity, promoting debt issuance, reducing tax asymmetries for different asset classes and terms, as well as supporting financial education and investor programmes.

2. Pension fund regulators could also consider more flexible limits for ESG-related investments such as green bonds, thus influencing strategic asset allocation.

Brazilian private bond market: Fixed income market distribution



Private Fixed income Market distribution (BRL bn) - Mar/16



Role of Development Banks

3. Development Banks can also stimulate this market by providing incentives for issuers. For example, BNDES (the Brazilian Development Bank) is currently requiring clients borrowing at subsidized rates (Long Term Interest Rate - TJLP) to use bond markets to complete their financing needs.

4. Credit enhancements can significantly improve ratings and attract conservative investors. For example, the Inter-American Development Bank enhanced Mexico's Development Bank, Nacional Financiera's (Nafin) \$500m Certified Climate Bond in 2015.

5. Local Development Banks themselves can refine their portfolios or issue green bonds as an alternative to raising funds internationally with multilateral institutions.

Other Opportunities

Refinancing green assets: Brazilian commercial banks had BRL 153bn in outstanding loans to low-carbon economy sectors in 2014²⁷, 9.6% of the total outstanding loans. These loans can be packed and sold as green bonds through instruments such as LCIs, LCAs and Notes, freeing up capital to new investments.

Financing public lighting and muni bonds: Cities are among the biggest consumers of energy in the world, accountable for more than 70% of greenhouse gas emissions. Green bonds can help to shift finance towards investments in energy efficiency for public lighting by financing LED street lighting technology. According to a World Bank study for Brazil, based on analyses undertaken by Pezco Consultoria, LEDs would allow Brazil to save as much as 2% of its current electricity consumption. Brazil has also transferred responsibility for street lighting

assets to municipalities. These rely on a stable flow of funds that are strictly earmarked, leading to a resurgence of projects all over the country.

Building a foundation to scale up the market: Brazil has the capacity to become a key global participant and leader in the transition to a low-carbon, climate-resilient economy.

The development of a robust and transparent ecosystem is vital to enabling the Brazilian green bond market to scale up. Since 2014, the Climate Bonds Initiative, in collaboration with its local partner SITAWI, has been working closely with the public and private sectors to help drive this agenda forward in Brazil. Leading institutions such as CEBDS²⁸, FEBRABAN²⁹, FGV³⁰, and PRI³¹, in coordination with Brazil's key industry players as well as banks, are contributing to these efforts. They are actively engaged in projects to provide guidance, expertise and educational activities for market participants.

²⁷. Febraban and GVces: https://www.febraban.org.br/Noticias1.asp?id_texto=2716

²⁸. CEBDS (Brazilian Business Council for Sustainable Development)

²⁹. Febraban (Brazilian Federation of Banks)

³⁰. FGV (Fundação Getúlio Vargas)

³¹. PRI (Principle for Responsible Investment).

Spotlight on: The US Municipal Bond Market

The US municipal (muni) bond market is replete with climate-aligned investment opportunities. We identified \$30bn of climate-aligned US muni bonds, 68% of which are unlabelled.

The first labelled green bonds issued by a municipality/city were issued by French regions Île-de-France, Nord-Pas-de-Calais and Provence-Alpes-Côte d'Azur in 2012. Since then, muni and city bonds from around the world have joined the market and total issuance makes up a significant proportion of the labelled green bond market. **Non-US municipalities/cities/regions have issued over \$6bn in labelled green bonds since 2012**, with multiple issuances from Île-de-France, City of Gothenburg, Stockholm Lans Landsting and others.

The entry of the first US Municipal bonds into the labelled market was a game-changer because of the scale of this market and its potential for future issuance. **Investors currently hold \$3.7tn of US municipal debt while issuance in 2015 was over \$400bn³².**

The search tools and reporting availability for the US muni market made it possible to carry out an in-depth analysis of thousands of individual US muni bond prospectuses from 2014-2016 to find bonds that meet our climate-aligned criteria.

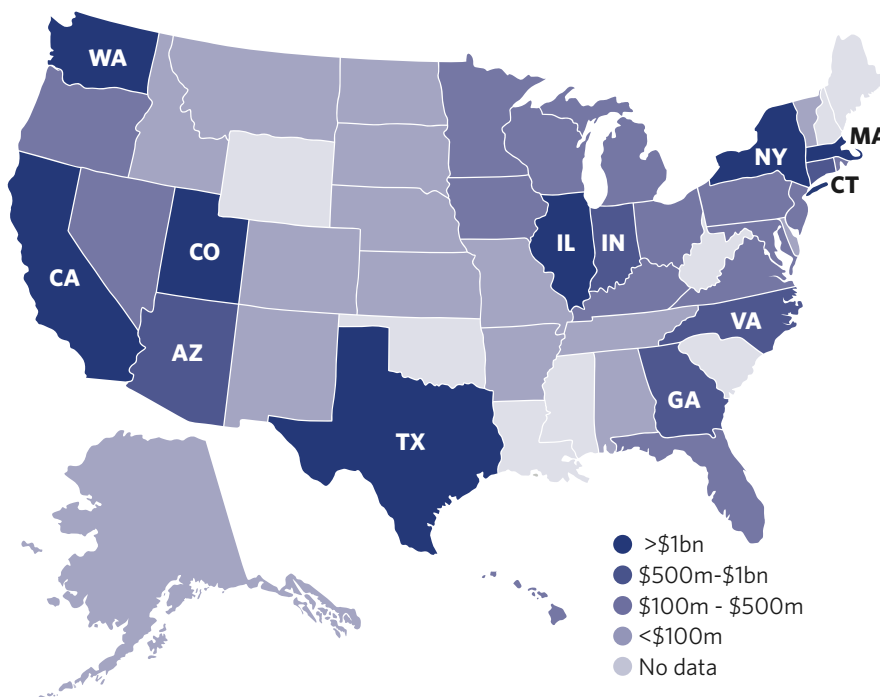
This enabled us to discover a further \$20.6bn of unlabelled climate-aligned bonds which, with the \$9.7bn labelled green bonds, **brought our total climate-aligned US muni bond universe to \$30.3bn.**

Green City bonds

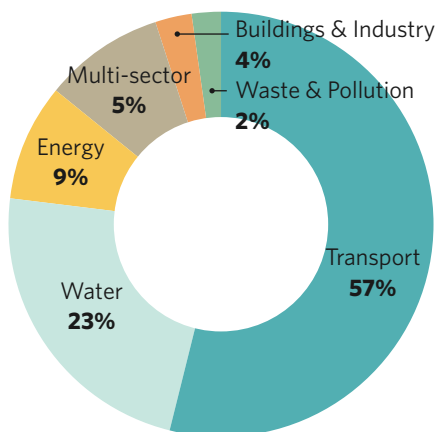
Green bonds can offer much needed access to capital for local governments and cities in emerging and developing countries to finance climate-friendly infrastructure. However, local governments, as well as local utilities and transport companies often lack the know-how or legislative power to access the bond market.

The Climate Bonds Initiative has partnered with others to provide guidelines on issuing muni bonds.

New York, California and Massachusetts are the top 3 climate-aligned bonds issuers



Bonds are primarily financing transport and water projects



Use of proceeds

Bonds were used to finance a diverse range of projects including: urban rail, renewable energy, energy efficiency projects, sewage treatment, recycling and flood defences. However, as in the wider climate-aligned universe, transport dominates issuance with the majority of debt being issued by transit authorities.

The US muni bond market has had a long history of issuing climate-aligned bonds. For a decade, US municipalities have been raising finance for energy conservation and renewable energy through Qualified Energy Conservation Bonds (QECBs) and Clean Renewable Energy Bonds (CREBs).

Labelled green bonds

2015 saw significant growth in the **labelled green muni bond market**, with \$4.7bn in issuance, up by 47% over 2014.

Largest issuers in 2015: Washington state (>\$1bn), Massachusetts (\$915m), New York (\$479m).

Water infrastructure accounted for 46% of issuance. Transport made up 25%.

The first Climate Bonds certified muni bond was issued in Feb 2016 by the Metropolitan Transportation Authority of New York.

An interesting feature of the American municipal bond market is the high number of retail investors; **up to 50% of US municipal bonds are bought by individuals**. A key reason for the popularity of the muni bond market in the US is that bonds are frequently structured to give tax breaks to bond buyers. This enables bonds like CREBs and QECBs to appeal to both retail investors and institutions that are looking for low-risk and tax efficient investments, which in exchange gives municipalities access to low-cost capital for clean energy projects.

³² https://www.sec.gov/spotlight/municipal_securities.shtml

Spotlight on: China

The Chinese government is ready to expand private investments for its transition to a low carbon economy.

An annual investment of at least RMB2-4tn (\$320-640bn) will be required to address climate change³³ in China, of which 85-90% is expected to come from the private sector³⁴. The Chinese government has announced it will issue RMB300bn (\$46bn) of labelled green bonds in 2016³⁵.

China is the largest country of issuance in the climate-aligned universe where unlabelled issuance is dominated by China Railway Corporation (largest issuer with \$194bn). These figures highlight the importance of bonds within the transport sector and demonstrate the continuing importance that bonds will play in raising finance for low-carbon transportation.

Our collaboration with entities such as the CCDC, CECEP, NAFMII and Shanghai Stock Exchange has helped to identify more unlabelled domestic bonds (see diagram to the right)³⁶.

Labelled green bonds in China

China is seen as a leader in driving growth in the labelled green bond market. Shanghai Pudong Development Bank, Industrial Bank Co. and Bank of Qingdao have issued labelled green bonds totalling \$7.5bn in 2016, making China the largest country of issuance in 2016 so far.

The total labelled issuance figure above is based on PBoC's recently developed green bond guidelines. These aim to encourage issuers to arrange external reviews on the green credentials of bonds and to incentivise institutions and service providers to develop issuing capabilities. PBoC is also the regulator overseeing the interbank bond market, accounting for 93% of outstanding bonds in China.

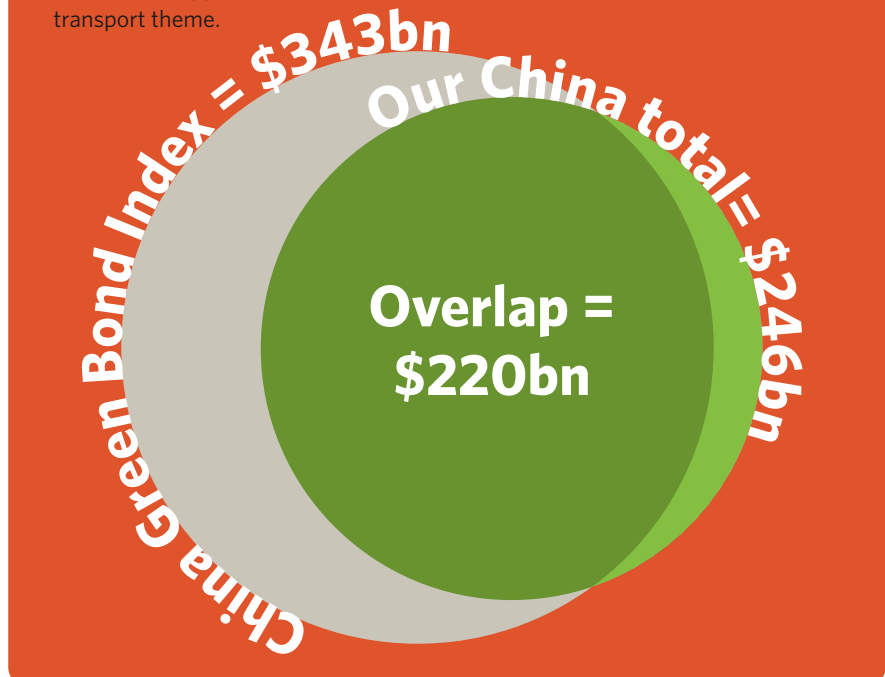
The implementation of third party certification against green bond standards is emerging. Approved verifiers under the international Climate Bonds Standard and Certification Scheme, such as KPMG, EY, DNV GL, Bureau Veritas and Trucost, can provide certification services in China against the Climate Bonds Standard, as well as checking adherence to PBoC's Guidelines.

This year marks the release of the ChinaBond China Green Bond Index which is a list of climate-themed bonds in China.

The China Green Bond Index, put together by CCDC and CECEP, amounts to approximately RMB 2.3tn (\$343bn). We analysed this index against our China bond dataset and discovered that:

- Overlapped bonds make up 90% of outstanding Chinese bonds in our dataset and 65% of the China Green Bond Index.
- 76% of overlapped bonds are in the transport theme.

The primary reason that the China Green Bond Index includes bonds which we excluded is due to differences in inclusion criteria, specifically based on China's context. For example, we require at least 95% of the companies' revenue to be climate-aligned. The China Green Bond Index's criteria also allow fossil-fuel related investment such as clean coal while we do not.



³³ <http://finance.china.com.cn/money/bank/yhyw/20160317/3631992.shtml>

³⁴ People's Bank of China/United Nations Environment Programme.

³⁵ China Daily: http://europe.chinadaily.com.cn/business/2016-03/04/content_23746490.htm

³⁶ National Association of Financial Market Institutional Investors (NAFMII): [http://www.nafmii.org.cn/english/China Central Depository & Clearing Co \(CCDC\): http://www.chinabond.cn/d2s/eindex.html](http://www.nafmii.org.cn/english/China%20Central%20Depository%20&%20Clearing%20Co%20(CCDC):http://www.chinabond.cn/d2s/eindex.html) China Energy Conservation and Environmental Protection Group (CECEP): <http://www.cecep.cn/g3603.aspx>

A Solid Foundation for Growth

The continuing strength of the labelled green bond market illustrates the extent of investor demand for climate-related investments.

The case for investors is simple: green bonds have comparable yield and ratings to other available investments, with the added benefit of proceeds going to assets or projects material to addressing climate change. Simple, yet powerful, with over-subscription being the norm in both developed and emerging markets. That's because investors with tens of trillions of dollars under management have indicated their anxiety about climate change risks.

The climate-aligned universe outlined in this report shows just how many *unlabelled* bonds are available to investors looking to shift capital to climate-aligned investments. It also demonstrates the opportunity for growth in the green bond market if future issuance from these issuers is labelled.

Combined with continuing growth in corporate green bonds, we believe the labelled green bond market can reach \$300bn p.a. of issuance by 2018.

Some \$2.5-3tn of capital is needed each year in climate change related investments, with 60-70% of that going to emerging markets. An indicator of adequate bond market engagement would be climate-related issuance of at least \$1tn a year. That's the objective for 2020.

To achieve this objective we need:

1. To develop local green bond markets

Insurance investors and pension funds have been the main drivers of the labelled green bonds market; playing an important role as *international* investors, they will stimulate green bond issuances in different countries. But domestic capital will need to be mobilised as well. That will take:

- Demonstration issuance of *domestic* green bonds by public sector entities and banks. The aim is to make domestic investor demand visible, while providing guidelines for issuance by others and liquidity for a nascent market. We

Key Takeaways

- COP21 commitments mean that vast green infrastructure investments are needed.
- The capital needed is available and it needs infrastructure style yield.
- Institutional investors say they want green; the green bond market is evidence of that demand.
- Governments now need to act to bring green infrastructure projects to market.

expect this next in countries such as Brazil, Mexico and South Korea.

- Convening national market development collaborations that include local institutional investors. For example, the Mexican Stock Exchange is hosting a Climate Bonds Working Group.
- Regulatory reform to encourage capital flows to climate-aligned investments. This will include: a) investibility reforms, like land use zoning that allows high-density developments over metro

In our 2015 State of the Market report, we proposed an agenda for policy makers. We're making progress:

1. Establish green project pipeline	<ul style="list-style-type: none"> ● In the wake of COP21, various projects are now pushing pipeline development. For example, a Green Infrastructure Investor Coalition, led by Climate Bonds, was launched this year. Its aim is to bring together investors, governments, development banks and project developers to promote capital flows to developed green project pipelines.
2. Strengthen local bond markets	<ul style="list-style-type: none"> ● In the wake of publishing green bond regulations, China opened up access to its interbank bond market for foreign investors in February 2016.
3. Strategic public issuance	<ul style="list-style-type: none"> ● State-owned development banks in Mexico and Costa Rica issued their country's first green bonds. Separately, IFC issued the first green masala bond (Indian Rupee denominated in an overseas market) in August 2015.
4. Develop green standards	<ul style="list-style-type: none"> ● Official green bonds guidelines published by the People's Bank of China and the National Development & Reform Commission (NDRC). ● Green bonds requirements published by the Securities and Exchange Board of India (SEBI).
5. Strategic public investment	<ul style="list-style-type: none"> ● In May 2016 IFC was the sole investor of a private placement deal to finance YES Bank's second green bond issuance. In October 2015 the Central Bank of Bangladesh committed to investing a share of foreign exchange reserves in green bonds.
6. Credit enhancement	<ul style="list-style-type: none"> ● In May 2016 Zhejiang Geely issued a green bond with an enhanced rating (A1/A/A), provided by a standby letter of credit from the Bank of China London Branch.
7. Tax incentives	<ul style="list-style-type: none"> ● In China, tax incentives for green labelled bonds were proposed by the PBoC in March 2015. In Dec 2015, SEBI proposed tax incentives for bonds of INR 50bn for renewable energy projects in India.
8. Instruments to aggregate assets and structure risks	<ul style="list-style-type: none"> ● In May 2015 the Inter-American Development Bank launched a project financing a demonstration green securitization deal, aggregating energy efficiency loans in Mexico. ● The Climate Aggregation Platform, launched at COP21 by UNDP & Climate Bonds, to promote the dissemination of best practice in green aggregation and securitisation.

stations in return for property value increases being used to pay for the metro line; b) capital market reforms like removing restrictions that limit green bond investments. China's opening up of the domestic bond market for overseas investors earlier this year is an example of a policy change that will benefit green bonds investment.

2. Ambition adequate to the challenge

While the scale of the challenge is large, the investment opportunity is also immense. Governments at national and sub-national levels need to turn their now ubiquitous climate change plans into green investment plans that can be used to drive financing strategies.

Some countries are acting with ambition: India has set a target of 175 gigawatts of new renewable energy capacity by 2022³⁷, and has similarly massive plans for rail development, water infrastructure and smart cities. According to Yes Bank, \$70bn of debt investment is needed to achieve the country's clean energy goals alone. China's ambition is even greater: the Central Bank believes the country will need \$300bn a year for its green transition, with only 15% available from public sources. Governments in Germany, France and Mexico also have ambition; others will follow this year.

37. Bloomberg: <http://www.bloomberg.com/news/articles/2015-02-28/india-to-quadruple-renewable-capacity-to-175-gigawatts-by-2022>



3. An opportunity for governments to act

There are trillions of dollars of investible projects around the world that must be developed in order to reduce emissions quickly and help economies adapt to climate change already underway. These are in areas like clean energy, low-carbon transport and climate-resilient water infrastructure.

At the same time, we have a world awash with capital, with much of it invested in historically low-yielding assets like German government bonds - assets that will not fund pension and insurance fund liabilities. These funds need investment opportunities with *some* yield.

Strong demand for green bonds shows there is clear investor appetite for green deal flow.

For a hundred years, governments have been using regulation, guarantees and long-term contracts to design projects that attract institutional capital.

Action to bring green infrastructure projects to market will deliver deal flow for pension and insurance funds, and deliver it with the risk/yield profiles investors need.

But we need urgent action. That means everything from creating clever public-private partnerships to reforming regulation to support green investing.

If we do that, we will see the needed \$1tn of green bonds issued annually.

Can a 'brown' company issue a green bond?

Yes. This is why:

- 1.** Green bonds are about use of proceeds. This is a pillar of the Green Bond Principles.
- 2.** Urgency requires big players: We don't have the time to leave all green investments to smaller, pureplay green companies, and wait for them to slowly displace fossil fuels.
- 3.** Fossil fuel companies offer scale: Their green units account for a small share of company balance sheets, but are large compared to other players. E.g. if the solar division of Total SA was separate, it would be one of the world's largest solar businesses.
- 4.** Using 'brown' balance sheets to build green infrastructure is what we need. If green bonds are backed by the full balance sheets of a fossil fuel company, investors don't need to take on renewable energy risk.
- 5.** It's already happening: Engie, a largely gas energy company, issued a green bond. The balance sheet does not impact the green credentials of the bond provided strong management practices are in place.
- 6.** Banks and energy giants issue green bonds despite fossil fuel filled balance sheets. Oil companies issuing green bonds is no different to issuance from banks with fossil fuel exposure.

Where is the 'additionality'?

To date, green bonds have been largely used for projects already planned or for refinancing completed projects. Do they really contribute to addressing climate change?

To answer that an understanding of the capital flow is needed: bonds are primarily refinancing instruments that allow equity investors and banks to free up capital from existing assets and recycle it into new projects. Or allow corporates to develop assets internally and, when the new asset is valued on their balance sheet, issue new bonds backed by that increased balance sheet. And then move on to the next crop of projects. A large and liquid bond market makes all that possible.

Is a price difference important? The implications of a "greenium"

Anecdotal evidence has emerged that, in some markets at least, green bonds are receiving better pricing than plain vanilla bonds. Is this a sign that some investors are willing to pay a 'greenium' for green?

A look at labelled green bonds in EUR and USD shows that quasi-government green bonds are priced roughly in line with vanilla bonds. However, for certain EUR denominated corporate green bonds, we see a premium in the secondary market, and primary market spreads are tighter.

There would seem to be a lack of supply relative to demand. That suggests ongoing appetite for more labelled green bonds, and investors paying a small 'greenium'.

A greenium implies lower returns for investors, but cheaper funding for issuers. A lower cost of capital would be a game-changer for issuers, but for investors means sacrificing returns. This could result in a green bond market limited to funds with a green bond mandate.

For the green bond market to reach the scale required, it's crucial green bonds are in mainstream portfolios. Our view is that pricing will (and should) remain tight, but within limits acceptable to the majority of investors. Beyond this, green investments should and will be preferred using government policy tools.

How governments can grow green bond markets & green finance

Fundamental Actions

- Establish green project pipeline
- Strengthen local bond markets
- Strategic public green bond issuance
- Develop green standards



Proven Support Tools

- Instruments to aggregate assets and structure risks
- Strategic public green bond investment
- Credit enhancement
- Tax incentives



Innovative Additions

- Adjust risk weightings for green investments
- Preference green investments in central bank operations



Bonds and Climate Change

We need a huge capital shift to avoid catastrophic climate change

- **Required: \$93tn global investment in climate solutions by 2030³⁸**
- **This will include substantial bond issuance**
- **Investors can act now: in a \$90tn bond market we find \$694bn of climate-aligned bonds outstanding**
- **This is largely an investment grade universe**

●
**The \$118bn
labelled green
bond market**

●
**The \$694bn
climate-aligned
bond universe**

The \$90tn global bond market

38. <http://2014.newclimateeconomy.report/finance/>

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The Climate Bonds Initiative is an investor focused not-for-profit, working to mobilize debt capital markets for a rapid transition to a low-carbon and climate resilient economy.

www.climatebonds.net

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