BONDS AND CLIMATE CHANGE
THE STATE OF THE MARKET IN 2014

PLUS:
Green Bonds Market Update

A $503 BILLION CLIMATE-THEMED BONDS UNIVERSE

Prepared by Climate Bonds Initiative.
Commissioned by HSBC.
Introduction

This focus of our third annual update and 2014 edition of Bonds and Climate Change: the State of the Market is to identify bonds linked to climate change that are both labelled and unlabelled. Since our first edition in 2012, the green and climate bonds landscape is unrecognisable.

Three years ago, labelled green bonds were a niche market pioneered by a handful of development banks. In the past year, however, labelled green bonds have entered the spotlight with $11bn issued in 2013 (over three times the issuance of any year previous) and $18.35bn issued up to 10 June in 2014. The issuer base has also expanded beyond development banks to include corporates and municipalities.

The Green Bonds era has begun. And while $100trn outstanding (over three times the issuance of any year previous) and $18.35bn issued (up to 10 June 2014) are included. Only bonds issued after 1 January 2005 and which remain outstanding on 10 June 2014 are included. This represents a different time frame from our previous reports which went up to Q1. The extended time frame has allowed us to capture some rapid developments in the labelled Green Bonds market, although it renders year-by-year comparisons difficult as capital market documentation available on market databases.

Mobilizing bond markets as a low cost financing tool will be essential for the realization of a low carbon and climate resilient economy.

Bonds can also enable investors to invest more directly in low carbon solutions, if proceeds are directed accordingly (as in the labelled green bond market). Bonds and Climate Change 2014 answers key questions around the size of both the labelled green bond market and the broader climate-themed bonds universe.

Methodology
The climate-themed bonds universe is an estimate of the size of the bond market where proceeds are directed towards areas aligned with a low carbon and climate resilient economy. The ‘snapshot’ methodology employed screens issuers and, where available, use of proceeds documentation available on market databases. Only bonds issued after 1 January 2005 and which remain outstanding on 10 June 2014 are included.

This represents a different time frame from our previous reports which went up to Q1. The extended time frame has allowed us to capture some rapid developments in the labelled Green Bonds market, although it renders year-by-year comparisons difficult as bonds are naturally redeemed.


Three features of the climate finance challenge

1. Scale
The IEA says1 that to avoid "catastrophic" global warming and get the world on a 2°C emissions trajectory requires $531bn in cumulative investment in energy supply and energy efficiency up to 2035. Action has been left so late that even with increased mitigation action, warming of 2°C can be expected. Trillions in additional finance will be needed to address adaptation. Niche financing solutions will not be sufficient, and neither will public sector funds alone. Capital markets are essential.

2. Urgency
A key risk is that global warming reaches "climate tipping points”2, processes such as mass leakage of frozen methane gas under the warming Arctic Sea that cause spikes in greenhouse gas concentrations. If tipping points are reached we lose the chance to control climate change. We have 5-10 years to decrease the likelihood of reaching climate change tipping points.3 To do that, low-carbon industries must grow, on average, 25-30% per annum globally4 — an indicator of success for the Climate Bonds Initiative.

3. Opportunity
The good news is that much of what is required can be constructed as investment:
- The capital is available;
- Interest rates - and so financing costs - are at an historic low, ideal for big infrastructure investments;
- The solutions are understood.

E.g. large scale deployment of existing renewable energy technology, a modal shift to low carbon transport; energy efficiency investments.

An Updated $502.6bn climate-themed bond Universe

We estimate the universe of climate-themed bonds outstanding to be $502.6bn. This is a significant expansion on the March 2013 estimate of $346bn.

The universe is made up of over 1,900 bonds from approximately 280 issuers and remains dominated by Transport ($358.4bn), Energy ($74.7bn) and Finance ($50.1bn) themes.

The transport theme, largely rail, continues to make up the majority of the universe of bonds. This is due to the inclusion of a number of large rail issuers that have long history of using bonds to raise finance.

Climate-themed bond issuance continues to grow (Fig. 2) with 2013 being the largest year to date at $95bn, a 12% increase on 2012.

75% of the climate-themed bond universe is made up of bonds which have an implicit or explicit backing from a government entity. This is due to the presence of large state-backed rail entities within the Transport theme, as well as multilateral development bank issuers in the Climate Finance theme. These entities largely fall into the AAA- ratings band, making the universe approximately 90% investment grade (BBB- and higher).

An analysis of the proportion of the universe that meets this and other index requirements is on Page 5.

China remains the largest single issuing country due to the inclusion of China Railway Corp. which is one of the largest builders of new rail infrastructure in the world (see more on Page 8). Large issuance also comes from the UK, US and France.

China = $164bn
UK = $51.6bn
US = $51bn
France = $49bn
Canada = $25bn
Southeast Asia = $14bn
Supra-nationals = $31.7bn
Rest of the World = $99bn

Figure 1. Thematic breakdown of climate-themed bond universe

Figure 2. Climate-themed bond issuance per year

Figure 3. Geographic breakdown of issuer origin
The core investable universe provides an analysis of the proportion of the broad universe that could be eligible for inclusion on mainstream indices. This is calculated by screening the full universe using the following filters:

- **Investment grade ratings** (BBB- and higher).
- **Currencies eligible on benchmark indices**.
- **Issue sizes over $200m**.

Using these filters identifies a universe of $236.6bn, approximately 47% of the full climate-themed bonds universe.

### Green Bonds Market $35.83bn

The green labelled bonds market grew rapidly in 2013 and 2014 and on 10 June 2014 stood at $35.83bn.

### Core Investable Universe is $236.6bn

- **Investment-grade bonds**
- **Sub-investment grade or unrated bonds**

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<tr>
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<td>17.67 bn</td>
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- **Bonds under size thresholds and bonds issued in restricted currencies**, such as China’s Renminbi (CNY), are generally excluded.
- **The transport theme remains dominant**, making up 71% of the total followed by energy at 14%.

### Project Bonds $7.8bn

Project bonds finance specific projects where the debt is paid back from the cashflows generated by the projects rather than an issuer’s balance sheet.

Project bonds have been used to finance renewable energy projects around the world and play an important role in raising the profile of bonds for climate solutions; we anticipate further issuance in 2014-15.

However, we expect project bonds to achieve a BBB rating. 18% achieved an AAA rating due to loan guarantees from the US Department of Energy (DoE). Geographically, the majority (71%) of the project bonds were for renewable projects in the US - the largest being the 2013 $1bn Solar Star bond and two Topaz Solar bonds totalling $1.1bn in 2012 & 13. The remaining 30% comes from Canada, UK, Italy, Mexico, South Africa and Germany.

Last year we noted that the European Investment Bank’s Project Bond Initiative (PBI) could support increased EU issuance. While renewable energy generation assets are not eligible in the universe, there is now a significant number of BBB-rated Russian Railways bonds.

The energy theme shows the most even distribution across ratings with small renewable manufacturers in the junk category, project bonds falling within investment grade at BBB and large utilities in the A and AA ratings bands (e.g. EDF and Hydro-Québec).

In line with global markets, the majority of bonds have tenors greater than 10 years, providing opportunities for pension and insurance funds to match assets with liabilities.

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**Many Dimensions**

**Climate-themed bonds universe**

The universe of climate-themed bonds amounts to $502.6bn and includes bonds whose proceeds are used primarily for financing the transition to a low carbon economy. This includes all the groups of bonds detailed below.

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5 Bonds and Climate Change  www.climatebonds.net July 2014

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4 Bonds and Climate Change  www.climatebonds.net July 2014
The Green Bonds Market lifts off in 2013 and 2014

The strong growth of the Green Bonds market in late 2013 and early 2014 has catapulted the market from niche to mainstream in the year since our last report.

Currencies
Currency denomination has been diverse across a range of currencies (21 in total) with USD and EUR dominant. Interestingly, the other common currencies for green bonds are SEK, ZAR and BRL which are generally less dominant across the bond markets.1

Standards and certification
Among Green Bonds issued in 2013 and 2014, 39% (by value) were issued without an independent review, while 61% were reviewed by CICERO (Oslo University’s climate change research centre), Paris-based Vigeo or DNV GL.

Utilities
Electricity utilities
As builders of renewable energy infrastructure, electricity utilities are an essential part of the transition to a low carbon economy. The IEA expects total global renewable capacity to grow from 1,580 gigawatts (GW) in 2012 to 2,350 GW in 2018. Much of this will be built by utilities and could be financed by Green Bonds.

Lending
Bank lending/asset finance
$150bn in 2013

Water utility bonds $25bn in 2013

Water infrastructure is a huge sector internationally. The use of water will be one of the areas most dramatically affected by rainfall changes as a result of climate change: from clean water provision to waterways management. Limited information on how utility/ municipality planning takes account of climate adaptation means that there are only two water bonds identified in our report. However, we expect this will change as adaptation becomes recognized as essential to water infrastructure planning.

In 2013 over $25bn was issued in water bonds by utilities and municipalities (where data is available). While none of these can currently be classified as ‘climate ready’, adaptation to climate change will be a key challenge in the future and one which bonds could play a role in addressing.

Auto manufacturers $250bn potential annual EV loans by 2020

Toyota was the first auto manufacturer to issue a Green Bond with an ABS linked to electric vehicle (EV) and hybrid car loans in early 2014.

There is potential for Green Bonds from other large EV manufacturers such as Nissan and Chevrolet. Global sales of EVs reached approximately 113,000 in 2013 which, using average vehicle prices, translates to annual loans of €4bn. Including hybrid vehicles in this figure would put the total loan volume at over €7bn per annum. According to the IEA, EV sales will reach 7.2m units globally per year by 2020 which could result in annual EV loan volumes of over $252bn.

The $502.6bn climate-themed universe analyzed in this report provides an estimate of the potential size of the future labelled Green Bonds market. These bonds originate from pure play corporates i.e. where their activities are fully aligned with our climate themes. These types of pure-play corporates are common in some themes such as transport, but not in others such as energy, and buildings & industry. However, the big growth area in Green Bonds issuance in the past year has come from non-pure-play companies issuing bonds with proceeds “ring-fenced” for green or climate related investments.

In this section we provide an outlook for future issuers of such bonds.

Figure 6. Green labelled bond issuance grew in 2013 and 2014

Figure 7: 3rd party reviews (2013-14)

1. Standard and Poor’s, Unicredit, Vigeo, DNV GL
2. CICERO
3. CERES
6. Vigeo Eiris, CERES
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New corporate issuers in 2013 & 2014

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<th>Issuer</th>
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Outlook for the Green Bonds Market

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<td>Svenska Cellulose</td>
<td>Sweden</td>
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<td>Toyota</td>
<td>Japan</td>
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</tbody>
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Outlook for the Green Bonds Market

The $502.6bn climate-themed universe analyzed in this report provides an estimate of the potential size of the future labelled Green Bonds market. These bonds originate from pure play corporates i.e. where their activities are fully aligned with our climate themes. These types of pure-play corporates are common in some themes such as transport, but not in others such as energy, and buildings & industry. However, the big growth area in Green Bonds issuance in the past year has come from non-pure-play companies issuing bonds with proceeds “ring-fenced” for green or climate related investments.

In this section we provide an outlook for future issuers of such bonds.

Figure 6. Green labelled bond issuance grew in 2013 and 2014

Figure 7: 3rd party reviews (2013-14)

1. Standard and Poor’s, Unicredit, Vigeo, DNV GL
2. CICERO
3. CERES
6. Vigeo Eiris, CERES
7. CERES

New corporate issuers in 2013 & 2014

<table>
<thead>
<tr>
<th>Issuer</th>
<th>Country</th>
</tr>
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<tbody>
<tr>
<td>Arise</td>
<td>UK</td>
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<tr>
<td>BoAML</td>
<td>Sweden</td>
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<tr>
<td>Électricité de France TD Bank</td>
<td>France</td>
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<td>GDF Suez</td>
<td>France</td>
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<td>Hannon Armstrong</td>
<td>US</td>
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<td>Iberdrola</td>
<td>Spain</td>
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<td>Regency Centres</td>
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<td>Richemont</td>
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</table>
**Low Carbon Transport**

- As with previous years, transport remains the dominant theme with $358.4bn in bonds outstanding.
- $59bn was issued in 2013, mostly rail bonds in China, the UK, France and the USA.
- Auto manufacturers featured for the first time.
- EV manufacturer Tesla issued a $60bn bond in May 2013.
- In Q1 2014, Toyota issued an ABS to finance EV and hybrid vehicle loan sales. It will likely precipitate further issuance.
- China Railways is the largest single issuer accounting for $146.0bn of the universe. China Railways was previously named the Ministry of Railways, but this was dissolved in 2013. Its debt service is transferred to a new state-owned railway corporation which continues to issue debt for specific rail projects across China.
- For 2014, China Railways have been given approval to issue CNY150bn ($24bn). This is less than in previous years – CNY190bn was issued in 2013 and CNY200bn in 2012.

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**The importance of rail**

- The IEA stresses the importance of rail investment to reduce transport sector emissions. Annual rail travel has to increase by more than 6.1 trillion passenger-kilometres, nearly 30% over current trajectories.
- China is an important part of this growth. Despite declining rates of rail investment in the rest of the world, China added 7,000km of track in 2000-2010 and by 2011 had 6,000km of high speed rail track - double the rest of the world.
- In the IEA’s 2 degrees scenario, rail infrastructure is expected to increase globally to 1.5 million track-kms by 2050 of which China will account for roughly 10%. In high speed rail, the IEA expects China to account for 60% of additional track up to 2030.
- Chinese rail bonds are essential in financing this additional infrastructure.

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**Buildings & Industry**

- At $13.5bn the theme is more than double last year’s figure and 2% of climate-themed bonds.
- The largest segment comes from energy efficient appliance/product manufacturers. LG Electronics has been included because 93% of its product range is certified with the Energy Star label. This compares with other major manufacturers assessed, none of which has more than 76% of products with ‘eco-product’ labels.
- Irish-based ESCO Ingersoll-Rand issued $2.3bn in 2013.
- The first green property bonds have been included. Swedish developer Vasakronan and a number of Australian REITs with high energy performance ratings across their portfolios.

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**Energy theme sub-categories**

- Geothermal 3%
- Bioenergy <1%
- Wind 18%
- Wave <1%
- Hydro 36%
- Solar 15%
- Mixed renewables 4%
- Landfill gas 1%
- Nuclear 23%

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**Waste & Pollution Control**

- Landfill gas 2%
- Pollution Control 9%
- Waste Heat <1%
- Recyling 15%
- Recycled materials 74%

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**Finance theme currency breakdown**

- USD
- EUR
- CHF
- AUD
- SEK
- ZAR
- GBP
- JPY
- Others

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**Water**

- Two water bonds identified: 1) $53.5bn California groundwater recovery and storage project. 2) $213m Green Bond from the New York State Environmental Facilities Corp.
- Disclosure on readiness for climate risks from water utilities remains limited. In the UK, it is expected that companies will report to DEFRA through the Adaptation Reporting Power framework in 2015.

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**Agriculture & Forestry**

- $4.2bn in bonds outstanding representing 1% of the total universe.
- 95% are from sustainable paper and pulp manufacturers and sustainable forest management.
- A recent bond by Swedish forest products company SCA is the first labelled bond linked to certified forests, and includes a commitment to increase forest cover by 1% each year.
- The small size of the theme is partly due to the fact that bonds are rarely used to raise finance in this sector – of the 1522 companies in the global forestry & paper plantations or fishing farming sectors, only 139 have bonds outstanding (the vast majority of which do not meet our criteria).

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**Bonds and Climate Change**

**Buildings & Industry sub-categories**

- LED 8%
- HVAC 4%
- Green buildings 16%
- Mixed 3%
- Smart Grid <1%
- EE Appliance 31%
- Bioplastic <1%
- Muni bond 8%
- EFCO 26%

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**Climate Finance**

- The Climate Finance theme amounts to $50bn outstanding, with $11.5bn issued during 2013, the majority of which are Green Bonds issued by development banks.
- The theme is comprised 39% of labelled green bonds (only those issued by financial institutions are included), 60% from rail lending institutions, and 1% from renewable energy lending institutions.
- Notable green bonds from Bank of America ($500m) and Crédit Agricole ($350m in retail bonds) signalled the first large commercial banks to enter the green bond market.

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**Waste & Pollution Control sub-categories**

- Muni bond 8%
- EE Lighting 4%
- Hydro-Quebec 4%
- Recycling 15%
- Recycled materials 74%

---

**Transport**

- $358.4bn
- $74.7bn
- $50.1bn
- $13.5bn
- $4.2bn
- $1.4bn

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**Number of bonds**

- 1000
- 736
- 430
- 130
- 42
- 29
- 2

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**Number of issuers**

- 89
- 160
- 33
- 40
- 11
- 13
- 2

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**Average bond size**

- $466m
- $122m
- $146m
- $117m
- $106m
- $60m
- $133.5m

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**Largest issuer**

- China Railway
- Hydro-Quebec
- Eurofima
- LG Electronic
- Swaskog
- Darling International
- Cadiz Inc.
The growth in the Green Bonds market is part of an overarching trend towards increasing interest in environmental, social and governance (ESG) issues across all asset classes.

This trend is gaining pace; over $13tn of global assets under management currently incorporate ESG issues into investment decisions; investors managing $45tn of assets have joined the Principles for Responsible Investment (which now has a working group on ESG in fixed income); and in climate, investors representing $22.5tn in 2012 called on governments to take urgent action on climate change.

It is not only investors who are interested - in January 2014 a sell-side collaboration launched the Green Bond Principles. The collaboration was formed when bankers, seeing the IFC’s $1bn Green Bond that sold out in one hour, realised the “ring-fenced” green bond model could be applied to the corporate sector.

The Green Bond Principles were designed to provide guidance for the development of the market (although they do not detail “what is green”). Originally formed by Citi Group, Bank of America Merrill Lynch, JP Morgan and Crédit Agricole, by May 2014 it had 49 underwriters, issuers and investors as signatories. Despite this groundswell of support, there is some concern that the Green Bonds market is mostly a re-packaging exercise, contributing only modest new investment. However, the market serves a vital role in exposing green investments, building a liquid market and engaging investors with the nascent sector.

Here are four reasons we think a thematic Green Bonds market is needed to help meet climate finance requirements.

1. Improved discoverability

A thematic market aids discoverability of climate or environmental investments. Green bonds provide a simple means to allocate funds in that direction. Bonds of equal yield and risk, a feature of the Green Bonds market in the past year, make that choice even easier.

2. Achieve scale and liquidity

A broader thematic approach allows for the pooling of multiple asset classes into portfolios and opens up opportunities for larger scale issuance that institutional investors prefer. Proceeds from EIB Climate Awareness Bonds are allocated to renewable energy, energy efficiency and other climate-related projects; similarly, Hannon Armstrong’s Sustainable Yield Bond is backed by a mixture of energy efficiency and solar energy leases.

3. Re-packaging kickstarts a market and leads to additonality

Bond markets generally start with high-grade issuance and expand to lower ratings levels. Labelling and re-packaging existing assets that already meet scale, rating and liquidity requirements is an important way to get investor-buy-in.

As issuers gain confidence in the market, bonds can be issued at lower ratings and against future assets thus enabling additionally. This is what we are seeing in the Green Bonds market.

4. Positive investment narrative

The Green Bonds market represents a change in the climate finance narrative towards emphasising climate solutions as positive investment opportunities.

With evidence now clear that there is significant demand for climate-related investments, governments can be pressed to fast-track planning and regulatory measures that will deliver low carbon investment opportunities.

Outlook: rapid growth, validation, green city bonds

1. Green bond market to grow by $40bn in 2014, $100bn in 2015

After a record-breaking year of labelled issuance in 2013 ($11bn), we estimated in February that this would double in 2014 to pass $20bn in a year. By our analysis cut-off date of 10 June 2014, issuance for the year had reached $18.35bn; as this report went to print it had passed $20bn.

We expect 2015 issuance to reach $100bn. Significant growth from a very low base will occur in new markets such as Germany, catalysed by a recently-announced KfW bond, and China, where the Government has called for the growth of a corporate green bonds market.

2. Improved steps to validate green

In the absence of clear and widely accepted guidelines around what is green there is a risk of “greenwashing”, where bond proceeds are allocated to assets that have little or doubtful environmental value.

This would shake confidence in the nascent market. The Green Bonds Principles address this issue by proposing that reporting on the use of proceeds and independent review of environmental credentials should be required. These aspects of the Principles should become effective mandatory rather than optional.

3. Risk-bridging activities

A common, science-referenced classification of what is green will be important to the next stage of growth as we see lower-rated issuers enter the market. At present there is no standardised approach for the issuance of a Green Bond.

The Climate Bonds Standard involves a wide coalition of academic and industry experts preparing open access guidelines for which climate-related investment comments can be associated with green bonds.

As issuance broadens from more obvious “green” areas such as renewable energy, we expect issuers to push for more clarity and better standards on what types of projects can be defined as green. This is especially important given the fast-moving and commodity nature of bond markets, where, even if an investor has in-house due diligence capability, a proxy for judging credibility is needed when decision-making windows are very short.

4. Growth of Green Securitization

One of the contributions a Green Bonds market can make is support post-construction recycling of capital to free up bank lending allocations and equity capital. That gives lenders and investors an exit strategy, allowing them to more rapidly recycle their limited capital into new projects. Project lending and investment requires due diligence capabilities that most bond buyers lack; and recapitalisation pressures on banks have reduced their allocations to such lendings and equity loans scarce in policy-vulnerable sectors.

Developing a loan securitisation pipeline would allow equity investors and bank lenders to do more with less. Securitization of green operating assets allows lower-risk, aggregate fragmented renewable energy and energy efficiency markets to meet the needs of investors. This will involve regulatory measures and support from policy-vulnerable sectors.

5. Sovereign/city green bonds

2013 and 2014 saw the issuance of green city and muni bonds, with bonds from Ile de France (Paris), Massachusetts, Gothenburg, Stockholm and Johannesburg. This is an important area for future growth as cities and sub-sovereign entities (especially in emerging markets) raise finance to meet climate infrastructure requirements.
Summary

The annual Bonds and Climate Change report aims to estimate the size of the existing universe of bonds whose proceeds are used primarily for financing the transition to a low carbon and climate resilient economy. The 2014 edition is the third iteration of this report. It includes a thorough analysis of all climate-themed bonds as well as detail on the current and future state of the rapidly-growing labelled Green Bonds market.

Key Findings

$502.6 bn TOTAL UNIVERSE
See page 3

$236.6 bn MEETS INDEX REQUIREMENTS
See page 5

$35.83bn LABELLED GREEN BONDS
See page 6 & 7

Disclaimer This report does not constitute investment advice and the Climate Bonds Initiative is not an investment adviser. The Climate Bonds Initiative is not advising on the merits or otherwise of any bond or investment. A decision to invest in anything is solely yours. The Climate Bonds Initiative accepts no liability of any kind for investments anyone makes, nor for investments made by third parties.