




Benchmarking the greenness of financial centres

Provisional version



 KICName is supported by the EIT, a body of the European Union

K4CE INSTITUTE FOR CLIMATE ECONOMICS
Une initiative de la Caisse des Dépôts et du Programme d'Investissement d'Innovation



Contents

Foreword	2
1. Process	3
2. Goal & Scope	4
2.1. Definition of a financial centre	4
2.2. Definition of green finance	4
2.3. Geographical scope of a financial centre	5
3. Dimensions.....	6
3.1. Transparency of environmental financial information	6
3.2. Availability of green financing.....	7
<i>Green bonds</i>	7
<i>Green lending</i>	10
<i>Private Equity investments</i>	11
3.3. Green intensity of bond markets	12
3.4. Green integrity of product offering and actors	12
3.5. Dynamics.....	13
<i>Emerging portfolio climate risk management among investors</i>	13
<i>Emerging carbon policies in the corporate sector</i>	14
<i>Green finance initiatives in financial centres</i>	15
4. Financial centre summaries	16
5. Appendix. Complementary method description..	20
5.1. Taxonomy.....	20
5.2. Currency and exchange rates.....	20
5.3. Stock Exchanges	20
5.4. Details on indicators	20
<i>Corporate Knight Disclosure score</i>	20
<i>Asset Owner Disclosure Project rating</i>	21
<i>UN Environment Inquiry</i>	21

First edition covering the main financial centres of the G7 countries: Frankfurt (Germany), London (United Kingdom), Milan (Italy), New York (USA), Paris (France), Tokyo (Japan), Toronto (Canada)

December 2017



Climate-KIC

Climate-KIC is one of three Knowledge and Innovation Communities (KICs) created in 2010 by the European Institute of Innovation and Technology (EIT). The EIT is an EU body whose mission is to create sustainable growth. Climate-KIC supports this mission by addressing climate change mitigation and adaptation.

www.climate-kic.org/



I4CE

I4CE – Institute for Climate Economics is a think tank that provides public and private decision-makers with expertise on economic and financial issues related to the energy and ecological transition.

We strive to implement the Paris Agreement, and make global financial flows compatible with low-carbon development that is resilient to climate change. I4CE is an initiative of Caisse des Dépôts and Agence Française de Développement.

www.i4ce.org



PwC

More than 223,000 people in 157 countries belonging to the PwC international network share their ideas, expertise and innovative views to deliver high-quality service to clients and partner companies. For more information, visit www.pwc.fr

By working every day to advise clients and support them in their success, PwC actively contributes to the development of the economy throughout the world. Through its studies and expert analyses, PwC is also committed to preparing for the economies of the future and developing new technological applications. Lastly, by providing solutions for risk management, PwC creates trust among stakeholders and helps maintain a secure environment at the heart of the economy.

“PwC” refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. For more information, visit www.pwc.com/structure

The information used by PwC in preparing this report has been obtained from a variety of sources as indicated within the report. While our work has involved analysis of transmitted information, PwC has not sought to establish the reliability of those sources or verified the information provided. Accordingly we assume no responsibility and make no representations with respect to the accuracy or completeness of any information provided to us, except where otherwise stated herein, and no assurance is given.

Our conclusions are based upon the information available as of December 1st, 2017. Our analysis may require updating from time to time or before any major decisions are taken based on the report.

Foreword

Financial centres can play an important role in the global shift towards greening the economy as they connect through to most companies and bank institutions.

A wide variety of activities and initiatives are carried out by multiple actors in financial centres but there is a lack of data to measure or characterize their contribution to the financing of the energy and environmental transition. Moreover, if those data can be provided, most of them can't be compared from a financial centre to another.

That is why the method used in this benchmark prioritises the use of existing international rankings and league tables from a variety of sources. **This ensures a fact-based, identical treatment of each financial centre** for each criterion retained. In that respect, the resulting benchmark is a tool for comparison of approaches between financial centres and for follow-up of each one's progress by means of its annual publications, making it possible to measure the progress achieved.

This first edition's report covers only the main financial centres of G7 countries: **Frankfurt** (Germany), **London** (United Kingdom), **Milan** (Italy), **New York** (United States), **Paris** (France), **Tokyo** (Japan) and **Toronto** (Canada).

Based on partial data, it does not pretend to be a tool for measuring the general green performance of financial centres, but **attempts to highlight the strong points of certain financial centres with respect to developing green finance.**

It provides information on **skills, capital available and effort of transparency and integrity of green finance** developed in the financial centres covered by this first edition.

This first benchmark shows that green finance is currently traceable mainly through stock exchanges and notably via green bonds. **A first conclusion is the need of diversifying green financial products and of developing their traceability and comparability at an international level.** This concerns mainly green lending, private equity, insurance and green investment funds.

1. Process

This benchmark is a result of a partnership between the Climate-KIC, I4CE and PwC. Climate-KIC is the sponsor of the project, I4CE proposed the methodology and PwC collected and analysed the data and wrote the report.

The methodology used in this report to assess the 'greenness' of financial centres was discussed, reviewed and accepted by an advisory committee composed of the following members:

- Prof. Carlo Carraro, FEEM, Italy;
- Ingrid Holmes, E3G, United Kingdom;
- Cary Krosinsky, Brown University and Yale School of Management, USA
- Karsten Löffler, Frankfurt School of Finance & Management GmbH Germany;
- Nick Robins, UN Environment Inquiry;
- Malte Schneider, Climate-KIC with Riyong Kim Bakkegaard;
- Takejiro Sueyoshi, UN Environment FI Asia with Kaori Nomura, UN Environment FI Japan;
- I4CE: Benoît Leguet, Pierre Ducret, Maria Scolan, Mathieu Arndt (advisor).

I4CE acted as the secretary of the advisory committee and proposed the draft method to the advisory committee. The advisory committee then reviewed the draft method and the results at each stage of the process.

From October to December 2017, PwC worked with I4CE to identify existing sources of data that could be used to flesh out the methodology, then collected and analysed data and drafted the report, on a pro bono basis.

Data was collected from the following organisations that we wish to deeply thank for their timely transmission of information:

- Bloomberg New Energy Finance: green lending, green bonds, private equity;

- Climate Bond Initiative (CBI): green bonds;
- Climate Disclosure Project (CDP): use of carbon prices, supply of low carbon products by companies;
- UN Environment Inquiry: national legislative framework around environmental topics.

We also wish to thank Corporate Knights and the Asset Owner Disclosure Project (AODP) for their work on rating financial activities and actors used in this benchmark.

To complete these data sources, a questionnaire was also developed by I4CE and PwC and sent to representatives from the financial centres. Only Paris answered to this questionnaire.

For the first edition of the benchmark, the availability of sufficient and consistent datasets was a major issue. Methods of classification differ between sources, in particular with regards to geographical allocation. For instance, some studies would focus on a country, some on stock exchanges, and yet others on financial centres. For green bond tracking it was not possible to identify the accurate amount of green bonds listed on each financial centre. Additionally, the timeframe of information collected varies across sources, which was sometimes a hurdle for data retrieval and compilation.

The forthcoming editions of this benchmark should integrate more refined indicators. The interesting 'green intensity' indicator is only rarely calculable because of the lack of consistent data, although it may bring a valuable idea of the 'greenness' of financial centres.

Finally, the present study should be widened to include other financial centres than those under study to capture a better perspective of green initiatives and encourage them in more and more locations around the world.

Warms thanks to:



2. Goal & Scope

The benchmark aims to meet the following objectives:

- **Assess the results of financial centres with respect to green criteria and taking their multidimensional nature into account.**
- **Within a competitive environment, capture the complex dynamics of a system with moving parts in a nascent movement of green financial centre initiatives.**
- **Foster emulation and possible cooperation among financial centres by highlighting factors that contribute to greening finance.**

The proposed benchmark is intended to measure, where possible, or otherwise characterise the contribution of different financial centres to the financing of the energy and environmental transition.

For the first edition of the benchmark, the definition of the scope under study has been adjusted to available data. The choice was made to focus on the main financial centres of G7 countries. Financial centres are here assumed to be relevant entities to represent dynamism towards green finance. These ecosystems may also have the most means of influence and communication to encourage and drive its players towards greener practices.

2.1. Definition of a financial centre

Financial centres are locations where there is “an intense concentration of a wide variety of financial businesses and transactions”¹. A financial centre regroups a large number of players. The typology below present the main ones:

- Financing and capital applicants: companies, countries and public institutions, banks, individuals;
- Financing and capital providers: banks and investors;

- Infrastructure for exchange of capital assets: stock exchanges;
- Service providers: asset managers, information providers (analysis, indexes, ratings...), legal and tax consultants, etc.;
- Vectors of knowledge: universities, think tanks, NGOs, media;
- Catalysts: some financial centres have bodies for federation, representation, promotion, collaboration between financial players;
- Legal and regulatory environment: public, regulatory and supervisory authorities.

2.2. Definition of green finance

Green finance covers all capital flows and services which contribute explicitly to *climate-related or environmental objectives*.

The benchmark ideally covers Sustainable Development Goals² (SDG) number 6 (clean water and sanitation), 7 (affordable and clean energy), 13 (climate action), 14 (life below water) and 15 (life on land). Climate related information (SDG 13 and 7) is the best known and is used when broader environmental information (natural resource management, biodiversity, depollution, circular economy etc.) is not known.

Responsible investment (RI) that is meant to “know better” and to reduce environmental, social and governance (ESG) risks is a privileged means of access to green finance but there is no one-on-one correspondence with financial flows contributing to climate or environmental objectives. RI data are used when necessary for lack of more precise information on ‘green’.

¹ UN Environment Inquiry – Corporate Knights report “Financial centres for Sustainability – Reviewing G7 financial centres”

² On September 25th 2015, countries adopted a set of goals to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years.

2.3. Geographical scope of a financial centre

A financial centre is located in a city. However, financial centres are dependent on their national or regional surroundings. They also contribute

to international financing flows. In parallel, a number of financial players, in particular systemic banks, have a presence on several financial centres, through teams specialised by country or regional area, and also, for global activities, by fields of activity/teams.

The seven financial centres under study are located on the map.



This report does not seek to assess the overall attractiveness of “city” financial centres (property market, density and quality of transport infrastructure, labour costs, etc.).

The geographical dimensions of financial centres are approached indicator by indicator, according to the following principles on a case by case approach:

- Enabling context: regional/nationwide indicators are used to characterise the enabling context, such as regulation.
- Flows:
 - Stock exchanges are considered to be clearly at city/financial centre level. Therefore listed assets are given priority in measurement. If multiple market places (e.g. Nasdaq+NYSE) exist in a financial centre, flows are added at the financial centre level.
 - Supply of unlisted financial assets. Listed assets are not sufficient to estimate green finance flows as intermediated and private finance is critical in most parts of the world and for essential purposes (retail, SME, innovation). Private equity and green lending are assessed via league tables providing only partial information.
 - Skills: teams and activities are allocated to the financial centre where they are physically located, whenever the information is available. As the information regarding the location of financial teams is rarely available, they are assumed to be located where the head office is based.

3. Dimensions

This benchmark does not have the ambition to fully measure the green performance of financial centres, as discussed above. Nonetheless, it is possible, based on a combination of indicators covering different dimensions of the issue, to emphasise the qualities that help to redirect funds towards environmental and climate-friendly allocations.

This benchmark regroups indicators from different categories of assets, services and players whether quantitative or qualitative, to define the dominant features of the different financial centres. It highlights five characteristics:

- transparency of information;
- availability of green finance;

- green intensity;
- integrity of green finance;
- dynamics of the green financial centres.

The choice of these dimensions was based on the fact that green finance is not only measured by quantities of financial flows but also by qualitative information like transparency and integrity that were considered as important complementary features. In addition, the dynamics dimension addresses the evolution of the 'greenness' of financial centres in the future.

The paragraphs below present several indicators and enable a first benchmark to be drawn.

3.1. Transparency of environmental financial information

A shift towards green finance would imply that financial players are able to access information on the 'greenness' of activities of individual companies. The disclosure of information relating to sustainability, and more specifically of environmental and climate information, can be required either by regulation, or by stock exchanges for listed companies, or else it can originate voluntarily from companies.

From one country to another, from one financial centre to another, such information does not cover the same scope, the level of stringency is different and there is an overall lack of relevance and comparability of this information (which the FSB-TCFD³ is working on). Only a cluster of indices can allow an assessment of the performance of financial centres in this area.

To assess the transparency of environmental financial information, data from the UN Environment Inquiry and Corporate Knights have been used. More details on the underlying methods and data are given in appendix.

Paris, London and Frankfurt achieve the best results in terms of ESG information disclosure. In those countries, the regulatory context is strong and increasingly demanding. A fourth European centre (Milan) comes next with an intermediate score. Non-European centres have the lowest disclosure score of our panel, which is probably correlated with a less stringent regulatory context.

In France, the latest major regulatory measure is Article 173 of the Energy Transition Law which requires listed companies, investors and asset managers to disclose financial risks related to the effects of climate change and measure adopted by the company to reduce them since 2015.

EU Directive on non-financial reporting 2014/95/EU requires companies with more than 500 employees to disclose in their management report information on policies, risks and outcomes as regards environmental matters, social and employee aspects, respect for human rights, anticorruption and bribery issues, and to disclose diversity in annual reports. This directive must have been transposed by EU Member States by the end of 2016.

³ Financial Stability Board – Task Force on Climate-related Financial Disclosures

Disclosure score and Policy and Regulatory environment

Source: UN Environment Inquiry data 2017, Corporate Knights 2017 – Measuring Sustainability Disclosure

Financial Centre	Corporate Knights overall Score	Companies – Reporting on ESG and climate	Investors and Asset Managers – Reporting on ESG and climate
Paris	77.0%	Mandatory*	Mandatory for investors and asset managers
London	73.9%	Mandatory*	Mandatory for pension funds, charities, asset managers
Frankfurt	64.3%	Mandatory*	Mandatory for pension funds
Milan	48.9%	Mandatory*	Mandatory for pension funds
Toronto	46.3%	Mandatory for listed companies on social and environmental information	Mandatory for pension funds (in Ontario)
Tokyo	39.2%	Mandatory for GHG emissions	Investors shall have access to sufficient ESG information
New York **	36.8%	Voluntary	Mandatory for insurers

* European Directive on non-financial reporting (Directive 2014/95/EU)

** As the New York financial centre includes two stock exchanges, the disclosure score is a combination of Nasdaq and NYSE results.

In the UK, listed companies must include carbon emissions data for their entire organisation in their annual report. Pension funds and charities are subject to ethical considerations, so that their selection of investments is in alignment with the funds' Statement of Investment Principle or the charities' stated aims.

US regulation requires insurers to address climate risk in their investment portfolio. In some states (including California, New York and Washington), insurers are in addition obliged to disclose to regulators the financial risk the face from climate change and actions they are taking to respond. Since 2016, financial disclosure of insurance companies' investments in fossil fuel enterprises is mandatory.

3.2. Availability of green financing

To assess the availability of green financing of a financial centre, easily available metrics are being compared. They consist of a broad array of green products and services that financial centres can provide to their various stakeholders and to the size and skills of green finance teams. Raw data are drawn from CBI and Bloomberg league tables and concern green bonds, green loans and private equity (PE) investments.

■ Green bonds

Green bonds are bonds whose proceeds are used to finance projects contributing to energy and ecological transition and labelled as 'green'.

In 2016, \$81.4bn labelled green bonds were issued⁴ – an increase of 108% compared to 2015.

⁴ Does not include unlisted bonds issued over the counter by public authorities

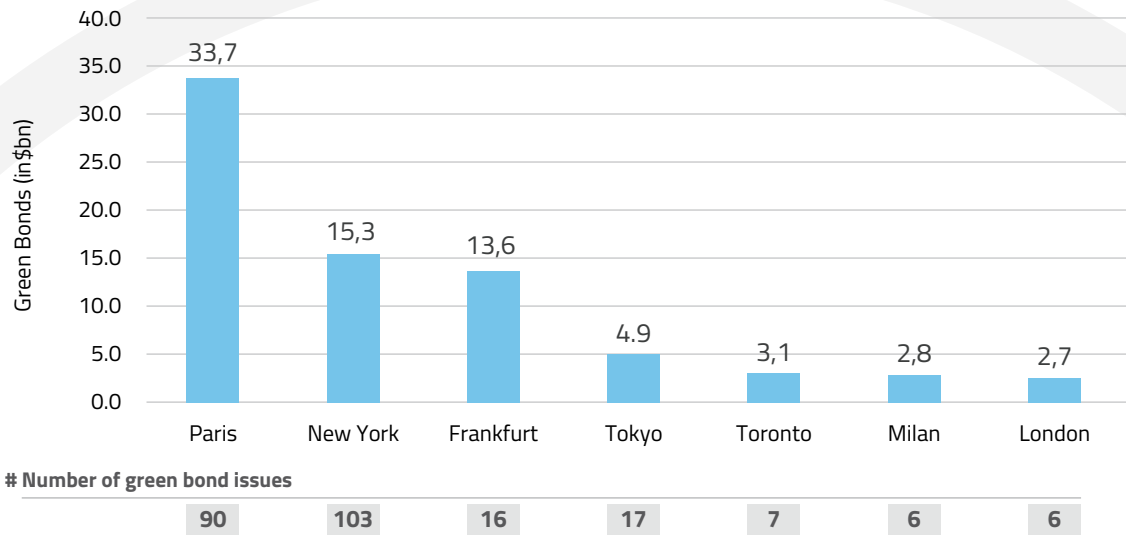
In order to better capture the trends of the green bond market regarding the dynamic nature of financial centres, three complementary approaches were adopted in terms of green bonds allowance. Green bonds can be allocated to the issuers' country, to the underwriters' country and to the stock exchange on which it is listed. Each indicator provides different kind of information.

Green bond issuers: supply of green capital

This first indicator shows the presence of issuers in each financial centre that can provide investors with green assets. If a green bond is not listed, it is allocated to the head office location of the issuing body. In the case where it is listed on several stock exchanges, the financial centre of its head office country is retained. This include labelled corporate, government and municipal green bonds.

Figure 1. Green bond issuance per issuers' country

Source: Climate Bond Initiative – Labelled green bonds data (January 2009 – November 2017)



Amongst G7 financial centres, Paris is the biggest issuer with \$33.7bn labelled green bonds tracked by CBI since 2009, including a noticeable \$13bn for 2017. It is followed by New York and Frankfurt with \$15.3bn and \$13.6bn respectively. The biggest corporate issuers are utilities (Iberdrola, Engie, EDF, etc.) investing in renewable projects, in particular wind and solar. Transport companies (Metropolitan Transportation Authority, SNCF Réseau) but also Apple are important issuers, investing in various project categories such as low carbon transport, green buildings, energy efficiency, recycling, water efficiency, eco-design of products.

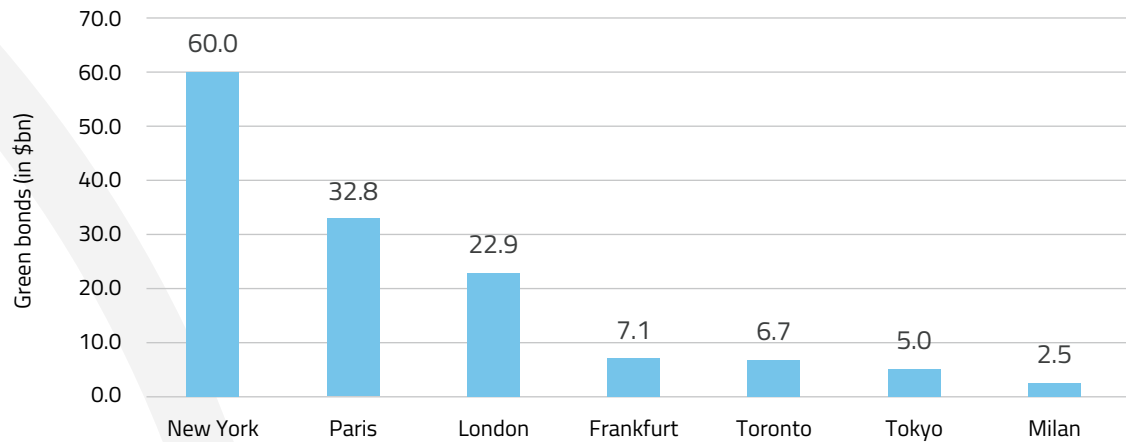
Supranational institutions are not taken into account so as not to bias the analysis. For instance, the European Investment Bank (EIB) – \$18.6bn-aggregated green bonds – is the first issuer in the world in terms of value and would account for one single country (Luxembourg) although it represents all EU countries. The same treatment is applied to other supranational institutions. However, state and public investment banks are being considered.

Green bond issuance vs. underwriters' country: skills on green services

This indicator classifies green bonds according to the country of the underwriter and shows skills existing in banks provided to issuers. Results are displayed on **Figure 2**. There is no available data listing whether underwriter teams are based in one financial centre or another. Consequently, underwriters are allocated to the country where their head office is based. All major banking institutions are present on the ranking.

Figure 2. Green bond issuances per underwriters' country

Source: Bloomberg New Energy Finance – Green bond top-50 underwriters by volume for green bonds issued (January 2014 – November 2017)



US banks (Bank of America Merrill Lynch, JP Morgan, Citigroup, Morgan Stanley, etc.) underwrite almost 30%⁵ of world green bond issuances taking advantage of their prominent role on the global bond market and on global finance in general.

French banks (Crédit Agricole CIB, BNP Paribas, Société Générale) and British banks (HSBC, Barclays) follow and account for respectively 16% and 11% of the market.

Green bond issuance vs. G7 stock exchange listing

The vast majority of green bonds (85%) is listed on one or several stock exchanges, not necessarily in the country of the issuing body. Listing a green bond on one stock exchange rather than on another one can be an indicator of green attractiveness of a financial centre and of its overarching attractiveness.

Data emanates from the Climate Bond Institute. For green bonds which are listed on several stock exchanges, although it is possible to know which are concerned, there is no information about the share of the listed green bond per stock exchange. Therefore, the choice has been made to split the green bond value equally between the stock exchanges and recorded on each leading financial centre. The ensuing bias is assumed to

better represent the trends compared to a no-splitting method resulting in double-counting.

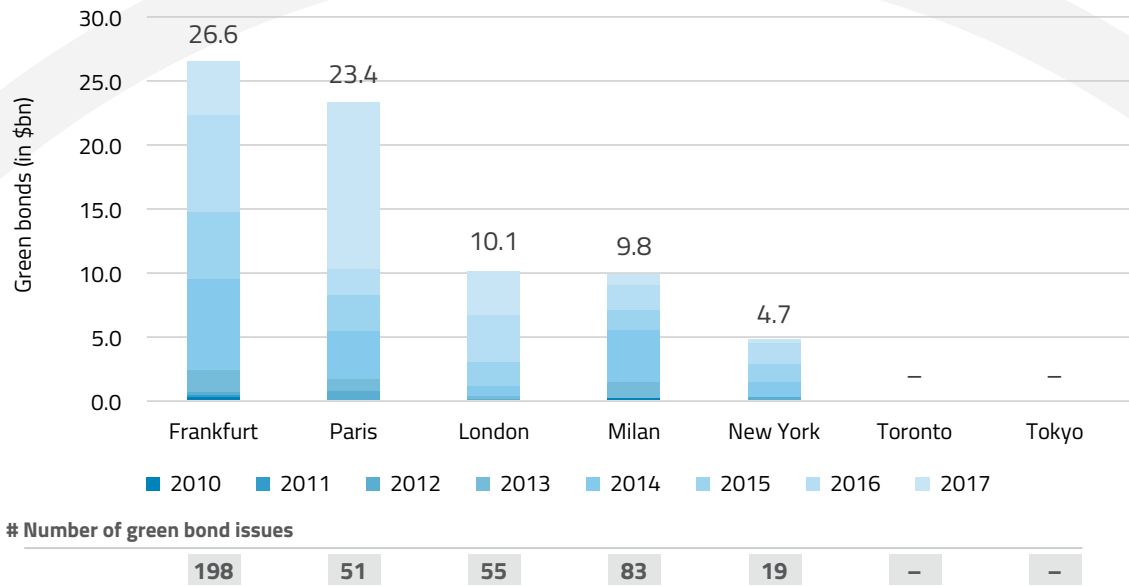
Unlike the previous methods, green bonds emanating from supranational organism such as the EIB or the World Bank are taken into account.

Green bonds are allocated to the financial centre hosting the stock exchange on which they are listed. In the case where a green bond is listed on several exchanges, its value is divided by the number of exchanges and recorded on each.

⁵ Market shares for green bond underwriting are based on the top-50 ranking by Bloomberg New Energy Finance

Figure 3. Volume (in \$bn) and number of green bonds issues listed on G7 stock exchanges

Source: Climate Bond Initiative – Green bond issuances (January 2010 – October 2017)



Amongst G7 countries, the Frankfurt financial centre is remarkably active with \$26.6bn listed overall since the creation of green bonds, with around 198 bond issuances. It shall be noted that other German financial centres gather other green bonds, with a total approaching \$68bn for Germany as a whole using this methodology - far ahead of the other countries. France totals 51 issuances representing \$23.4bn. The United Kingdom and Italy follow with an average \$10bn listed on the London and Milan marketplaces. The Canadian and Japanese financial centres have not yet started to list green bonds while New York stands behind European centres with \$4.7bn.

■ Green lending

Green lending corresponds to loans provided by banks to finance renewable energy, energy efficiency, sustainable water and waste management projects. In the present report, only the first two of these categories were considered.

Japanese entities are the most dynamic in terms of green lending, representing a table share of 16.7% for 250 deals over the period 2012-2017. Mitsubishi UFJ Financial and Sumitomo Mitsui Financial Group both arrange more than \$5bn of credit for wind and solar energy projects

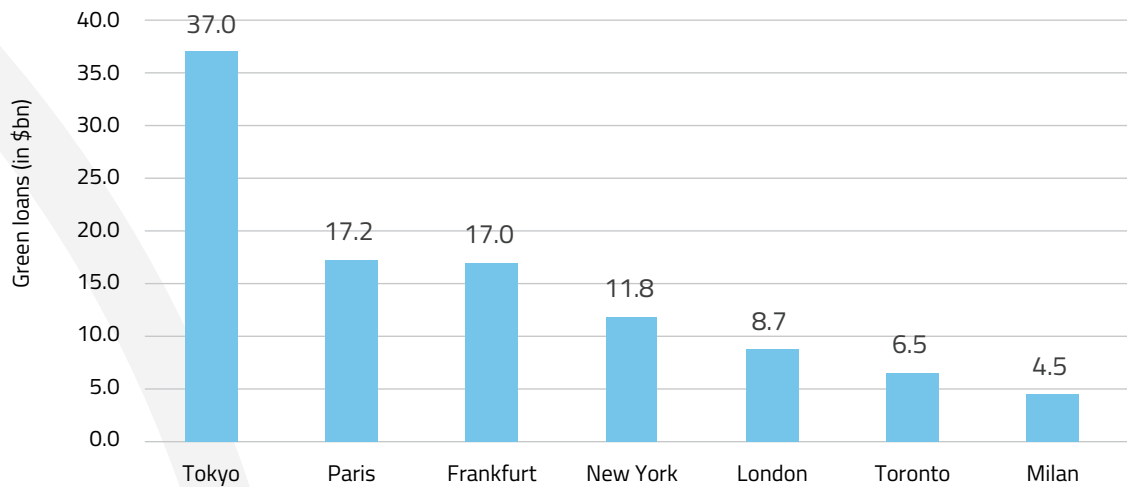
in 2016. With \$17.2bn and \$17.0bn respectively, Paris and Frankfurt are leading the green lending market in Europe, cumulating 92 and 109 deal operations respectively.

All in all, wind energy projects account for 57% of debt financing in 2016 and solar energy projects, 34%. Debt financing for biofuel, biomass, waste, geothermal and marine projects is negligible.

Lead arrangers are allocated to the financial centre on which they are listed, and if they are not listed, to where their head office is based. In the case where an entity is listed on two or more stock exchanges, it is allocated to the financial centre of the country corresponding to its head office location. The analysis is based on **Bloomberg New Energy Finance** tables listing the world's top-100 lead arrangers for clean energy, energy efficiency and electric vehicles loans. It includes private placements; however, supranational loans from multilateral development banks are not recorded here.

Figure 4. Volume of green loans per arrangers' country

Source: Bloomberg New Energy Finance – Green loans top-100 lead arrangers by \$ volume (January 2012 – November 2017)

**# Number of green loans**

250	92	109	55	54	42	61
-----	----	-----	----	----	----	----

3.2.2.1. Market share (%) in value among top-100 green loans

16.7	7.8	7.7	5.3	3.9	2.9	2.0
------	-----	-----	-----	-----	-----	-----

Private Equity investments

Investment in private equity is usually carried out via investment funds by business sector or by market segment (seed, venture, development). Private equity is usually used to finance cleantech (or greentech) companies defined as companies that produce processes, products and services that reduce negative environmental impacts, including GHG emissions.

At the moment, there are few dedicated PE funds for green products. However, more and more integrate ESG criteria when selecting investments. A survey⁶ by PwC indicates that 83% of PE funds report to investors on their ESG activities in 2016, compared to 56% in 2013.

Green private equity is assessed by **Bloomberg New Energy Finance** using the amount of investment realised in clean energy and energy smart technologies. Investors are assigned to the financial centre in which their head office is based. Only the world's top-20 investors by volume are taken into account in this

table, representing 62% of the market share. Tokyo, Paris and Milan are not represented in this top-20 table.

Financial centre	PE credit in \$bn
New York	0.77
Toronto	0.21
London	0.14
Frankfurt	0.11
Tokyo	n/a
Paris	n/a
Milan	n/a

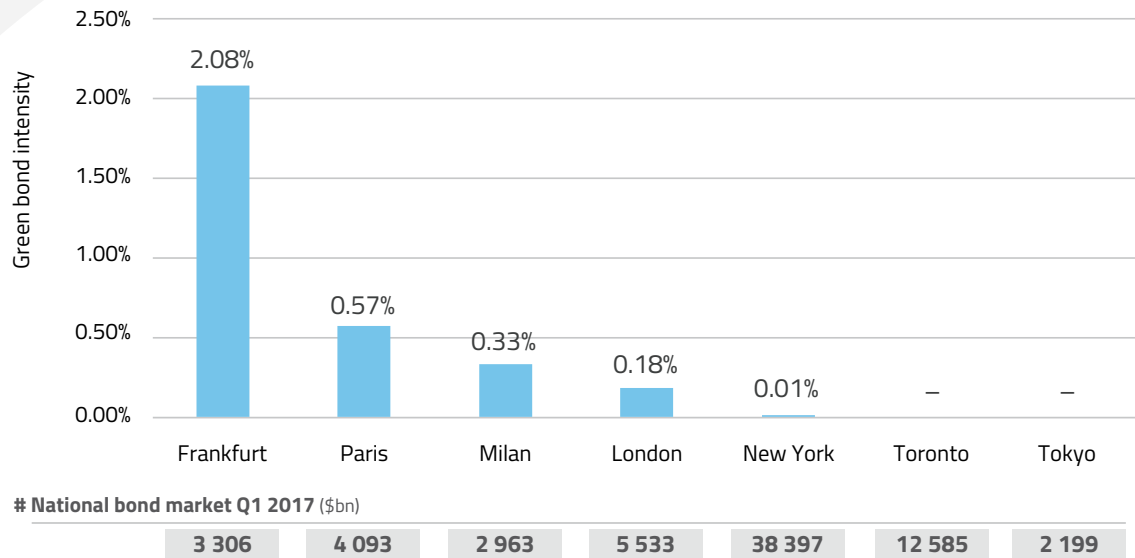
Source: Bloomberg New Energy Finance – League tables 2016 – Venture Capital / Private Equity top-20 investors

6 PwC Global PE Responsible Investment Survey 2016

3.3. Green intensity of bond markets

Figure 5. The concentration of green bonds on the bond market provides a first insight of green intensity of a specific financial centre.

Source: Bank for International Settlements – Q1 2017



The green intensity is calculated here by dividing the sum of green bonds (allocation per stock exchange listing) by the national bond market size. Data for assessing the bond market size originates from the **Bank for International Settlements**⁷. In the specific case of the Frankfurt financial centre, as bond market data is only available at a national level, the ratio is calculated by dividing all green bonds listed on German

stock exchanges by the overall bond market size in Germany. Bond issued by multilateral development banks are not taken into account.

Although the green bond market is currently booming, with a \$100bn-cap emission exceeded in November 2017, it still amounts to a small part of the overall bond market, below 1% except for Germany where green bonds take the largest share of the bond market among G7 financial centres, with a still relatively modest 2% share.

⁷ <https://www.bis.org/statistics/c1.pdf>

3.4. Green integrity of product offering and actors

The term “green” is most often self-proclaimed. Several indicators can constitute signs of its trustworthiness (compliance with recognised principles, product-labelling, measurement of the impact of investments...).

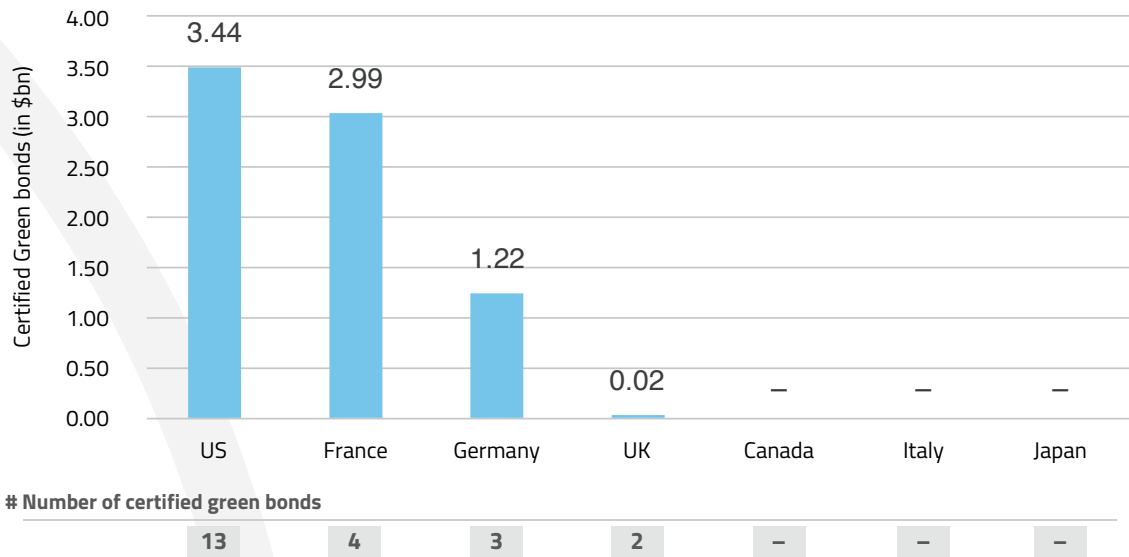
This year’s report is limited to the number and volume of certified green bonds by the CBI. This sole indicator is due to the very limited universe of other labelled asset classes and to the lack of international data to trace them. The Climate Bond Initiative certification is a voluntary process

designed to work in parallel with the normal bond issuance process, including a pre-issuance and a post-issuance phase. The bond must follow the Climate Bond Standard and the issuer shall have established internal processes and controls to keep track of how the bond proceeds are used.

13 US green bonds totalling \$3.44bn have been certified by CBI. France and Germany complete the top-3, while issuers from other G7 countries have almost never certified their green bonds.

Figure 6. Number and volume of CBI certified green bonds per issuers' country

Source: Climate Bond Initiative – Certified Green Bonds (January 2009 – August 2017)



3.5. Dynamics

The concept of the green financial centre is recent and significant progress is expected in order to accompany the green transition of the financial industry. The demand for green capital by investors is here chosen as a sign of a good dynamic at a financial centre level, along with the share of companies using an internal carbon price and classifying its products as low carbon and/or avoided emissions. Although this does not reflect the 'greenness' of financial centres, it gives an outlook of ongoing voluntary good practices.

■ Emerging portfolio climate risk management among investors

More and more investors are willing to place their investments in assets and products which reduce their long term climate and environment-related risks and are thus contributing to the 'greening' of finance. It is proposed to use the demand for green capital by investors as a sign of a dynamic green financial centre. Data comes from Asset Owner Disclosure Project (AODP) and is available at country level.

Climate risk exposure management of the top-500 asset owners (AO) aggregated under their country and the corresponding covered assets under management (AUM)

Source: AODP Global Climate 500 Index

Country	AODP Rating	Total # Asset Owners	% of AO with A-AAA rating	% of AUM with A-AAA rating	AUM in \$bn
France	B	13	31%	42%	1,961
UK	CC	43	9%	14%	3,171
Italy	D	5	0%	0%	643
Canada	D	25	0%	0%	1,349
USA	D	183	4%	17%	10,382
Germany	D	25	0%	0%	1,591
Japan	D	23	0%	0%	5,702

Depending on their portfolio climate risk management, asset owners are given a rating from AAA to D, plus an X-rating when no evidence of action is established. More details about the method are given in appendix.

Based on published information, asset owners (AO) results at managing climate risk within their portfolios are quite diverse among our panel of 7 financial centres:

- 42% of French assets under management by the 13 French AO among the world-largest 500 asset owners are rated with the highest AODP (A-AAA) grades.
- None of the Italian, Canadian, German or Japanese AO reached these grades in 2016.

It is to be pointed out that only the best ratings (AAA to A) have been displayed, which explains why the US ranks behind Italy and Canada. While 4% of US-based AO are rated A-AAA, 63% get an X-rate, meaning no evidence of considering financial implications of climate change in investments.

■ Emerging carbon policies in the corporate sector

Under the pressure of regulation, investors and public opinion, more and more companies are developing a carbon policy. A growing proportion of players recognise that putting a price on carbon emissions influences their decisions⁸ and encourages them to invest in clean energies and low-carbon technologies. Public authorities in several countries have already taken this step. In 2016, 13% of world carbon emissions are covered by a regulatory pricing mechanism. The internal carbon price value is set on a voluntary basis by the company to internalise the economic cost of its carbon emissions. It is both a decarbonation strategy decision-making tool and a risk management instrument.

The internal carbon price mainly follows two complementary approaches:

- a steering carbon price defined by the company and integrated to its investment decisions, and
- an internal carbon tax which the company applies voluntarily to its operations, raising their costs depending on the resulting carbon emissions. The generated product is then used at the company's discretion.

It shall be noted that the figures presented hereinafter are an indicator of green dynamism but do not reflect the 'greenness' of companies on a financial centre. As the carbon price is set internally, it may significantly differ from one company to the next. However, companies using an internal carbon price indicate that they have developed a carbon policy and are getting prepared for the possibility of an increasingly significant carbon market.

For each financial centre within our panel, the table presents the proportion of total market capitalization corresponding to listed companies that use an internal carbon price.

Similarly, the table also shows reporting details of whether these companies classify their products and/or services as low carbon products and/or enable a third party to avoid greenhouse gas (GHG) emissions.

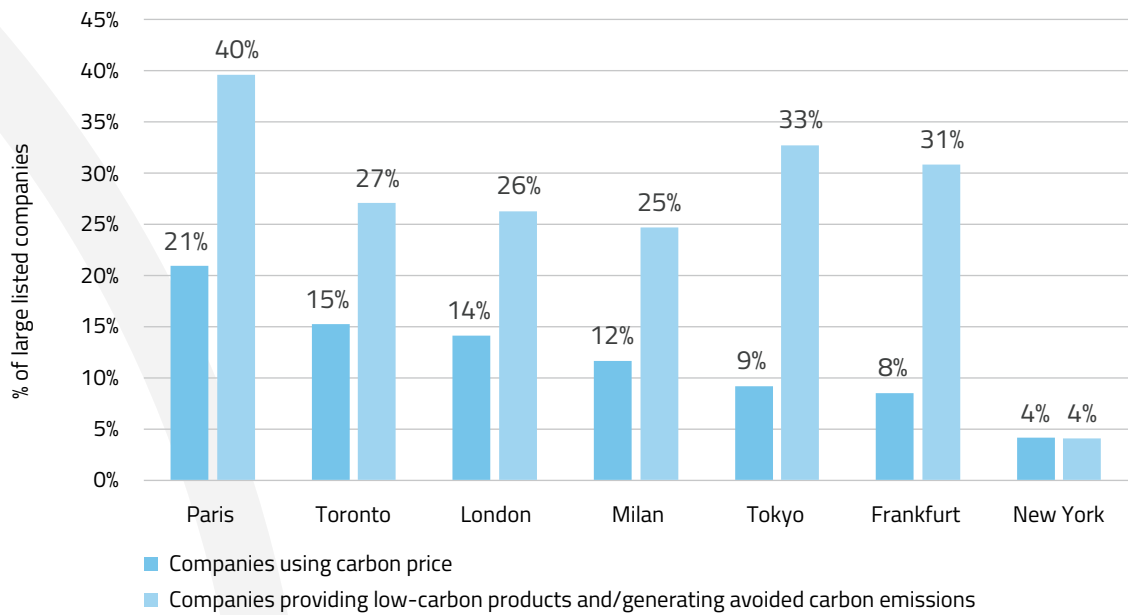
These tables have been established from companies' answers to the **Carbon Disclosure Project's** (CDP) questionnaire. As answers to CDP questionnaires are given on a voluntary basis, information is not available for all listed companies, and ratios calculated may therefore be underestimated⁹. For more consistency in the results, only the largest companies with a capitalisation of over \$1bn (December, 30th 2016) are being considered.

8 EPE & I4CE: Prix interne du carbone, une pratique montante en entreprse, 2016

9 As a conservative measure, companies who did not answer to CDP are considered neither to use carbon prices nor to propose low carbon products and services nor to allow third parties to avoid GHG emissions.

Figure 7. Share of large listed companies on G7 financial centres using a carbon price or providing low-carbon products / services or allowing third parties to avoid GHG emissions

Source: CDP Public Investors 2017



Large listed companies

Paris	Toronto	London	Milan	Tokyo	Frankfurt	New York
139	211	320	69	591	130	1,894

21% of large French companies use an internal carbon price, ahead of Toronto (15%) and London (14%). At the other end, only 4% of New York large companies report using an internal carbon price.

Between 25% and 40% of companies listed in Paris, Toronto, London, Milan, Tokyo and Frankfurt provide low carbon products and/or enable third parties to avoid GHG emissions.

Once again, New York lags behind with only 4% of its large listed companies doing so.

The 21% of Paris' large companies using an internal carbon price represent 37% in volume of the over-\$1bn overall capitalisation. For London and Frankfurt, companies using a carbon price represent 32% and 23% of their respective stock exchange capitalisation.

Green finance initiatives in financial centres

Among the seven financial centres under study, three already existing green finance initiatives contribute to establishing a positive green dynamics.

Financial centre	Green finance initiative
Frankfurt	Accelerating Green Finance
London	Green Finance Initiative
Paris	Finance for Tomorrow

4. Financial centre summaries

A questionnaire addressed to financial centres representatives has been sent October 2017. It was meant to contribute to assess the quantity and quality of green activity at a financial centre level.

The questionnaire focuses on teams, skills and dynamics, while information above were gathered through external sources such as existing league tables, indexes and databases. This questionnaire is intended to better estimate the variety of services provided

at a financial centre level and its specialization on certain types of products and activities.

Only the French financial centre green initiative (Finance for Tomorrow, Paris Europlace) has completed the questionnaire, which curbs the opportunities to draw valuable conclusions from comparisons between financial centres. This first draft will be adjusted in the forthcoming editions of the study and will hopefully help to assess financial centres' contribution to green finance.

Frankfurt (Germany)

Green finance initiative

Accelerating Sustainable Finance

Green Bonds

Green bond stock exchange listing name: **n/a**

Green bond value:..... **€26.6bn**

green bonds listed:..... **198**

certified green bonds:..... **3**

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$17.0bn from 5 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... **n/a**

crowdfunding platforms:..... **n/a**

Sustainable indices

- ÖkoDAX, DAXglobal Alternative Energy, DAXglobal Sarasin Sustainability Germany, STOXX ESG Leaders Index, STOXX Sustainability Index, Photovoltaik Global 30, Credit Suisse Global Alternative Energy

Research institutions

Academics

(chairs, institute, research initiative): **n/a**

Think-tanks: **n/a**

Green finance specialized university curricula:... **n/a**

London (United Kingdom)

Green finance initiative
Green Finance Initiative



Green Bonds

Green bond stock exchange listing name:..... **n/a**

Green bond value:..... **€10.1bn**

green bonds listed:..... **55**

certified green bonds:..... **2**

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$8.7bn from 5 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... **n/a**

crowdfunding platforms:..... **n/a**

Sustainable indices

- FTSE Green Revenues Index Series, FTSE4Good Index Series, FTSE Environmental Market Index Series, FTSE All-World Ex-Fossil Fuel Index Series

Research institutions

Academics

(chairs, institute, research initiative):..... **n/a**

Think-tanks:..... **n/a**

Green finance specialized university curricula:... **n/a**

Milan (Italy)

Green finance initiative
n/a

Green Bonds

Green bond stock exchange listing name:..... **n/a**

Green bond value:..... **€9.8bn**

green bonds listed:..... **83**

certified green bonds:..... **no**

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$4.5bn from 3 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... **n/a**

crowdfunding platforms:..... **n/a**

Sustainable indices

no

Research institutions

Academics

(chairs, institute, research initiative):..... **n/a**

Think-tanks:..... **n/a**

Green finance specialized university curricula:... **n/a**

New York (United States)

Green finance initiative

n/a

Green Bonds

Green bond stock exchange listing name:..... n/a

Green bond value:..... **€4.7bn**

green bonds listed:..... **19**

certified green bonds:..... **13**

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$11.8bn from 8 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... n/a

crowdfunding platforms:..... n/a

Sustainable indices

- NYSE Arca Environmental Services Index, NYSE Arca WilderHill Clean Energy Index, NYSE Arca WilderHill Progressive Energy Index, NYSE Arca Cleantech Index
- Nasdaq Clean Edge US index, OMX CRD Global Sustainability Index, OMX GES Ethical indexes

Research institutions

Academics

(chairs, institute, research initiative):..... n/a

Think-tanks:..... n/a

Green finance specialized university curricula:.. n/a

Paris (France)

Green finance initiative

Finance for Tomorrow



Green Bonds

Green bond stock exchange listing name:
Euronext Green Bond Franchise

Green bond value:..... **€23.4bn**

green bonds listed:..... **51**

certified green bonds..... **4**

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$17.2bn from 5 major lead arrangers, mostly for renewable energy projects

Green Asset Management funds

7 funds managed by 6 asset managers

Green Private Equity funds

7 PE funds

\$700m invested in cleantech in 2016 through 85 deals

Green crowdfunding

Crowdfunding debt for renewable energy projects in 2016:..... **€11.5m**

crowdfunding platforms:..... **13**

supported projects:..... **25**

Sustainable indices

- CAC40 Governance, Euronext Low Carbon, Euronext Climate Europe, Euronext Objective Climate 50, Euronext Family Business

Dedicated segment

Euronext Cleantech franchise | **58** issuers totaling a combined market capitalization of **€41bn**

Research institutions

Academics

(chairs, institute, research initiative): **17**

Think-tanks: **10**

Green finance specialized university curricula:.... **8**

Tokyo (Japan)

Green finance initiative

n/a

Green Bonds

Green bond stock exchange listing name:..... n/a

Green bond value:..... n/a

green bonds listed:..... n/a

certified green bonds:..... no

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$37.0bn from 5 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... n/a

crowdfunding platforms:..... n/a

Sustainable indices

- S&P/TOPIX 150 Carbon Efficient Index

Research institutions

Academics

(chairs, institute, research initiative):..... n/a

Think-tanks:..... n/a

Green finance specialized university curricula:.. n/a

Toronto (Canada)

Green finance initiative

n/a

Green Bonds

Green bond stock exchange listing name:..... n/a

Green bond value

(total cumulated up to oct-2017):..... n/a

green bonds listed:..... n/a

certified green bonds:..... no

Green Lending, Asset Management, Private Equity

Green lending market and actors

\$6.5bn from 6 major lead arrangers

Green Asset Management funds

n/a

Green Private Equity funds

n/a

Green crowdfunding

Crowdfunding:..... n/a

crowdfunding platforms:..... n/a

Sustainable indices

- S&P/TSX 60 ESG, S&P/TSX 60 Fossil Fuel Free Carbon Efficient Index, S&P/TSX 60 Fossil Fuel Free Index, S&P/TSX Renewable Energy and Clean Technology Index

Research institutions

Academics

(chairs, institute, research initiative):..... n/a

Think-tanks:..... n/a

Green finance specialized university curricula:.. n/a

5. Appendix. Complementary method description

5.1. Taxonomy

This document focuses on 'green' projects, which is a smaller scope than Sustainable and Responsible Investments (SRI). 'Green' projects include renewable energy, energy efficiency,

water treatment, waste management and low carbon transportation topics. Financial products (e.g. 'green' bonds and 'green' loans) are used to finance such projects.

5.2. Currency and exchange rates

Green bond values are given in USD. The rates of exchange correspond as much as possible to the date of issue for each bond. If not available, the

rate of exchange from December, 1st 2017 has been used.

5.3. Stock Exchanges

For each financial centre the following stock exchanges have been taken into account:

- Frankfurt: FWB;
- London: LSE;
- New York: NYSE + Nasdaq (values from the 2 stock exchanges are added together);
- Paris: Euronext Paris;
- Tokyo: JPX;
- Toronto: TSX.

5.4. Details on indicators

■ Corporate Knight Disclosure score

Each year, in its "Measuring Sustainability Disclosure"¹⁰ report, Corporate Knights Inc. publishes a ranking of companies listed on the main stock exchanges, based on Bloomberg and Thomson Reuters data. This ranking picks up on information made public by companies, resulting not only from regulations but also from their own initiatives. Since the methodology for this annual exercise has remained unchanged since it was first presented in 2012, it is possible to therefore compare and contrast

stock exchanges on any progress made in terms of the public availability of quantitative sustainability performance data.

The Corporate Knights score is based on an analysis of seven sustainability indicators, from Bloomberg and Thomson Reuters data for the year 2015:

1. Energy use;
2. Greenhouse gas emissions (GHGs);
3. Waste generation;
4. Water use;
5. Injury employee rate;
6. Employee turnover rate;
7. Personnel costs.

¹⁰ <http://www.corporateknights.com/reports/2017-world-stock-exchanges/>

Only publicly traded companies with a revenue above \$1bn in FY2016-17 have been analysed. The score is the result of 3 measures of performance:

- (i) The proportion of listed entities of each exchange disclosing the seven indicators (50% scoring weight);
- (ii) The growth rate in the proportion of listed entities of each exchange disclosing the seven indicators in the period 2011-2015 (20% scoring weight);
- (iii) The delay in reporting sustainability data after the end of the fiscal year for listed entities of each exchange (30% scoring weight).

■ Asset Owner Disclosure Project rating

The Asset Owner Disclosure Project (AODP) – an independent global not-for-profit organisation – publishes yearly the AODP Global Climate 500 Index, rating the world’s 500 biggest asset owners (including pension funds, insurers, sovereign wealth funds, foundations and endowments) “on their success at managing climate risk within their portfolios, based on direct disclosure and publicly available information”.¹¹

Here, environmental considerations other than climate risks are not looked at. Three indicators are taken into account to assess each asset owner with a grade:

- Governance & Strategy
 - Organisation structure and approach used to oversee climate risk mitigation actions and objectives;
 - Degree of integration of climate risk principles in the organisation’s policies and processes;
- Portfolio Carbon Risk Management
 - Variety and effectiveness of tools and approaches used to evaluate and manage climate change-related financial risks and opportunities. This includes engagement, voting practices, and portfolio management tools;

■ Metrics & Targets

- Key metrics used to measure, monitor and compare portfolio climate risk management performance, including the value asset owners have invested in low-carbon assets.

The world’s top-500 asset owners by size are aggregated under their country by AODP. A-rating to AAA-rating means that the asset owner can demonstrate strong to elite performance across all capabilities mentioned above. It should be noted that only the top 7% of the 500 asset owners present sufficient evidence to obtain an A to AAA rate.

■ UN Environment Inquiry

The Inquiry is a leading international platform for advancing national and international efforts to shift the trillions required for delivering an inclusive, green economy through the transformation of the global financial system. Since launching in 2014, the Inquiry has worked with more than twenty countries on national processes, published around 90 reports and working papers and serves as the Secretariat for the G20’s Green Finance Study Group.

The UN Environment Inquiry is intended to support the acceleration of the transition to a green economy by identifying best practice, and exploring financial market policy and regulatory innovations that would support the development of a green financial system. In particular, the UN Environment Inquiry compiles main actions taken by governments and financial regulators through mandatory and voluntary measures.

¹¹ AODP Global Climate 500 Index 2017 - <http://aodproject.net/global-climate-500-index/>

Climate-KIC
www.climate-kic.org

I4CE
www.i4ce.org

PwC
www.pwc.fr