



# The Global Green Finance Index 1

MARCH 2018





We are pleased to present the first edition of the Global Green Finance Index (GGFI 1).

The GGFI has been developed jointly by Z/Yen, as part of its Long Finance Initiative, and Finance Watch. We are grateful to the MAVA Foundation for its sponsorship of this work.

Founded by late Dr Luc Hoffmann in 1994, **MAVA** is a Swiss-based philanthropic foundation with a focus on biodiversity conservation. Running three region-based programmes in Switzerland, the Mediterranean and West Africa, and a fourth programme focused on Sustainable Economy, MAVA works through partnerships with international, national and local NGOs, research institutions and universities, and occasionally with government bodies or individuals.

**Finance Watch** is a European, not-for-profit association of civil society members, dedicated to making finance work for the good of society. Finance Watch works for a financial system that allocates capital to productive use through fair and open markets, in a transparent and sustainable manner without exploiting or endangering society at large.

**Z/Yen** helps organisations make better choices - our clients consider us a commercial think-tank that spots, solves and acts. Our name combines Zen and Yen - "a philosophical desire to succeed" - in a ratio, recognising that all decisions are trade-offs. One of Z/Yen's specialisms is the development and publication of research combining factor analysis and perception surveys.

**Long Finance** is a Z/Yen initiative designed to address the question "**When would we know our financial system is working?**" This question underlies Long Finance's goal to improve society's understanding and use of finance over the long-term. In contrast to the short-termism that defines today's economic views the Long Finance time-frame is roughly 100 years.

The authors of this report, Greg Ford, Mireille Martini, Simon Mills and Mike Wardle, would like to thank Shevangee Gupta, Bikash Kharel, Nina Lazic, Benoît Lallemand, Michael Mainelli, Mark Yeandle and the rest of the Z/Yen and Finance Watch teams for their contributions with research modelling and ideas.



## Foreword

Over the last 24 years of conservation philanthropy, the MAVA Foundation has supported more than 850 projects to bring human activity in harmony with nature. We are pleased to add the Global Green Finance Index (GGFI) to this list, in partnership with Finance Watch and Z/Yen, as part of our programme to contribute to the creation of a more sustainable global economic system.

Great strides have been made by pioneering organisations over the last two decades and green finance is becoming a mainstream economic activity. The MAVA Foundation believes that in the coming years the profile of this field is set to grow rapidly.

From tackling global threats such as climate change, to delivering new opportunities in risk management and the financing of technological innovation, financial services have a critical role in achieving the Sustainable Development Goals. As the markets for green finance continue to grow, the field has the potential to drive a shift towards an economy that ensures human prosperity and a healthy planet.

In policy terms it is often remarked that “what you measure is what you get”. This new index that measures how ‘green’ financial centres are, will help catalyse movement towards supporting an economy that respects planetary limits and supports sustainable development.

In commissioning the Global Green Finance Index, the MAVA Foundation is seeking to establish a programme which will:

- provide insight on what makes a financial centre ‘green’ or not;
- promote a race to the top in green finance; and
- spread best practice in green finance and green financial centres.

In pursuit of these goals the GGFI will be published twice a year with a significant online presence. We hope that the GGFI will give policy makers insight into the growth and competitiveness of green financial centres over time, and encourage the sharing of best practice.

We are particularly excited that smaller and more specialised centres, such as Hamburg and San Francisco, and financial centres with strong policy frameworks around green finance, such as Paris, Luxembourg and centres in China have performed well in this first index. The findings in this report show that greener finance can follow its own path of development and that today’s strategic policymaking will be crucial for shaping tomorrow’s green financial centres.

**André Hoffman**

President

MAVA, *Fondation pour la Nature*

## Introduction

Welcome to the inaugural Global Green Finance Index (GGFI), the first edition in a series which will chart the progress of the world's financial centres towards a financial system that delivers sustainable development, and values people and the planet as much as profit.

As we accelerate through the 21<sup>st</sup> Century, the world is facing a number of significant challenges which will require unprecedented levels of investment in systems and infrastructure if they are to be overcome.

The UN recognises the vitally important role of a sustainable financial system, which *“serves the long term needs of a healthy real economy, an economy that provides decent, productive and rewarding livelihoods for all, and ensures that the natural environment on which we all depend remains intact and so able to support the needs of this and future generations.”*<sup>1</sup>

### Why An Index?

Measurement is important, and this is reflected in the mantra of business management, “we value what we measure”.

As Mainelli and Harris point out, *“Environmental Sustainability is a tough equation”*,<sup>2</sup> so the more data we have to work with the better.

However, as Boyle states, we are often *“exact about some of the least interesting things, but silent on wider and increasingly important truths.”*<sup>3</sup>

Measurement is only a means to an end. The purpose of measurement is to create the data from which information and knowledge emerge. Information and knowledge which can be used as the basis for sound decision making and policy creation.

We hope that this index will provide policy makers, businesses, academics and NGOs with data that can be used to facilitate the development of sustainable financial systems and the greening of financial products and services.

### What Are We Seeking To Measure?

The GGFI seeks to measure perceptions of the quality and depth of green financial products across the world's financial centres.

This leads to three questions:

- What is Green Finance?
- What is a financial centre?
- How can you measure quality and depth?

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<sup>1</sup> UNEP 2016 *Imagining a Sustainable Financial System* [http://unepinquiry.org/wp-content/uploads/2016/02/Imagining\\_a\\_Sustainable\\_Financial\\_System.pdf](http://unepinquiry.org/wp-content/uploads/2016/02/Imagining_a_Sustainable_Financial_System.pdf)

<sup>2</sup> Mainelli M & Harris I *“The Price of Fish: A New Approach To Wicked Economics And Better Decisions”* NB Publishing 2011 [https://www.amazon.co.uk/Price-Fish-Approach-Economics-Decisions-ebook/dp/B01HPVH806/ref=sr\\_1\\_1?s=books&ie=UTF8&qid=1517488400&sr=1-1&keywords=The+price+of+fish](https://www.amazon.co.uk/Price-Fish-Approach-Economics-Decisions-ebook/dp/B01HPVH806/ref=sr_1_1?s=books&ie=UTF8&qid=1517488400&sr=1-1&keywords=The+price+of+fish)

<sup>3</sup> Boyle, D 2010 *“The Tyranny of Numbers”*, Flamingo; New Ed edition



## What Is Green Finance?

Numerous organisations and institutions have developed their own definitions of Green Finance.

The G20 defines Green Finance as the “*financing of investments that provide environmental benefits in the broader context of environmentally sustainable development*”.<sup>4</sup> The OECD considers the term to be “*stand-alone, a sub-set of a broader investment theme or closely related to other investment approaches such as SRI (socially responsible investing), ESG (environmental, social and governance investing), sustainable, long-term investing or similar concepts.*”<sup>5</sup>

Deutsches Institut für Entwicklungspolitik (DIE) defines it as the financing of public and private green investments (including preparatory and capital costs) in the following areas:

- environmental goods and services (such as water management or protection of biodiversity and landscapes);
- prevention, minimization and compensation of damages to the environment and to the climate (such as energy efficiency or dams);
- the financing of public policies (including operational costs) that encourage the implementation of environmental and environmental-damage mitigation or adaptation projects and initiatives (for example feed-in tariffs for renewable energies);

- components of the financial system that deal specifically with green investments, such as the Green Climate Fund or financial instruments for green investments (e.g. green bonds and structured green funds), including their specific legal, economic and institutional framework conditions.<sup>6</sup>

For the purposes of the GGFI, Green Finance refers to any financial instrument or financial services activity – including insurance, equity, bonds, commodity and derivatives trading, analytical or risk management tools – which results in positive change for the environment and society over the long term (sustainability). The most basic “greenness” criterion of a company or project is that it contributes to reducing the emission of Greenhouse Gases.

Over the last two decades, the rise of new financial instruments, such as Green Bonds, and environmental markets, such as carbon, forestry, or water services, along with advances in analytical techniques, have increased attention on Green Finance.

As demonstrated by its prominence in international policy discussions, such in recent World Economic Forum meetings, Green Finance is no longer seen as a fringe activity, but a profitable and desirable sector, which drives financial markets, serves society and enhances the status of financial centres that demonstrate expertise.

<sup>4</sup> G20 Green Finance Study Group 2016 *G20 Green Finance Synthesis Report* [http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis\\_Report\\_Full\\_EN.pdf](http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf)

<sup>5</sup> Inderst, G., Kaminker, Ch., Stewart, F. (2012), “Defining and Measuring Green Investments: Implications for Institutional Investors” Asset Allocations”, OECD Working Papers on Finance, Insurance and Private Pensions, No.24, OECD Publishing. [https://www.oecd.org/finance/WP\\_24\\_Defining\\_and\\_Measuring\\_Green\\_Investments.pdf](https://www.oecd.org/finance/WP_24_Defining_and_Measuring_Green_Investments.pdf)

<sup>6</sup> Lindenberg, N. 2014 *Definition of Green Finance*, DIE, Bonn [https://www.die-gdi.de/uploads/media/Lindenberg\\_Definition\\_green\\_finance.pdf](https://www.die-gdi.de/uploads/media/Lindenberg_Definition_green_finance.pdf)

The transition to a green economy, required if the world is to meet the targets laid down in the Paris Agreement, is a global investment opportunity estimated to be worth tens of trillions of dollars.<sup>7</sup> Vast investment is required for sustainable urbanisation in the face of a growing world population.<sup>8</sup>

Financial services, if properly regulated and sized, are an essential component of a sustainable economy,<sup>9</sup> which meets the needs of stakeholders, enhances quality of life, protects the environment and addresses global issues such as climate change. However, there is still a long way to go: so far, only five to ten percent of bank loans are “green”<sup>10</sup> (based on data from the few countries where national definitions of green loans are available), brown finance (finance flows that support carbon-intensive projects or activities) still massively overshadows green: G20 countries alone spent USD 72 billion annually in public finance on fossil fuel energy production between 2013 and 2015.<sup>11</sup>

Financial systems are failing effectively to reflect pricing signals and risk, as financial systems do not routinely take account of environmental costs or environmental limits. Four out of nine “planetary boundaries” have been crossed: climate change, loss of biosphere integrity, land-system change, and altered biogeochemical cycles.<sup>12</sup>

To help explore these issues, the Global Green Finance Index gives a measure of how financial centres are responding to this challenge. We hope that enabling centres to compare their performance with their peers will improve policy makers’ understanding of the drivers of green growth, and assist them in shaping financial systems to support sustainability goals.

#### *What Is A Financial Centre?*

For practical purposes, a financial centre often means a city with a stock exchange. UNEP defines financial centres “as cities with an intense concentration of financial activity involving an interlocking set of financial sectors and transactions.”<sup>13</sup>

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<sup>7</sup> BOE 2017 *The Bank of England’s response to climate change* Quarterly Bulletin, 2017 Q2 <https://www.bankofengland.co.uk/-/media/boe/files/quarterly-bulletin/2017/the-banks-response-to-climate-change.pdf>

<sup>8</sup> Von Gunten, C. 2014 *Financing Tomorrow’s Cities* Z/Yen, London [http://www.longfinance.net/images/reports/pdf/COLC\\_FTMetaAnalysis\\_2014.pdf](http://www.longfinance.net/images/reports/pdf/COLC_FTMetaAnalysis_2014.pdf)

<sup>9</sup> Mainelli, M & Mills, S 2018 *Financial Innovations & Sustainable Development* Z/Yen Ltd, London

<sup>10</sup> Dombret, A. & Loriet, A. 2017 “These are the risks and opportunities of Green Finance” WEF <https://www.weforum.org/agenda/2017/07/green-finance-risk-and-opportunity/>

<sup>11</sup> OCI 2017 “*Talk Is Cheap: How G20 Governments are Financing Climate Disaster*” [http://priceofoil.org/content/uploads/2017/07/talk\\_is\\_cheap\\_G20\\_report\\_July2017.pdf](http://priceofoil.org/content/uploads/2017/07/talk_is_cheap_G20_report_July2017.pdf)

<sup>12</sup> W Steffen 2015- Planetary Boundaries - an update <http://www.stockholmresilience.org/research/research-news/2015-01-15-planetary-boundaries---an-update.html>

<sup>13</sup> UNEP 2017 *Financial Centres For Sustainability* UNEP/Corporate Knights [https://wedocs.unep.org/bitstream/handle/20.500.11822/20999/Financial\\_Centres\\_for\\_Sustainability.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/20999/Financial_Centres_for_Sustainability.pdf?sequence=1&isAllowed=y)

### *Our Approach To Measuring Quality And Depth*

Green financial products and services have been traded for over two decades, but until recently, volumes were quite small and trade tended to be primarily restricted to niche and domestic, rather than mainstream international markets.

Measuring the quality and depth of green financial products across the world's financial centres presents a significant challenge. This has been recognised by the UN and other international bodies and has formed the focus of a number of initiatives, including UNEP FI's Positive Impact Initiative,<sup>14</sup> UNEP's Financial Centres For Sustainability Initiative,<sup>15</sup> Climate KIC, I4CE and PwC's Benchmark,<sup>16</sup> and UN PRI's Sustainable Stock Exchanges Initiative.<sup>17</sup>

The GGFI is complementary to these initiatives, as it seeks to use advanced statistical techniques to bridge the gaps in existing data by combining quantitative factors with the perceptions of financial services professionals and other experts.

Another strength of this approach is that it is future-facing; combining the real-time opinions of practitioners with past performance data. As survey data for the GGFI is gathered on a continual basis and the intention is to publish updates twice a year, the index will be sensitive to real-time changes in the international policy environment and developments in financial services markets.

The survey asks for views on the penetration of green finance in a financial centre's overall financial activities. This reflects that the mix of financing activities, such as the ratio between green and brown financing, is important for sustainability.

The survey also asks about the quality of green finance, enabling respondents to rate a financial centre independently from its market volumes. Thus, if a centre adopts weak green labelling standards in a bid to boost volumes, this may show up in the GGFI as a lower quality rating. This approach is designed to encourage a race-to-the-top among financial centre policymakers.

The GGFI, in combination with the other measurement initiatives listed above will allow the identification of trends, and potentially enable policy makers to track the impacts of their decisions and identify and fill data gaps.

We hope to add more instrumental factors to the index as the availability of green finance data improves, and to add more financial centres as we build the number and geographical spread of survey respondents (several centres that did not receive enough assessments to be included in GGFI 1, such as Casablanca, Istanbul and Prague, would have performed relatively well had they had more assessments).

Information regarding the methodology used in the development of the GGFI is at Appendix 4.

<sup>14</sup>. UNEPFI 2017 *Positive Impact Initiative* <http://www.unepfi.org/positive-impact/positive-impact/>

<sup>15</sup>. UNEP 2017 *Financial Centres For Sustainability* [http://unepinquiry.org/wp-content/uploads/2017/06/Financial\\_Centres\\_for\\_Sustainability.pdf](http://unepinquiry.org/wp-content/uploads/2017/06/Financial_Centres_for_Sustainability.pdf)

<sup>16</sup>. Climate KIC, I4CE and PwC 2017 *Benchmarking the Greenness of Financial Centres* <https://www.i4ce.org/wp-core/wp-content/uploads/2017/12/0118-Climate-KIC2752-Rapport-Benchmarking.pdf>

<sup>17</sup>. UNPRI/UNCTAD 2009 <http://www.sseinitiative.org/>

## GGFI 1 Summary And Headlines

The Global Green Finance Index is based on a worldwide survey of finance professionals' views on the quality and depth of green finance offerings across 108 international financial centres.

The online survey is at <http://survey.greenfinanceindex.net/>. Please take a moment to fill it in if you have not already done so: the survey is running continuously, and the more responses are collected, the more significant the results.

The 47 centres listed in this first edition of the Index (GGFI 1) are those which received a minimum of ten assessments from survey respondents. Assessments of respondents' home centres were excluded from the data in order to avoid home centre bias.

The assessments were combined with 113 Instrumental factors to give an overall rating for each centre. These instrumental factors are quantitative measures provided by third parties including Corporate Knights, the Carbon Bonds Initiative, the World Health Organisation, the United Nations Environment Programme Finance Initiative and the World Bank among others.

We received 1,790 ratings from 337 individual respondents over two months, from 15 December 2017 to 5 February 2018. Details of the profile of these respondents can be found in Appendix 3. The survey runs continuously online and will be sampled every six months in order to generate further editions of the index.

### The Results – Penetration And Quality of Green Finance

- **The ratings for penetration of green finance in a centre's overall financial offering range between 333 and 402 out of 1000.** This is equivalent to between three and four out of ten on a ten point scale. These assessments are higher than the very low historical market data on penetration - for example green bonds made up only 2.08% or less of G7 national bond markets in 2017<sup>18</sup> - and suggests that due to their involvement with the field or the general level of debate around green finance, survey respondents may perceive green finance as being more prevalent than it is.
- **The ratings for quality given to centres range between 322 and 437 out of 1,000.** The generally low assessments given to centres by respondents, particularly for penetration, indicate that the green finance sector commands a relatively small share of global finance and there is significant room for growth in the range and quality of products on offer.

*“Important that skilled professionals have ease of movement to different centres - universally recognised credentials are necessary.”*

Central Banker, Brunei

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<sup>18</sup>. Climate-KIC, I4CE and PwC, "Benchmarking the greenness of financial centres", December 2017 <https://www.i4ce.org/wp-core/wp-content/uploads/2017/12/0118-Climate-KIC2752-Rapport-Benchmarking.pdf>



- **Narrow margins separate ranked centres.** 115 points separate the top and bottom centres in the quality index (the equivalent of one point on an assessment scale of one to ten) and a mere 69 points separate them for penetration. As further editions of the index are published, rankings are likely to be sensitive to change because of the narrow margins between ratings.
- **Western Europe does well, featuring nine of the top ten centres in the quality index and seven of the top ten in the penetration index. 21 of the 47 centres in the index are in Western Europe.** London came top for both measures, closely followed by Amsterdam for Quality and Luxembourg for penetration. Only 58 points separate the top five centres for quality and just 21 points for penetration.
- **San Francisco and Washington come equally in tenth place in the ranking as the top North American centres in the quality index. San Francisco is also the top North American centre in the penetration index.** Despite being acknowledged as one of the world's top financial centres, New York was significantly outperformed by other North American centres in the GGFI.
- **Shanghai and Shenzhen were top in the Asia Pacific region for quality and penetration respectively.** Chinese centres all performed well and were closely clustered in terms of ratings.
- **Johannesburg is the top-ranked centre in The Middle East and Africa for quality, with Cape Town just below.** Cape Town is the top centre in the penetration index in this region.
- **Mexico City and Moscow were the only centres to achieve sufficient assessments to be listed in the Latin America and the Caribbean and Eastern Europe and Central Asian regions.**
- **The index appears to demonstrate an element of centre specialism.** Centres which have demonstrated significant leadership on green finance, such as Paris, Luxembourg, and the Chinese centres, have achieved high ranking in the index.

### Green Finance Innovation: Luxembourg - Luxembourg Green Exchange

In 2016, the Luxembourg Stock Exchange launched the Luxembourg Green Exchange (LGX), the world's first platform exclusively dedicated to green securities, and today listing half the world's green bonds. The LGX today also features a dedicated social and sustainable bond window. Luxembourg has a long-established track record as the location of choice for sustainable and impact investment funds, with a total market share of 39% of responsible investment funds in European, over 60% of European impact funds as well as over 60% of global microfinance assets, and has been a pioneer in the area of sustainable finance labels for more than a decade.

<http://www.luxembourgforfinance.com/en/products-services/luxembourg-natural-choice-international-sustainable-finance>

### Green Finance Innovation: San Francisco - Green Bonds

San Francisco is a hub for cleantech finance. San Francisco benefits from California's long-standing leadership on both climate change and clean energy, as well as the state's active promotion of green finance. Public authorities in the City and Bay Area have also been active in the green bond market, issuing over US\$1 billion to date. The local private sector is also participating, with Apple making US\$2.5 billion in issuances.

<https://sfwater.org/index.aspx?page=1182>

### Additional findings

As part of the questionnaire, respondents were asked their views on the future prospects of green financial centres, on which areas of green finance from a list of options given in the survey were of most interest, which areas would have the greatest impact on sustainability, and which factors are driving the uptake of green finance. Full results of the responses to these questions are in Appendix 2.

### Future Prospects

- Paris, New Delhi, and Los Angeles led the centres whose green finance offerings were expected to improve significantly over the next two to three years.
- Paris, Frankfurt, and New York led the centres most cited as likely to become more significant over the next two to three years.
- Moscow, Boston and Chicago were the centres most expected to decline in green finance over the next two to three years.

### Areas Of Interest

From the list of options given in the survey:

- Green bonds and renewable energy investment scored highly as areas of interest in green finance, as did emerging areas such as Sustainable Infrastructure Finance and Energy Efficiency. Established areas such as Social and Impact Investment ESG analytics also did well.
- Respondents showed less interest in Climate Risk Stress Testing, Disinvestment from Fossil Fuels, Carbon Markets and Carbon Disclosure, Natural Capital Valuation, and Green Insurance;
- Amongst other areas highlighted by respondents were the circular economy and green quantitative easing.

## Areas Of Impact

- With respect to views on the areas of green finance with the greatest impact on sustainable development, Renewable Energy Investment, Green Bonds and Sustainable Infrastructure Finance were rated highest.
- ESG analytics, Social and Impact Investment and Disinvestment from Fossil Fuels were also ranked highly. The inclusion of Divestment from Fossil Fuels amongst the highest rankings in areas of impact contrasts with “areas of interest” where it received considerably less attention.
- There was a close correlation between interest and impact suggesting that, with the exception of Disinvestment from Fossil Fuels, the financial professionals working within green finance are driven to focus their attention on the areas they consider will have the most beneficial impact on sustainable development.
- These results appear to show that people in green finance markets recognise that policy has a critical role as an enabler both for technological change and in developing investor demand.
- Food security and loss of biodiversity score low as drivers, which may suggest that these areas are currently a low priority in terms of the development of green finance products, or in policy.
- Few respondents gave insurance industry research and academic research high scores as drivers of Green Finance uptake. This may reflect the interests of respondents, few of whom were from the insurance industry.

## Drivers Of Green Finance

- There were two themes that arose from respondents’ views on the drivers of the uptake of green finance.
  - ◇ First, an enabling policy framework - at national and international level driving tax incentives, mandatory disclosure and technological change.
  - ◇ Second, demand – from investors, climate change, public awareness, and infrastructure investment.

### Green Finance Innovation: Moscow - Capital Repairs

Russia accounts for largest proportion of climate-aligned bonds from Eastern Europe. In addition to bond issuance associated with infrastructure renewal, a significant driver has been the Law on Capital Repairs (adopted in 2013), a large scale housing policy reform, established a new system for financing capital repairs of multi-family buildings in Russia, with increased role of the private sector, leading to climate change benefits.

## Conclusions

This is the first edition of the GGFI and, as further editions of the index are developed, the data on which we base our conclusions will grow richer. The conclusions we reach at this stage are as follows:

- Green finance is perceived as being more prevalent than the data suggests;
- The market in green finance is immature;
- Respondents recognise the importance of policy frameworks and investor demand in fuelling the growth of green finance markets;
- There is a disconnection between some areas of high impact, such as divestment from fossil fuels, and areas of interest and activity, suggesting a potential role for policy action;
- There is a narrow range in the ratings of financial centres meaning that the index is reactive to changes in policy and market conditions;
- The relative positions of financial centres show that financial centres can pull ahead of more dominant rivals through specialisation, encouraged by policy frameworks;
- The level of response we had to our survey from the global finance community demonstrates a high level of interest in this area.

## Outlook For Further Research

As noted, we are in the early stages of the index, which is a piece of longitudinal research. Our work so far raises a number of questions that invite further research. We will explore these as we gather more data. Experience from other research suggests that significant improvements will be taking place in centres as we move forward and that as the data we have grows, we will be able to develop our analysis.

Areas for further research are likely to include:

- Which factors lead to significant improvements in centres over time?
- Which policy and regulatory changes are having most effect?
- How those working in different sectors and with differing levels of involvement in green finance view the field?

### Green Finance Innovation: Paris - Finance For Tomorrow

Finance for Tomorrow is a major initiative led by Paris EUROPLACE and opinion leader in the Paris Financial Center to promote sustainable finance in France and internationally. The objective of this initiative, which is supported at the highest levels of the French Government, is to contribute to a shift in financial flows towards a low carbon and inclusive economy, in line with the Paris Agreement and the UN Sustainable Development Goals.

<https://financefortomorrow.com/en/>

## GGFI 1 Ranks And Ratings

**Table 1 | Ranks And Ratings Of Green Finance Penetration**

| Centre        | GGFI 1 |        |
|---------------|--------|--------|
|               | Rank   | Rating |
| London        | 1      | 402    |
| Luxembourg    | 2      | 389    |
| Copenhagen    | 3      | 385    |
| Amsterdam     | 4      | 384    |
| Paris         | 5      | 381    |
| Shenzhen      | 6      | 380    |
| Stockholm     | 7      | 379    |
| Guangzhou     | 8=     | 376    |
| Zurich        | 8=     | 376    |
| Shanghai      | 10=    | 375    |
| Beijing       | 10=    | 375    |
| Brussels      | 12     | 374    |
| Hamburg       | 13     | 370    |
| Sydney        | 14     | 367    |
| Singapore     | 15     | 366    |
| San Francisco | 16     | 365    |
| Munich        | 17=    | 364    |
| Seoul         | 17=    | 364    |
| Los Angeles   | 19=    | 361    |
| Frankfurt     | 19=    | 361    |
| Tokyo         | 19=    | 361    |
| Dublin        | 22     | 360    |
| Hong Kong     | 23     | 359    |
| Washington DC | 24     | 358    |

| Centre       | GGFI 1 |        |
|--------------|--------|--------|
|              | Rank   | Rating |
| Edinburgh    | 25     | 357    |
| Milan        | 26=    | 356    |
| Jersey       | 26=    | 356    |
| Geneva       | 26=    | 356    |
| Cape Town    | 29     | 355    |
| Toronto      | 30=    | 353    |
| Madrid       | 30=    | 353    |
| Vienna       | 32     | 351    |
| Rome         | 33=    | 350    |
| Johannesburg | 33=    | 350    |
| Boston       | 35     | 348    |
| Kuala Lumpur | 36=    | 346    |
| Dubai        | 36=    | 346    |
| Isle of Man  | 38=    | 343    |
| Chicago      | 38=    | 343    |
| Abu Dhabi    | 38=    | 343    |
| Mexico City  | 41=    | 342    |
| Guernsey     | 41=    | 342    |
| New York     | 43     | 341    |
| Mumbai       | 44=    | 335    |
| Bangkok      | 44=    | 335    |
| New Delhi    | 46=    | 333    |
| Moscow       | 46=    | 333    |



Table 2 | Ranks and Ratings Of Green Finance Quality

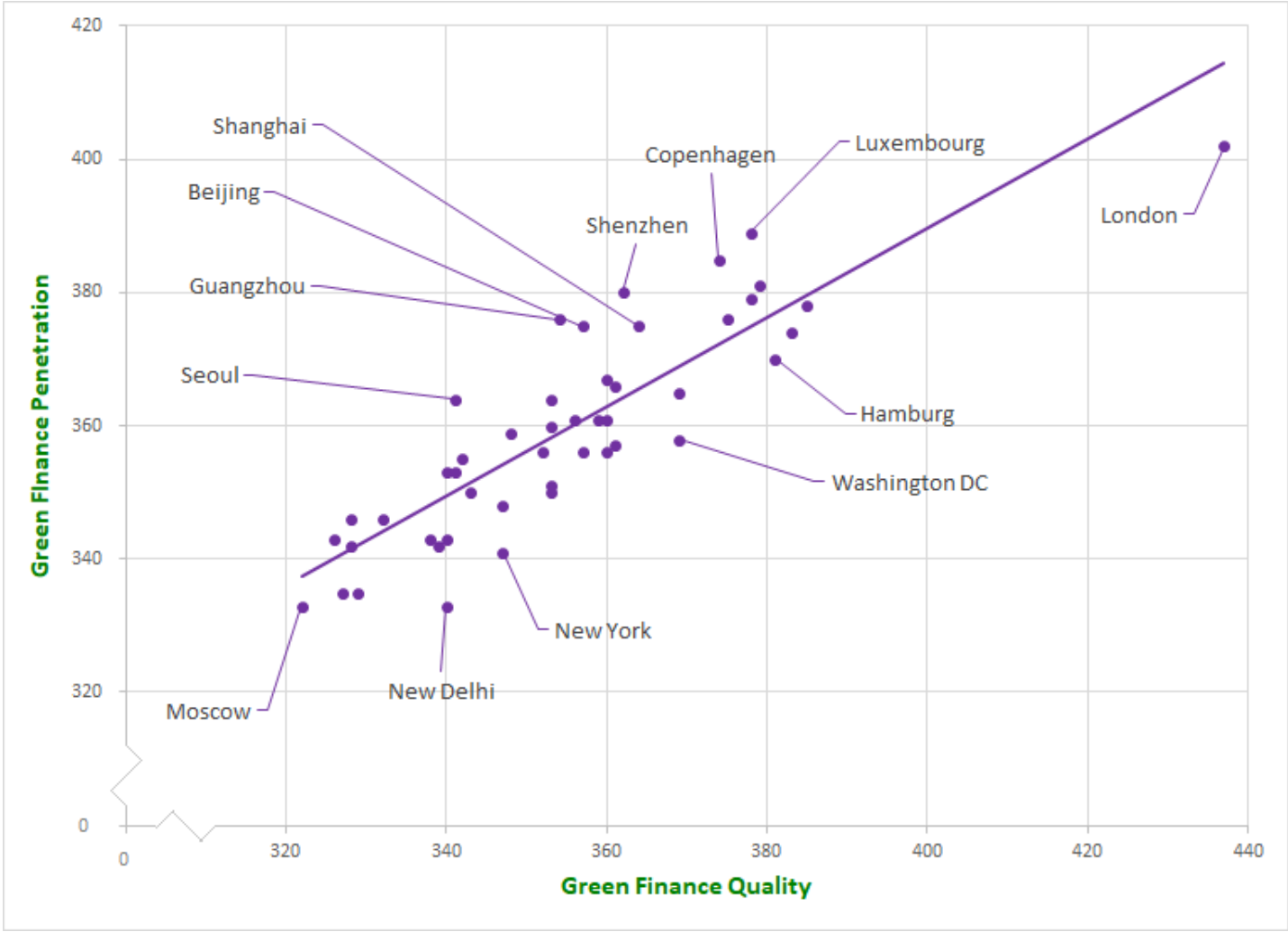
| Centre        | GGFI 1 |        |
|---------------|--------|--------|
|               | Rank   | Rating |
| London        | 1      | 437    |
| Amsterdam     | 2      | 385    |
| Brussels      | 3      | 383    |
| Hamburg       | 4      | 381    |
| Paris         | 5      | 379    |
| Stockholm     | 6=     | 378    |
| Luxembourg    | 6=     | 378    |
| Zurich        | 8      | 375    |
| Copenhagen    | 9      | 374    |
| San Francisco | 10=    | 369    |
| Washington DC | 10=    | 369    |
| Shanghai      | 12     | 364    |
| Shenzhen      | 13     | 362    |
| Singapore     | 14=    | 361    |
| Edinburgh     | 14=    | 361    |
| Geneva        | 16=    | 360    |
| Sydney        | 16=    | 360    |
| Los Angeles   | 16=    | 360    |
| Frankfurt     | 19     | 359    |
| Beijing       | 20=    | 357    |
| Jersey        | 20=    | 357    |
| Tokyo         | 22     | 356    |
| Guangzhou     | 23     | 354    |
| Munich        | 24=    | 353    |

| Centre       | GGFI 1 |        |
|--------------|--------|--------|
|              | Rank   | Rating |
| Dublin       | 24=    | 353    |
| Rome         | 24=    | 353    |
| Vienna       | 24=    | 353    |
| Milan        | 28     | 352    |
| Hong Kong    | 29     | 348    |
| Boston       | 30=    | 347    |
| New York     | 30=    | 347    |
| Johannesburg | 32     | 343    |
| Cape Town    | 33     | 342    |
| Toronto      | 34=    | 341    |
| Seoul        | 34=    | 341    |
| New Delhi    | 36=    | 340    |
| Isle of Man  | 36=    | 340    |
| Madrid       | 36=    | 340    |
| Guernsey     | 39     | 339    |
| Chicago      | 40     | 338    |
| Dubai        | 41     | 332    |
| Mumbai       | 42     | 329    |
| Kuala Lumpur | 43=    | 328    |
| Mexico City  | 43=    | 328    |
| Bangkok      | 45     | 327    |
| Abu Dhabi    | 46     | 326    |
| Moscow       | 47     | 322    |

Chart 1 shows the relationship between ratings of penetration and quality in the index. The ratings are universally low, however, this chart shows the

generally close correlation between the assessments of each factor by respondents.

**Chart 1 | Relationship Between Ratings Of Penetration and Quality**



*“Many more people are gaining exposure to green finance and so the skill set is developing. As knowledge grows the confidence grows too.”*

Head of Responsible Business, Wealth Advisers, London

## GGFI 1 Further Analysis

### Future Prospects

We asked respondents to identify which financial centres they thought would become more significant as green finance centres over the next two to three years. Table 3 shows the top five centres mentioned.

It is notable that both Paris and Frankfurt, as the top centres mentioned, have developed strong leadership to promote green finance and have created a policy framework which is likely to enhance the scope and range of opportunities in green finance.

### Expected Change In Centres

We asked respondents to the questionnaire to give a view as to whether the centres they rated would improve, decline or stay the same in relation to their Green Finance offering over the next two to three years. The results are displayed in Chart 2.

Overall the picture is optimistic. Thirty-seven of the 47 centres in the index are considered likely to improve by over half the respondents who rated them. For 17 centres, over 70 percent of those who commented expected them to improve their green finance offering over the next two to three years.

Centres whose green finance offerings were most expected to improve significantly over the next two to three years included Paris, New Delhi, Los Angeles, Beijing and Toronto.

Centres whose green finance offerings were most expected to decline or significantly decline over the next two to three years included Moscow, Boston, Chicago, Abu Dhabi and Washington DC.

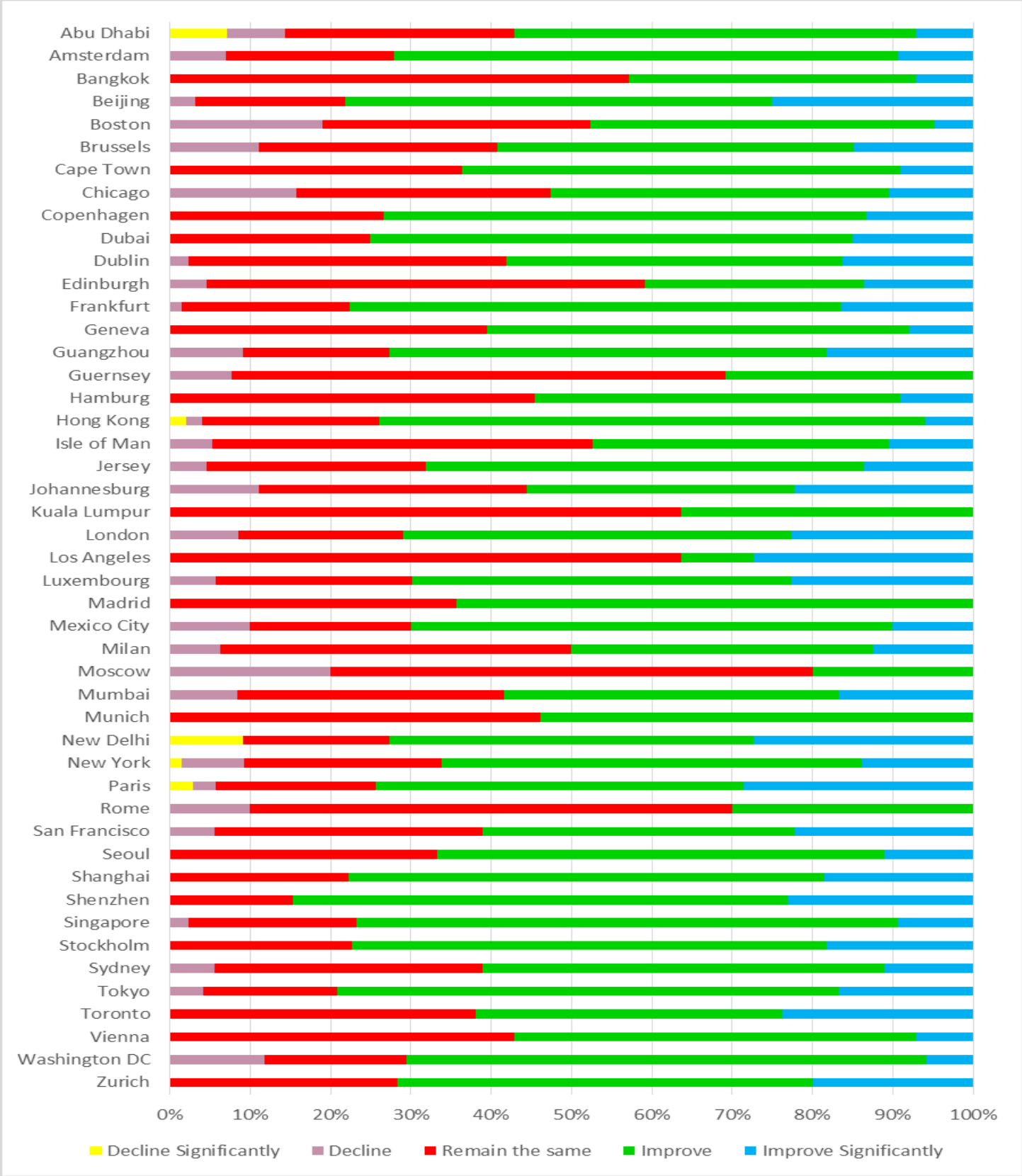
**Table 3 | The Five Centres Likely To Become More Significant**

| Centre    | Number of Mentions |
|-----------|--------------------|
| Paris     | 19                 |
| Frankfurt | 12                 |
| New York  | 11                 |
| Singapore | 10                 |
| London    | 9                  |

*“This offers an opportunity for smaller financial centres to find niche markets in green finance - by building up an ecosystem of relevant (specialized) skills. Luxembourg and Singapore are good emerging examples.”*

Senior Analyst, Equity and Capital Markets, London

Chart 2 | Expected Change In Green Finance Offering



### Instrumental Factors

The GGFI is created using 113 instrumental factors which relate to a range of aspects of competitiveness, including green measures.

Table 4 shows the top ten instrumental factors in terms of their correlation with the ranking of penetration and quality. It is notable that many of these factors are not specifically related to sustainability.

**Table 4 | Top Ten Instrumental Factors by R Squared Correlation**

| Penetration   | R Squared | Quality                                  | R Squared |
|---|-----------|--|-----------|
| Networked Society Index                                 | 0.366     | Networked Society Index                  | 0.359     |
| Global Sustainable Competitiveness Index                | 0.285     | Logistics Performance Index              | 0.333     |
| OECD Country Risk Classification                        | 0.273     | Global Innovation Index                  | 0.322     |
| Logistics Performance Index                             | 0.254     | Legatum Prosperity Index                 | 0.299     |
| Global Innovation Index                                 | 0.243     | Global Enabling Trade Report             | 0.283     |
| Global Enabling Trade Report                            | 0.228     | Open Government                          | 0.282     |
| Sustainable Cities Index                                | 0.211     | Global Sustainable Competitiveness Index | 0.281     |
| Wage Comparison Index                                   | 0.210     | Quality of Living City Rankings          | 0.279     |
| CBI labelled green bonds by exchange (preliminary data) | 0.205     | Sustainable Cities Index                 | 0.278     |
| Quality of Living City Rankings                         | 0.197     | Global Intellectual Property Index       | 0.267     |

*“Ireland boasts a strong knowledge centre regarding Green Finance with strong transferable skills. Investment in tertiary education graduates with appropriate green finance skill-sets is critical to developing the industry.”*

*Debt and Derivatives Adviser, Dublin*



Focusing only on the instrumental factors which relate to sustainability, the factors most closely correlated in terms of their R Squared relationship with the GGFI rankings are set out in Table 5.

**Table 5 | Top Ten ‘Green’ Instrumental Factors By R Squared Correlation**

| Penetration   | R Squared | Quality   | R Squared |
|---|-----------|---|-----------|
| CBI labelled green bonds by exchange (preliminary data) | 0.294     | IESE cities in motion index                             | 0.356     |
| Logistics Performance Index                             | 0.277     | Sustainable Cities Index                                | 0.344     |
| Global Sustainable Competitiveness Index                | 0.253     | Global Sustainable Competitiveness Index                | 0.329     |
| Sustainable Cities Index                                | 0.219     | Railways per Land Area                                  | 0.303     |
| IESE cities in motion index                             | 0.206     | Sustainable Economic Development                        | 0.282     |
| Sustainable Economic Development                        | 0.197     | Logistics Performance Index                             | 0.271     |
| Railways per Land Area                                  | 0.193     | CBI labelled green bonds by exchange (preliminary data) | 0.260     |
| Quality of Domestic Transport Network                   | 0.129     | Environmental Performance                               | 0.255     |
| Financial institutions clean revenue to fossil-related  | 0.128     | Shares of wind and solar in electricity                 | 0.218     |
| Share of renewables in electricity production           | 0.128     | Air Quality Data  | 0.211     |

### Green Finance Innovation: Guangzhou - Green Finance Pilot Zone

China is investing billions into clean energy, promoting the use of electric vehicles, investing in low-emissions infrastructure for its fast-growing cities, and widening the options for green financing. Guangzhou, is one of five pilot zones established in China to promote “green finance” and help for state efforts to tackle pollution, which are expected to cost at least 3 trillion yuan (\$440 billion) a year. The capital of the industrialized Guangdong region, on China’s southeast coast, has been encouraged to develop credit mechanisms to support energy conservation and the reduction of emissions.

<http://ets-china.org/news/china-carbon-market-100-index-released-at-green-finance-forum-in-guangzhou/>

When all instrumental factors are taken into account, it is apparent that the preferences for high performing green financial centres are similar to those for high performing international financial centres - stable governance, a highly skilled workforce, good trade links, and effective IT infrastructure. However, a focus on sustainability features prominently, particularly with respect to market penetration.

When the scope is narrowed to green instrumental factors, the size of labelled green bonds listed in a centre stands out clearly in respect of penetration. With respect to quality, things are more nuanced. The top three factors in this analysis are:

- The Instituto de Estudios Superiores de la Empresa (IESE) Cities in Motion Index. This index evaluates cities in relation to ten dimensions: the economy, human capital, technology, the environment, international outreach, social cohesion, mobility and transportation, governance, urban planning and public management;
- The Arcadis Sustainable Cities Index. This ranks 100 global cities on three dimensions of sustainability: people, planet and profit. These represent social, environmental and economic sustainability and offer an indicative picture of the health and wealth of cities for the present and the future.
- The Global Sustainable Competitiveness Index, which measures current and future capability of countries (nation-economies) to generate and/or sustain financial and non-financial income and wealth for its population. The Global Sustainable Competitiveness Index is based on 109 quantitative performance indicators,

grouped in the five pillars of sustainable competitiveness: natural capital, resource intensity, intellectual capital, social cohesion, and governance.

All three of these indices attempt to measure sustainability performance at a national or local level and cover social economic and environmental factors. Cities, or cities located in nations scoring highly in these indices, are likely to display the following characteristics:

- Respect for the environment – characterised by a well-defined policy framework;
- Respect for law – characterised by a well-developed and progressive legal system; and
- High levels of social cohesion – characterised by a high standard of living and low levels of crime.

### **Green Finance Innovation: Copenhagen - State of Green**

Denmark's decision to become independent of fossil fuels by 2050, is backed by an ambitious policy framework which provides fertile ground for domestic green finance. The use of blended finance (the complementary use of grant-equivalent instruments and non-grant financing to enhance the risk profile of projects) has enabled Danish financial institutions to invest in sustainable infrastructure projects around the world, enhancing the domestic eco-tech sector and expertise in green finance products.

<https://stateofgreen.com/files/download/9511>

We have also conducted an analysis of the assessments provided by respondents using only the instrumental factors that have a direct

relationship to sustainability. This analysis produces slightly different results to the main index as shown in the comparison in Table 6.

**Table 6 | Top 15 Centres Using All Factors And Only Green Factors**

| Rank | All Factors   |               | Green Factors |            |
|------|---------------|---------------|---------------|------------|
|      | Penetration   | Quality       | Penetration   | Quality    |
| 1    | London        | London        | London        | London     |
| 2    | Brussels      | Amsterdam     | Luxembourg    | Luxembourg |
| 3    | Copenhagen    | Brussels      | Paris         | Copenhagen |
| 4    | Paris         | Hamburg       | Amsterdam     | Amsterdam  |
| 5    | Luxembourg    | Paris         | Shanghai      | Paris      |
| 6    | Amsterdam     | Stockholm     | Beijing       | Shenzhen   |
| 7    | Zurich        | Luxembourg    | Copenhagen    | Stockholm  |
| 8    | Shanghai      | Zurich        | Shenzhen      | Guangzhou  |
| 9    | Geneva        | Copenhagen    | Zurich        | Zurich     |
| 10   | Jersey        | San Francisco | Brussels      | Beijing    |
| 11   | Frankfurt     | Washington DC | Stockholm     | Shanghai   |
| 12   | Washington DC | Shanghai      | Guangzhou     | Brussels   |
| 13   | Munich        | Shenzhen      | Singapore     | Hamburg    |
| 14   | Beijing       | Singapore     | Sydney        | Sydney     |
| 15   | Stockholm     | Edinburgh     | Munich        | Singapore  |

### Green Finance Innovation: Mexico City - Green Corridor

Mexico City issues some \$200m in municipal bonds every year. In December 2016 it became the first city in Latin America to finalise a green bond worth \$50m (1 billion pesos) to finance the Green Corridor, an ambitious plan to build a 23 km “green corridor” along the Eje 8 Sur Popocatepetl, one of Mexico City’s largest arterial roads. In developing this bond, Mexico City worked with C40 Cities Finance Facility (CFF) to develop a sellable plan. Launched at the Paris COP21, the CFF assists cities to develop capacity to prepare urban climate change projects.

## Areas Of Competitiveness

The instrumental factors used in the GGFI model are grouped into four broad areas:

- Sustainability;
- Business;
- Human Capital;
- Infrastructure.

To assess how financial centres' green finance offerings perform against each of these areas, the GGFI model is run for each area separately.

The top ranked 15 centres for penetration and quality in each sub-index are shown in Tables 7 and 8.

**Table 7 | Top 15 Centres For Penetration By Areas Of Competitiveness**

| Rank | Sustainability | Business   | Human Capital | Infrastructure |
|------|----------------|------------|---------------|----------------|
| 1    | London         | London     | London        | London         |
| 2    | Luxembourg     | Shenzhen   | Luxembourg    | Paris          |
| 3    | Paris          | Luxembourg | Copenhagen    | Luxembourg     |
| 4    | Shanghai       | Amsterdam  | Paris         | Amsterdam      |
| 5    | Amsterdam      | Paris      | Stockholm     | Stockholm      |
| 6    | Beijing        | Stockholm  | Amsterdam     | Zurich         |
| 7    | Brussels       | Shanghai   | Shenzhen      | Copenhagen     |
| 8    | Zurich         | Beijing    | Shanghai      | Beijing        |
| 9    | Shenzhen       | Zurich     | Zurich        | Shanghai       |
| 10   | Stockholm      | Copenhagen | Guangzhou     | Brussels       |
| 11   | Copenhagen     | Sydney     | Beijing       | Hamburg        |
| 12   | Singapore      | Hamburg    | Brussels      | Tokyo          |
| 13   | Guangzhou      | Guangzhou  | Singapore     | Singapore      |
| 14   | Sydney         | Seoul      | Sydney        | Munich         |
| 15   | Frankfurt      | Munich     | San Francisco | Shenzhen       |

*“Government has a key role in providing a regulatory framework that drives change.”*

Head of Economics and Climate Change, Edinburgh

**Table 8 | Top 15 Centres For Quality By Areas Of Competitiveness**

| Rank | Sustainability | Business   | Human Capital | Infrastructure |
|------|----------------|------------|---------------|----------------|
| 1    | London         | London     | London        | London         |
| 2    | Brussels       | Amsterdam  | Luxembourg    | Paris          |
| 3    | Paris          | Luxembourg | Amsterdam     | Luxembourg     |
| 4    | Luxembourg     | Stockholm  | Paris         | Amsterdam      |
| 5    | Zurich         | Edinburgh  | Stockholm     | Zurich         |
| 6    | Amsterdam      | Brussels   | Zurich        | Stockholm      |
| 7    | Stockholm      | Paris      | Hamburg       | Hamburg        |
| 8    | Singapore      | Zurich     | San Francisco | Brussels       |
| 9    | Geneva         | Copenhagen | Brussels      | Tokyo          |
| 10   | Washington DC  | Hamburg    | Washington DC | Frankfurt      |
| 11   | Copenhagen     | Shenzhen   | Geneva        | San Francisco  |
| 12   | Shanghai       | Munich     | Los Angeles   | Singapore      |
| 13   | Frankfurt      | Sydney     | Copenhagen    | Geneva         |
| 14   | Munich         | Singapore  | Shenzhen      | Copenhagen     |
| 15   | Sydney         | Shanghai   | Frankfurt     | Edinburgh      |

We asked respondents to the GGFI survey to comment on aspects of competitiveness that have a relationship with the development of green finance. Table 9 gives the areas, the number of comments received and the main themes which arose. It is interesting that on taxation, there were split views on the need for tax incentives. While the weight of comments was towards tax incentives to support green finance, a third of those commenting on tax incentives said that they would be detrimental. Further work may be required to understand the role of tax incentives on the development of green finance.

**Table 9 | Commentary On Areas Of Competitiveness**

| Area Of Competitiveness                     | Number Of Mentions | Main Themes  |
|---|--------------------|--|
| Regulatory Environment                      | 125                | <ul style="list-style-type: none"> <li>• There is a need for transparency and disclosure</li> <li>• International standards are important</li> <li>• Stability in the regulatory framework would be helpful</li> <li>• Article 173 in France has been influential</li> </ul> |
| Taxation                                    | 112                | <ul style="list-style-type: none"> <li>• Tax incentives are required</li> <li>• A carbon tax is required</li> <li>• Tax incentives would be detrimental</li> </ul>   |
| The Availability of Skills in Green Finance | 108                | <ul style="list-style-type: none"> <li>• Growing but still niche</li> <li>• Universally recognised credentials would help movement of people</li> </ul>  |

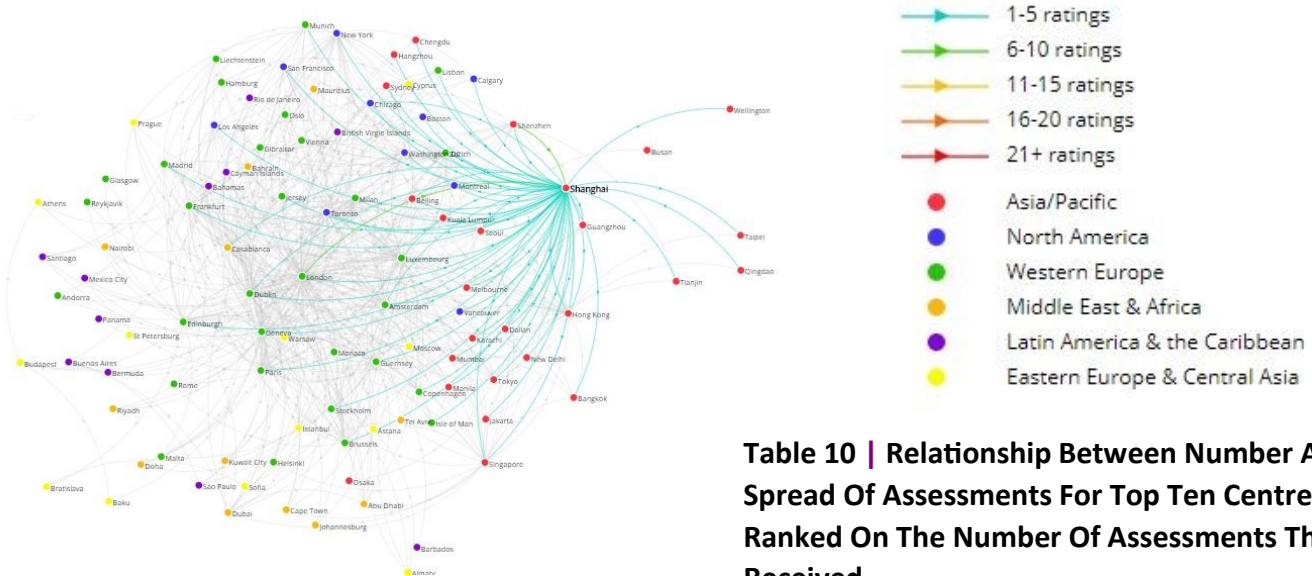


# Connectivity

One factor in the way in which financial centres’ green finance performance differs is the extent to which centres are connected to other financial centres.

One way of measuring this connectivity is to look at the number of assessments given to and received from other centres. Charts 3 and 4 use Shanghai and Guangzhou as examples to contrast the different levels of connectivity that the two centres enjoy.

**Chart 3 | GGFI 1 Connectivity - Shanghai**



**Chart 4 | GGFI 1 Connectivity - Guangzhou**

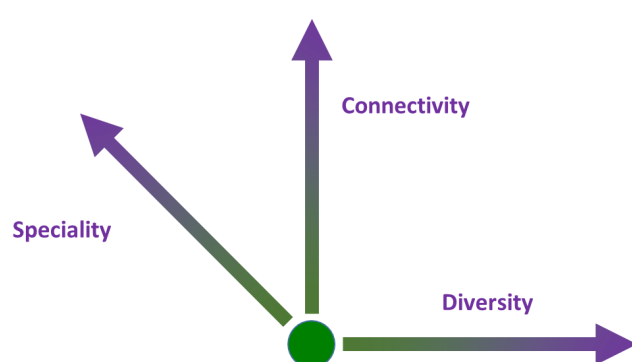


**Table 10 | Relationship Between Number And Spread Of Assessments For Top Ten Centres Ranked On The Number Of Assessments They Received**

| Centre     | Number Of Assessments | Number Of Centres Providing Assessments |
|------------|-----------------------|---|
| London     | 95                    | 27                                      |
| Paris      | 72                    | 20                                      |
| Frankfurt  | 71                    | 19                                      |
| New York   | 68                    | 22                                      |
| Zurich     | 61                    | 17                                      |
| Luxembourg | 55                    | 16                                      |
| Hong Kong  | 51                    | 20                                      |
| Amsterdam  | 45                    | 15                                      |
| Singapore  | 44                    | 15                                      |
| Dublin     | 44                    | 12                                      |

## Financial Centre Profiles

Using clustering and correlation analysis we have identified three measures (axes) that determine a financial centre's profile along different dimensions relating to its offering.



**‘Connectivity’** – the extent to which a centre is well known around the world, and how much non-resident professionals believe it is connected to other green financial centres.

A centre's connectivity is assessed using a combination of 'inbound' assessment locations (the number of locations from which a particular centre receives assessments) and 'outbound' assessment locations (the number of other centres assessed by respondents from a particular centre).

If the weighted assessments for a centre are provided by over 13 per cent of other centres, this centre is deemed to be 'Global'. If the ratings are provided by over seven per cent of other centres, this centre is deemed to be 'International'.

**‘Diversity’** – the breadth of financial industry sectors that flourish in a financial centre. We consider this sector 'richness' to be measurable in a similar way to that of the natural environment. We therefore use a combination of biodiversity indices (calculated on the instrumental factors) to assess a centre's diversity. A high score means that a centre is well diversified; a low diversity score reflects a less rich business environment.

**‘Speciality’** – the depth within a financial centre of green finance and sustainability. A centre's 'speciality' or performance is calculated from the difference between the GGFI rating and the ratings based only on sustainability factors.

In Tables 11 and 12, 'Diversity' (Breadth) and 'Speciality' (Depth) are combined on one axis to create a two dimensional table of financial centre profiles, first for penetration and second for quality. The 47 centres in GGFI 1 are assigned a profile on the basis of a set of rules for the three measures: how well connected a centre is, how broad its services are, and how specialised it is.

The Global Leaders (in the top left of the tables) have both broad and deep green finance activity and are connected with a greater range of other financial centres. Other leading centres are profiled as Established International Centres.

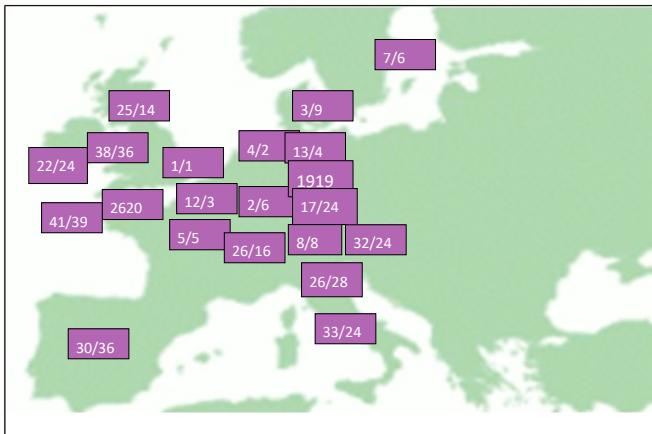
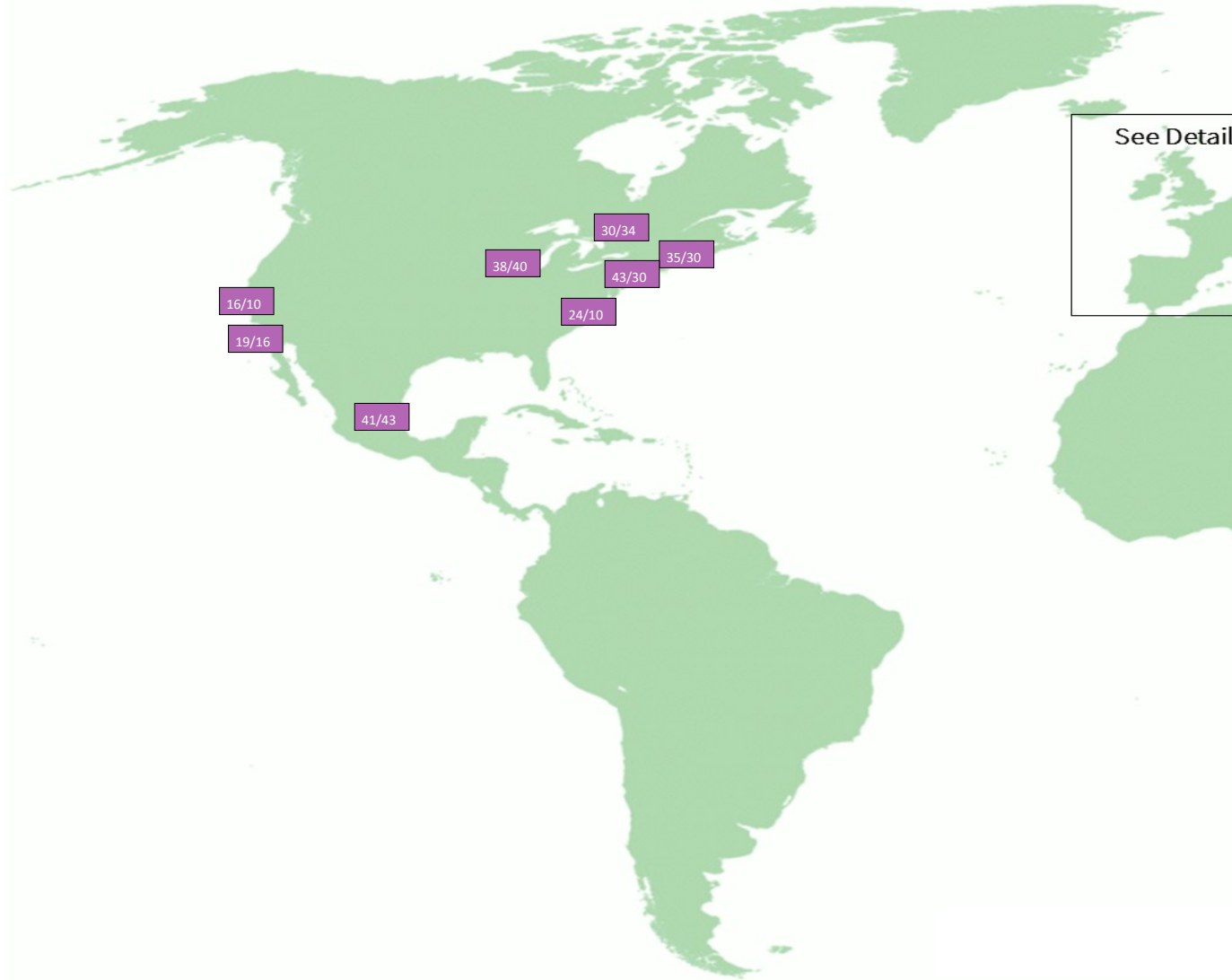
Table 11 | Financial Centre Profiling - Penetration

|               | Broad and Deep            | Relatively Broad          | Relatively Deep           | Emerging                 |
|---------------|---------------------------|---------------------------|---------------------------|--------------------------|
| Global        | Global Leaders            | Global Diversified        | Global Specialists        | Global Contenders        |
|               | London                    | Frankfurt                 | Luxembourg                | Shanghai                 |
|               | Amsterdam                 | Toronto                   | Brussels                  | Dublin                   |
|               | Paris                     | New York                  | Hong Kong                 | Geneva                   |
|               | Zurich                    |                           |                           |                          |
| International | Established International | International Diversified | International Specialists | International Contenders |
|               | San Francisco             | Washington DC             | Shenzhen                  | Beijing                  |
|               | Seoul                     |                           |                           | Singapore                |
|               | Los Angeles               |                           |                           | Dubai                    |
|               | Tokyo                     |                           |                           | Guernsey                 |
|               | Edinburgh                 |                           |                           |                          |
|               | Milan                     |                           |                           |                          |
|               | Madrid                    |                           |                           |                          |
|               | Established Players       | Local Diversified         | Local Specialists         | Evolving Centres         |
|               | Stockholm                 | Vienna                    | Copenhagen                | Mumbai                   |
| Hamburg       | Boston                    | Guangzhou                 | New Delhi                 |                          |
| Sydney        | Chicago                   | Jersey                    | Moscow                    |                          |
| Munich        |                           | Cape Town                 |                           |                          |
| Rome          |                           | Johannesburg              |                           |                          |
| Kuala Lumpur  |                           | Isle of Man               |                           |                          |
| Mexico City   |                           | Abu Dhabi                 |                           |                          |
|               |                           | Bangkok                   |                           |                          |

Table 12 | Financial Centre Profiling - Quality

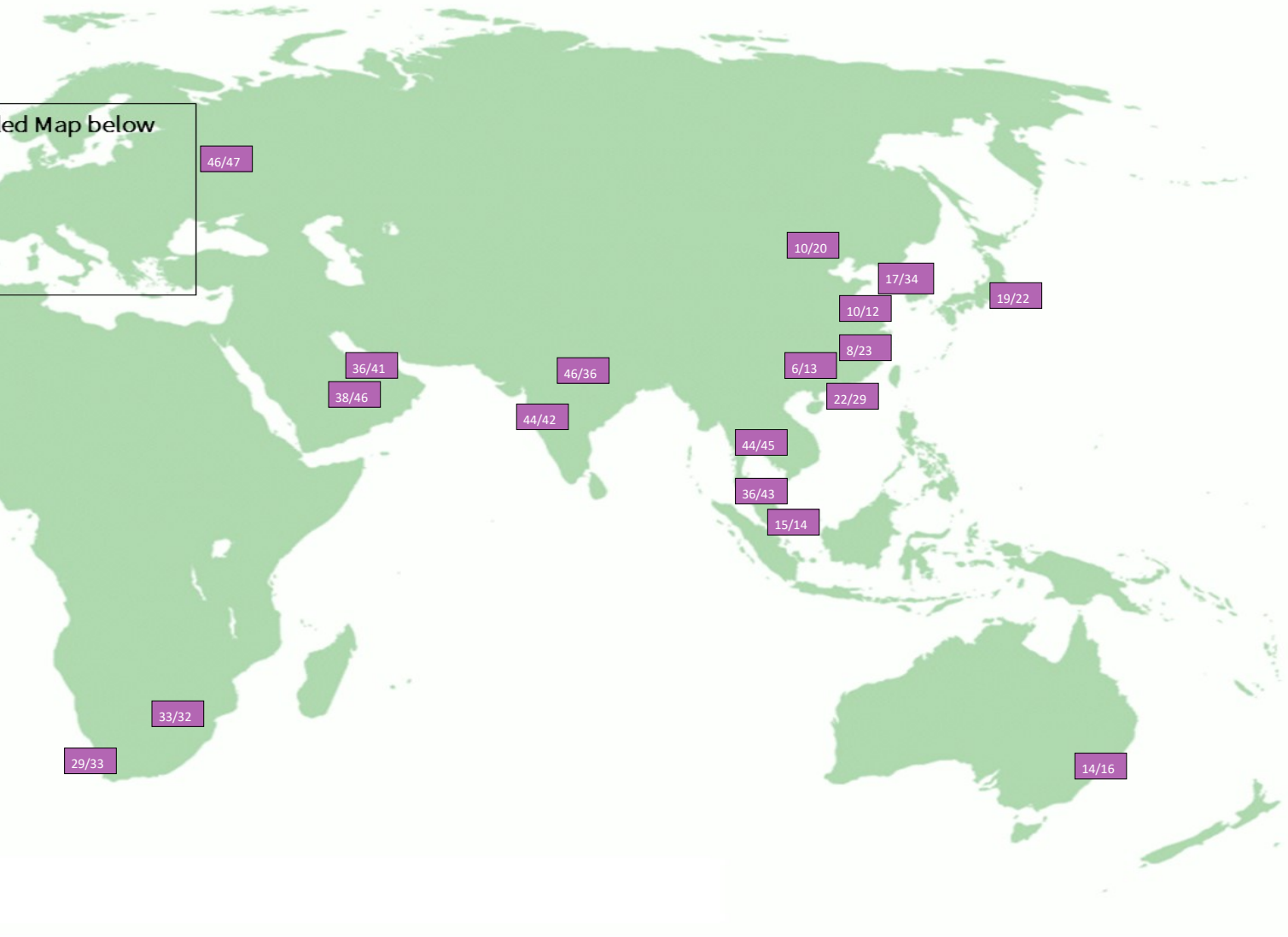
|               | Broad and Deep                   | Relatively Broad                 | Relatively Deep                  | Emerging                        |
|---------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|
| Global        | <b>Global Leaders</b>            | <b>Global Diversified</b>        | <b>Global Specialists</b>        | <b>Global Contenders</b>        |
|               | London                           | Frankfurt                        | Luxembourg                       | Brussels                        |
|               | Amsterdam                        | Toronto                          | Shanghai                         | Geneva                          |
|               | Paris                            | New York                         | Dublin                           |                                 |
|               | Zurich                           |                                  | Hong Kong                        |                                 |
| International | <b>Established International</b> | <b>International Diversified</b> | <b>International Specialists</b> | <b>International Contenders</b> |
|               | San Francisco                    | Seoul                            | Shenzhen                         | Beijing                         |
|               | Los Angeles                      | Milan                            |                                  | Singapore                       |
|               | Tokyo                            | Madrid                           |                                  | Dubai                           |
|               | Washington DC                    |                                  |                                  | Guernsey                        |
| Local         | <b>Established Players</b>       | <b>Local Diversified</b>         | <b>Local Specialists</b>         | <b>Evolving Centres</b>         |
|               | Stockholm                        | Sydney                           | Copenhagen                       | Cape Town                       |
|               | Hamburg                          | Munich                           | Guangzhou                        | Abu Dhabi                       |
|               | Vienna                           | Rome                             | Jersey                           | Moscow                          |
|               | Mexico City                      | Boston                           | Johannesburg                     |                                 |
|               |                                  | Kuala Lumpur                     | Isle of Man                      |                                 |
|               |                                  | Chicago                          | Mumbai                           |                                 |
|               |                                  |                                  | Bangkok                          |                                 |
|               |                                  |                                  | New Delhi                        |                                 |

## The GGFI 1 World





ed Map below



The numbers on the map indicate the rankings first for penetration and second for quality in GGFI 1

## Regional Analysis

### Western Europe

Table 13 shows the top 10 Western European Centres in GGFI 1 for penetration and quality. Overall, Western Europe performed well in the index, holding seven out of the top ten rankings for penetration and nine out of the top ten for quality.

Twenty-one of the 47 centres in the index are located in Western Europe.

Gibraltar, Lisbon, Malta, Helsinki, Liechtenstein, Oslo, and Glasgow were close to inclusion in the index, but did not receive the required number of assessments.

**Table 13 | Western European Top Ten Centres In GGFI**

| Penetration |             |               | Quality    |             |               |
|-------------|-------------|---------------|------------|-------------|---------------|
| Centre      | GGFI 1 Rank | GGFI 1 Rating | Centre     | GGFI 1 Rank | GGFI 1 Rating |
| London      | 1           | 402           | London     | 1           | 437           |
| Luxembourg  | 2           | 389           | Amsterdam  | 2           | 385           |
| Copenhagen  | 3           | 385           | Brussels   | 3           | 383           |
| Amsterdam   | 4           | 384           | Hamburg    | 4           | 381           |
| Paris       | 5           | 381           | Paris      | 5           | 379           |
| Stockholm   | 7           | 379           | Stockholm  | 6           | 378           |
| Zurich      | 8           | 376           | Luxembourg | 6           | 378           |
| Brussels    | 12          | 374           | Zurich     | 8           | 375           |
| Hamburg     | 13          | 370           | Copenhagen | 9           | 374           |
| Munich      | 17          | 364           | Edinburgh  | 14          | 361           |

#### Green Finance Innovation: London - Green Investment Group

The new, fully integrated, business brings together the Green Investment Bank and Macquarie Capital's renewable team to create one of Europe's largest team of specialist investors. The Green Investment Group continues to have a strong relationship with the UK Government, making investments in developing economies and managing assets in the UK on its behalf.

<http://greeninvestmentgroup.com/what-we-do/>

## Asia Pacific

Table 14 shows the top ten performing centres for penetration and quality in the Asia Pacific region. A total of 13 Asia Pacific centres feature in the index, with Shenzhen coming highest for penetration and Shanghai just above Shenzhen for quality. Chinese centres did well in the index.

Melbourne, Jakarta, and Manila all received just under the minimum threshold of assessments to be included in the index this time.

**Table 14 | Asia Pacific Top Ten Centres In GGFI 1**

| Penetration  |      |               | Quality   |      |               |
|--------------|------|---------------|-----------|------|---------------|
| Centre       | Rank | GGFI 1 Rating | Centre    | Rank | GGFI 1 Rating |
| Shenzhen     | 6    | 380           | Shanghai  | 12   | 364           |
| Guangzhou    | 8    | 376           | Shenzhen  | 13   | 362           |
| Beijing      | 10   | 375           | Singapore | 14   | 361           |
| Shanghai     | 10   | 375           | Sydney    | 16   | 360           |
| Sydney       | 14   | 367           | Beijing   | 20   | 357           |
| Singapore    | 15   | 366           | Tokyo     | 22   | 356           |
| Seoul        | 17   | 364           | Guangzhou | 23   | 354           |
| Tokyo        | 19   | 361           | Hong Kong | 29   | 348           |
| Hong Kong    | 23   | 359           | Seoul     | 34   | 341           |
| Kuala Lumpur | 36   | 346           | New Delhi | 36   | 340           |

*“In Asia, a lot of the green finance innovation is being driven by governments and regulatory bodies; there is a competition between Singapore, Hong Kong and Tokyo to become the 'green finance centres' of Asia.”*

Bond Analyst, Toronto

## North America

Seven centres in North America are included in the index. San Francisco is highest for penetration and quality. Los Angeles and Washington DC also scored highly.

Toronto is the only Canadian centre in the index.

Calgary, Montreal, and Vancouver received almost enough assessments to join the index.

**Table 15 | North American Centres in GGFI 1**

| Penetration   |        |        | Quality       |        |        |
|---------------|--------|--------|---------------|--------|--------|
| Centre        | GGFI 1 |        | Centre        | GGFI 1 |        |
|               | Rank   | Rating |               | Rank   | Rating |
| San Francisco | 16     | 365    | San Francisco | 10     | 369    |
| Los Angeles   | 19     | 361    | Washington DC | 10     | 369    |
| Washington DC | 24     | 358    | Los Angeles   | 16     | 360    |
| Toronto       | 30     | 353    | Boston        | 30     | 347    |
| Boston        | 35     | 348    | New York      | 30     | 347    |
| Chicago       | 38     | 343    | Toronto       | 34     | 341    |
| New York      | 43     | 341    | Chicago       | 40     | 338    |

## The Middle East & Africa

Four centres in the Middle East and Africa feature in the index with Cape Town and Johannesburg regional leaders for both penetration and quality. Dubai and Abu Dhabi in the Middle East are both ranked higher for penetration than quality.

Casablanca, Nairobi, Riyadh, and Mauritius are all close to receiving the number of assessments required to feature in the index, with Casablanca scoring particularly well from the assessments it received.

**Table 16 | Middle East & African Centres In GGFI 1**

| Penetration  |        |        | Quality      |        |        |
|--------------|--------|--------|--------------|--------|--------|
| Centre       | GGFI 1 |        | Centre       | GGFI 1 |        |
|              | Rank   | Rating |              | Rank   | Rating |
| Cape Town    | 29     | 355    | Johannesburg | 32     | 343    |
| Johannesburg | 33     | 350    | Cape Town    | 33     | 342    |
| Dubai        | 36     | 346    | Dubai        | 41     | 332    |
| Abu Dhabi    | 38     | 343    | Abu Dhabi    | 46     | 326    |

## Latin America & The Caribbean

Only Mexico City appears in the index from this region.

The Cayman Islands and Sao Paulo were both just outside the index on the number of assessment they received from other centres.

**Table 17 | Latin American & Caribbean Centres In GGFI 1**

| Penetration |             |               | Quality     |             |               |
|-------------|-------------|---------------|-------------|-------------|---------------|
| Centre      | GGFI 1 Rank | GGFI 1 Rating | Centre      | GGFI 1 Rank | GGFI 1 Rating |
| Mexico City | 41          | 342           | Mexico City | 43          | 328           |

## Eastern Europe & Central Asia

Moscow is the only centre from Eastern Europe and Central Asia to receive enough assessments to be included in the index.

Istanbul and Prague had almost enough assessments to feature in the index and received good scores from those who assessed them.

**Table 18 | Eastern European & Central Asian Centres in GGFI 1**

| Penetration |             |               | Quality |             |               |
|-------------|-------------|---------------|---------|-------------|---------------|
| Centre      | GGFI 1 Rank | GGFI 1 Rating | Centre  | GGFI 1 Rank | GGFI 1 Rating |
| Moscow      | 46          | 333           | Moscow  | 47          | 322           |

### Green Finance Innovation: Cape Town - Greencape

South Africa ranks 13th out of 21 countries to use tax as an incentive to drive the green growth agenda (ahead of Australia, Singapore, and Finland) according to the KPMG Green Tax Index. A range of funding solutions is available to green technology manufacturers and service companies, as well as those who use or procure such goods and services. These cover development finance institutions (DFI), local public and private sector financiers and investors, and a considerable range of tax incentives. The Green Finance Desk at Greencape acts as a facilitator in the financing of green projects and green business and acts as a gateway to a network of financial institutions (private and public) with green finance interests.

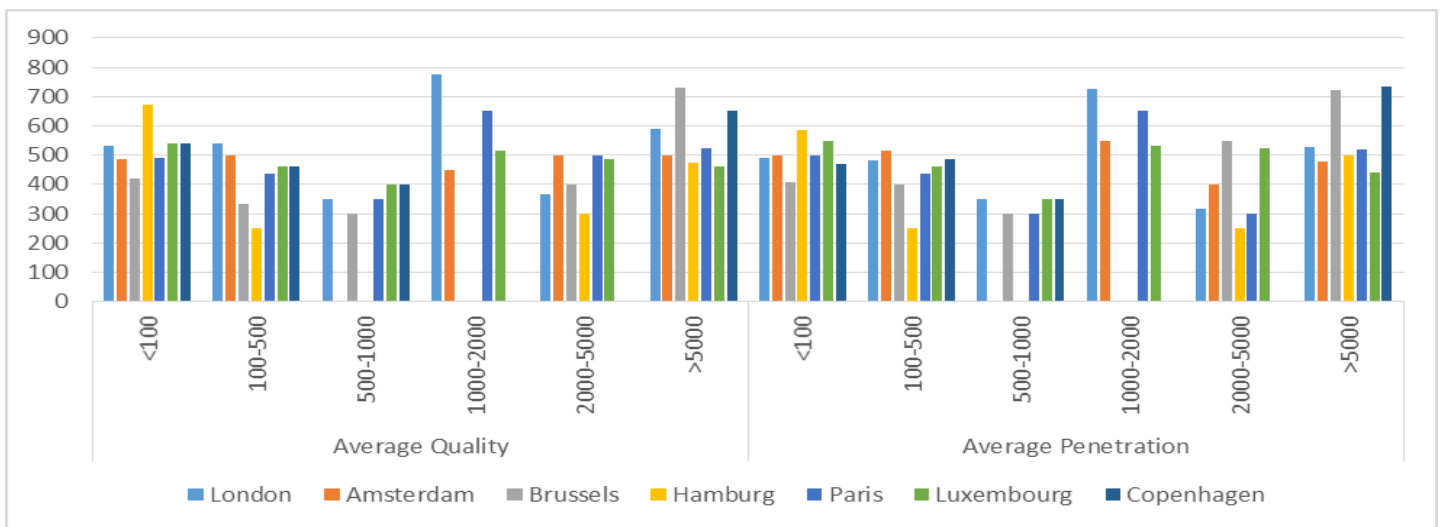
<https://www.greencape.co.za/content/sector/green-finance>

### Organisation Size

There is variation in how the leading centres are viewed by respondents working for different sizes of organisation. Taking the seven centres that appear in the top five of the rankings for both penetration and quality, Chart 5 shows the average of the assessments given by respondents in different sizes of organisation.

The results show that respondents from the smallest organisations gave higher assessments to Hamburg and Luxembourg than those from larger organisations. Those in medium sized organisations scored London and Paris higher than those in other organisations. Brussels and Copenhagen received higher scores from those in the largest organisations.

**Chart 5 | Average Assessments By Respondents' Organisation Size**



### Reputation Analysis

In the GGFI model, we look at reputation by examining the difference between the weighted average assessment given to a centre and its overall rating. The first measure reflects the average score a centre receives from finance professionals around the world. The second measure is the GGFI score itself, which represents the average assessment adjusted to reflect the instrumental factors.

If a centre has a higher average assessment than its GGFI rating, this indicates that respondents' perceptions of a centre are more favourable than the quantitative measures alone suggest. Five of the top 15 centres in terms of reputational

advantage for penetration are in the Asia/Pacific region. Scandinavian and other Western European cities have an advantage, as do San Francisco and Los Angeles.

On quality, a similar range of centres feature, but London, Jersey and Zurich replace Brussels, Guangzhou, and Sydney. The reputational advantage shown may be due to strong marketing or general awareness.

Tables 19 and 20 show the top 15 centres with the greatest positive difference between the average assessment and the GGFI rating for penetration and then for quality.

**Table 19 | Top Ten Centres – Reputational Advantage For Penetration in GGFI 1**

| Centre        | Weighted Average Assessment | GGFI 1 Rating | Reputational Advantage |
|---------------|-----------------------------|---------------|------------------------|
| Copenhagen    | 516                         | 385           | 131                    |
| Stockholm     | 498                         | 379           | 119                    |
| Shenzhen      | 496                         | 380           | 116                    |
| Hamburg       | 459                         | 370           | 89                     |
| Beijing       | 446                         | 375           | 71                     |
| Shanghai      | 443                         | 375           | 68                     |
| Luxembourg    | 455                         | 389           | 66                     |
| Amsterdam     | 445                         | 384           | 61                     |
| Sydney        | 428                         | 367           | 61                     |
| San Francisco | 423                         | 365           | 58                     |
| Los Angeles   | 418                         | 361           | 57                     |
| Paris         | 436                         | 381           | 55                     |
| Munich        | 412                         | 364           | 48                     |
| Guangzhou     | 423                         | 376           | 47                     |
| Brussels      | 413                         | 374           | 39                     |

Tables 21 and 22 show the 15 centres with the greatest reputational disadvantage – an indication that respondents’ perceptions of a centre are less

**Table 21 | Bottom Ten Centres – Reputational Disadvantage For Penetration in GGFI 1**

| Centre       | Weighted Average Assessment | GGFI 1 Rating | Reputational Advantage |
|--------------|-----------------------------|---------------|------------------------|
| Mexico City  | 300                         | 342           | -42                    |
| Chicago      | 292                         | 343           | -51                    |
| Seoul        | 305                         | 364           | -59                    |
| New Delhi    | 273                         | 333           | -60                    |
| Johannesburg | 280                         | 350           | -70                    |
| Isle of Man  | 266                         | 343           | -77                    |
| Rome         | 272                         | 350           | -78                    |
| Guernsey     | 254                         | 342           | -88                    |
| Dubai        | 255                         | 346           | -91                    |
| Vienna       | 240                         | 351           | -111                   |
| Mumbai       | 200                         | 335           | -135                   |
| Abu Dhabi    | 200                         | 343           | -143                   |
| Kuala Lumpur | 177                         | 346           | -169                   |
| Bangkok      | 164                         | 335           | -171                   |
| Moscow       | 135                         | 333           | -198                   |

**Table 20 | Top Ten Centres – Reputational Advantage For Quality in GGFI 1**

| Centre        | Weighted Average Assessment | GGFI 1 Rating | Reputational Advantage |
|---------------|-----------------------------|---------------|------------------------|
| Hamburg       | 514                         | 381           | 133                    |
| Stockholm     | 509                         | 378           | 131                    |
| Copenhagen    | 503                         | 374           | 129                    |
| San Francisco | 462                         | 369           | 93                     |
| Luxembourg    | 451                         | 378           | 73                     |
| Zurich        | 438                         | 375           | 63                     |
| Paris         | 440                         | 379           | 61                     |
| Amsterdam     | 442                         | 385           | 57                     |
| Shenzhen      | 419                         | 362           | 57                     |
| Jersey        | 414                         | 357           | 57                     |
| Munich        | 408                         | 353           | 55                     |
| London        | 490                         | 437           | 53                     |
| Los Angeles   | 409                         | 360           | 49                     |
| Shanghai      | 400                         | 364           | 36                     |
| Beijing       | 393                         | 357           | 36                     |

favourable than the quantitative measures alone would suggest.

**Table 22 | Bottom Ten Centres – Reputational Disadvantage For Quality in GGFI 1**

| Centre       | Weighted Average Assessment | GGFI 1 Rating | Reputational Advantage |
|--------------|-----------------------------|---------------|------------------------|
| Dubai        | 281                         | 332           | -51                    |
| Madrid       | 287                         | 340           | -53                    |
| Cape Town    | 286                         | 342           | -56                    |
| Rome         | 291                         | 353           | -62                    |
| Guernsey     | 277                         | 339           | -62                    |
| Isle of Man  | 272                         | 340           | -68                    |
| New Delhi    | 264                         | 340           | -76                    |
| Chicago      | 255                         | 338           | -83                    |
| Vienna       | 263                         | 353           | -90                    |
| Abu Dhabi    | 210                         | 326           | -116                   |
| Moscow       | 200                         | 322           | -122                   |
| Bangkok      | 203                         | 327           | -124                   |
| Seoul        | 200                         | 341           | -141                   |
| Mumbai       | 167                         | 329           | -162                   |
| Kuala Lumpur | 96                          | 328           | -232                   |



# GGFI 1 Interest, Impact And Drivers of Green Finance

Alongside the ratings of penetration and quality in the GGFI questionnaire, we asked additional questions about the development of Green Finance. These focused on:

- The areas of Green Finance which were considered most interesting by respondents
- The areas of Green Finance which had most impact on sustainability; and
- The factors driving the development of Green Finance.

## Green Finance Innovation: Stockholm - Green Digital Finance

Established in collaboration with Stockholm Fintech Hub, Stockholm Green Digital Finance works through constructive partnerships with capital market actors, international partners and fintech innovators to deliver solutions that help scale green finance and innovation globally for effective delivery on the UN Sustainable Development Goals and the Paris Agreement.

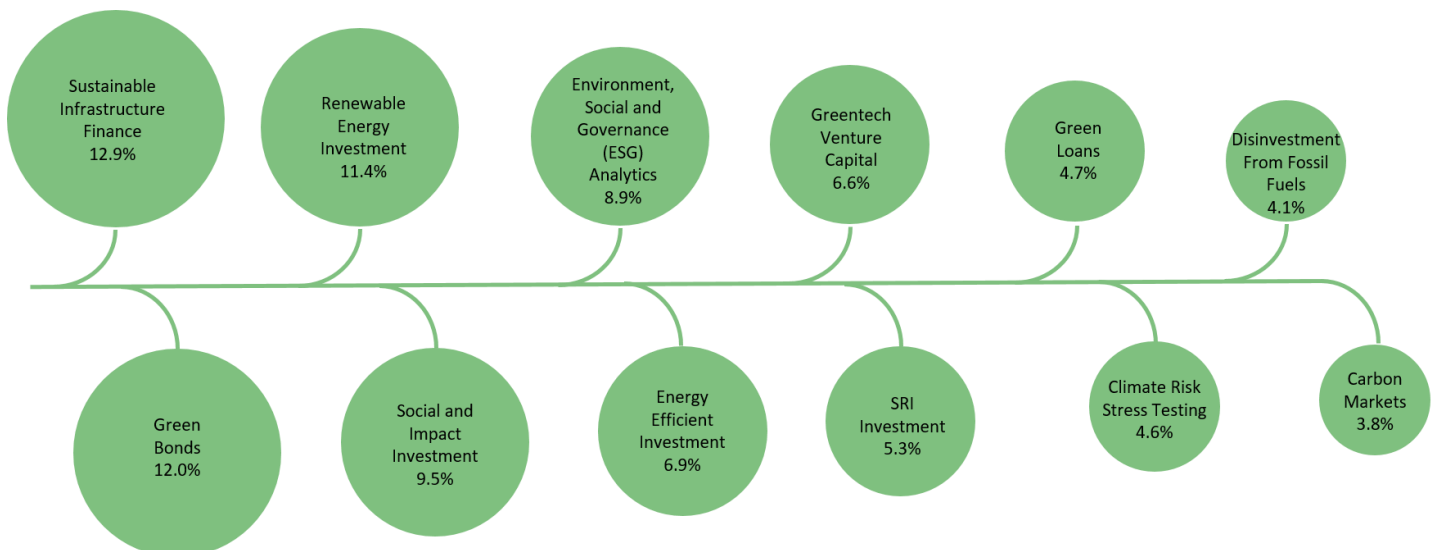
<https://stockholmgreenfin.tech/>

## Areas Of Interest In Green Finance

We asked respondents to identify the four areas of green finance which they considered most interesting. The results are shown in Chart 6 below. The top areas listed were:

- Sustainable Infrastructure Finance;
- Green Bonds;
- Renewable Energy Investment; and
- Social and Impact Investment.

Chart 6 | Most Interesting Areas Of Green Finance

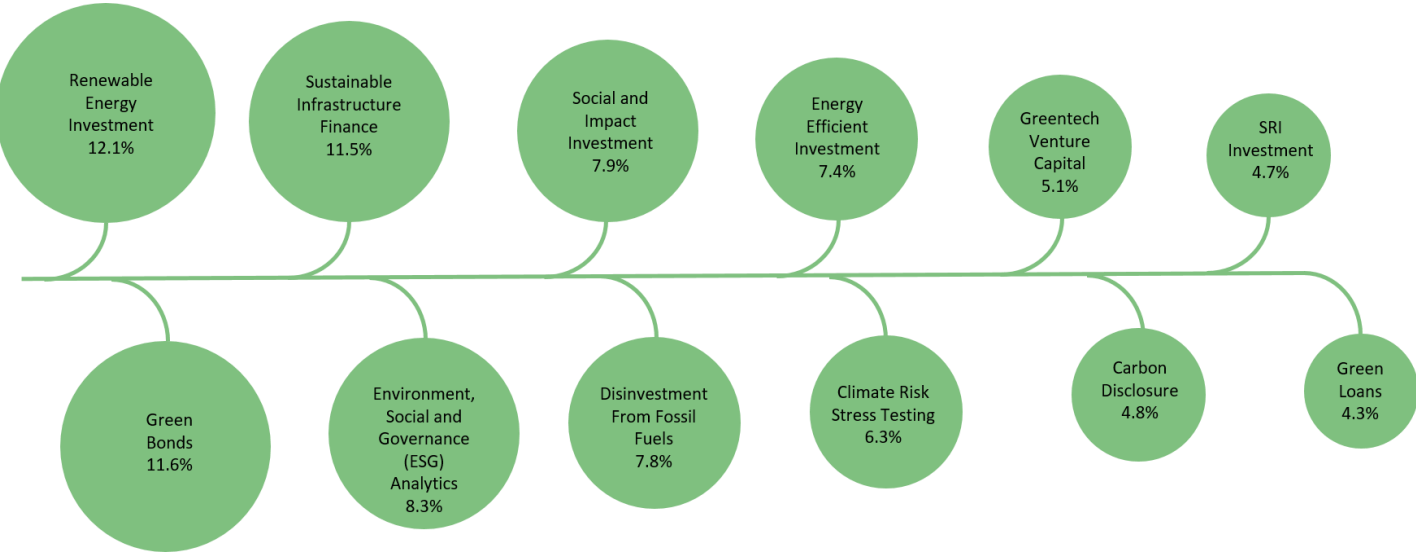


**Areas of Green Finance Impact On Sustainability**

We also asked respondents to identify the four areas of green finance which they considered had most impact on sustainability. The results are shown in Chart 7 below. The top areas listed were:

- Renewable Energy Investment;
- Green Bonds;
- Sustainable Infrastructure Finance;
- Environment, Social and Governance (ESG) Analytics.

**Chart 7 | Green Finance Activities With Most Impact On Sustainability**



**Green Finance Innovation: Amsterdam - Sustainable Finance Platform**

The Sustainable Finance Platform is a cooperative venture of De Nederlandsche Bank (chair), the Dutch Banking Association, the Dutch Association of Insurers, the Federation of the Dutch Pension Funds, the Dutch Fund and Asset Management Association, the Netherlands Authority for the Financial Markets, the Ministry of Finance, the Ministry of Infrastructure and the Environment, and the Sustainable Finance Lab. The aim of this platform, set up by DNB in 2016, is to promote and encourage a dialogue on sustainable finance in the financial sector.

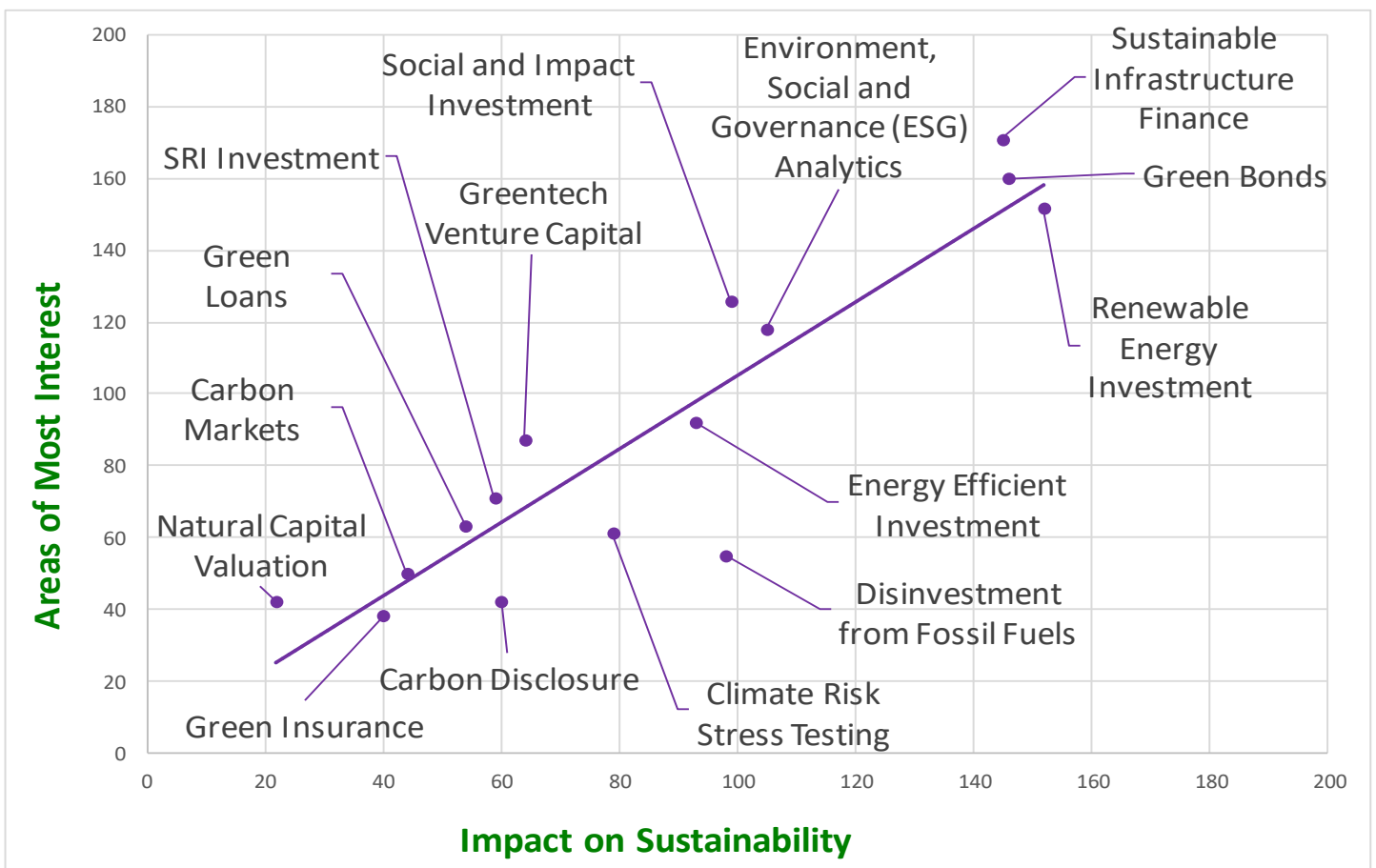
<https://www.dnb.nl/en/about-dnb/co-operation/platform-voor-duurzame-financiering/werkgroepen/index.jsp>

### Relationship Between Areas Of Interest And Impact

Looking at the areas of Green Finance respondents identified as interesting and those they considered had most impact, we see a close correlation, as shown in Chart 8.

Disinvestment from Fossil Fuels stands out as further from the trendline, reinforcing that its impact was judged greater than the interest shown in it as a green finance activity.

**Chart 8 | Relationship Between Areas of Interest and Impact**



*“Various regulators are asking questions on the degree of climate change risk in bank portfolios which will drive awareness by senior management.”*

*Risk Manager, London*

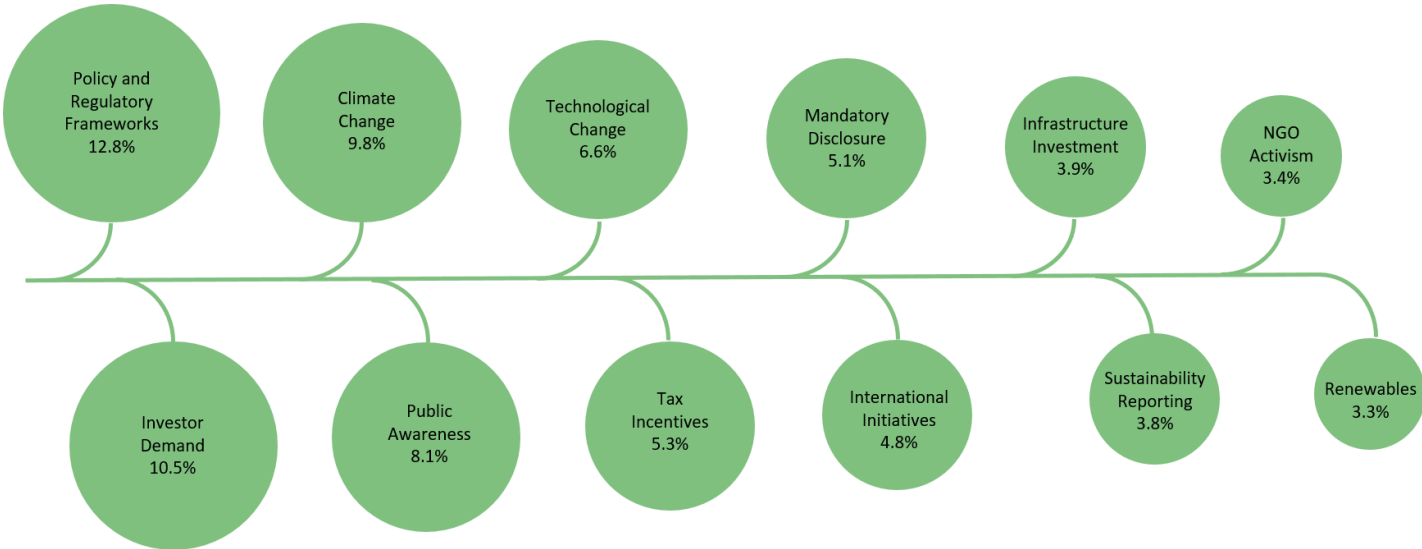
**Drivers of Green Finance**

Finally, we asked respondents to identify the four areas that they considered were driving the development of Green Finance. The results are shown in Chart 9 below.

The top drivers identified were:

- Policy and regulatory frameworks;
- Investor demand;
- Climate change;
- Public Awareness.

**Chart 9 | Leading Drivers of Green Finance**



**Green Finance Innovation: Casablanca - Casablanca Statement On Financial Centres For Sustainability**

The first global meeting of sustainable financial centres was hosted in Casablanca, in September 2017 by the Casablanca Finance City Authority and UN Environment, in association with Italy’s Ministry of the Environment and Morocco’s presidency of the COP22 climate conference. The meeting brought together representatives from 15 financial centres, including Astana, Casablanca, Dublin, Hong Kong, London, Luxembourg, Milan, Paris, Qatar, Shanghai, Stockholm, Tokyo, Toronto and Zurich. At the meeting, representatives agreed to promote strategic action in their financial centres on green and sustainable finance and cooperate on expanding the pipeline of green assets and products.

[http://www.casablancafinancecity.com/wp-content/uploads/2017/09/Casablanca-statement-on-financial-centres-for-sustainability\\_Final.pdf](http://www.casablancafinancecity.com/wp-content/uploads/2017/09/Casablanca-statement-on-financial-centres-for-sustainability_Final.pdf)

## Appendix 1: Assessment Details

**Table 23 | Details Of Assessments Of Green Finance Penetration By Centre**

| Centre        | GGFI 1 Rank | GGFI 1 Rating | Assessments |         |         |
|---------------|-------------|---------------|-------------|---------|---------|
|               |             |               | Number      | Average | St. Dev |
| London        | 1           | 402           | 95          | 490     | 237     |
| Luxembourg    | 2           | 389           | 55          | 505     | 254     |
| Copenhagen    | 3           | 385           | 16          | 566     | 270     |
| Amsterdam     | 4           | 384           | 45          | 494     | 251     |
| Paris         | 5           | 381           | 72          | 485     | 259     |
| Shenzhen      | 6           | 380           | 13          | 546     | 284     |
| Stockholm     | 7           | 379           | 22          | 548     | 258     |
| Guangzhou     | 8=          | 376           | 11          | 473     | 160     |
| Zurich        | 8=          | 376           | 61          | 456     | 230     |
| Shanghai      | 10=         | 375           | 33          | 495     | 217     |
| Beijing       | 10=         | 375           | 27          | 493     | 239     |
| Brussels      | 12          | 374           | 28          | 463     | 236     |
| Hamburg       | 13          | 370           | 11          | 509     | 214     |
| Sydney        | 14          | 367           | 18          | 478     | 267     |
| Singapore     | 15          | 366           | 44          | 430     | 223     |
| San Francisco | 16          | 365           | 18          | 472     | 234     |
| Munich        | 17=         | 364           | 13          | 462     | 266     |
| Seoul         | 17=         | 364           | 10          | 355     | 148     |
| Los Angeles   | 19=         | 361           | 11          | 468     | 212     |
| Frankfurt     | 19=         | 361           | 71          | 408     | 214     |
| Tokyo         | 19=         | 361           | 25          | 434     | 279     |
| Dublin        | 22          | 360           | 44          | 392     | 229     |
| Hong Kong     | 23          | 359           | 51          | 396     | 247     |
| Washington DC | 24          | 358           | 18          | 403     | 172     |

| Centre       | GGFI 1 Rank | GGFI 1 Rating | Assessments |         |         |
|--------------|-------------|---------------|-------------|---------|---------|
|              |             |               | Number      | Average | St. Dev |
| Edinburgh    | 25          | 357           | 22          | 382     | 225     |
| Milan        | 26=         | 356           | 17          | 368     | 202     |
| Jersey       | 26=         | 356           | 22          | 405     | 260     |
| Geneva       | 26=         | 356           | 38          | 389     | 226     |
| Cape Town    | 29          | 355           | 11          | 373     | 216     |
| Toronto      | 30=         | 353           | 21          | 379     | 244     |
| Madrid       | 30=         | 353           | 15          | 400     | 245     |
| Vienna       | 32          | 351           | 15          | 290     | 153     |
| Rome         | 33=         | 350           | 11          | 323     | 214     |
| Johannesburg | 33=         | 350           | 10          | 330     | 203     |
| Boston       | 35          | 348           | 21          | 379     | 211     |
| Kuala Lumpur | 36=         | 346           | 11          | 227     | 113     |
| Dubai        | 36=         | 346           | 21          | 305     | 243     |
| Isle of Man  | 38=         | 343           | 19          | 316     | 216     |
| Chicago      | 38=         | 343           | 19          | 342     | 173     |
| Abu Dhabi    | 38=         | 343           | 15          | 250     | 207     |
| Mexico City  | 41=         | 342           | 11          | 350     | 259     |
| Guernsey     | 41=         | 342           | 13          | 304     | 265     |
| New York     | 43          | 341           | 68          | 351     | 201     |
| Mumbai       | 44=         | 335           | 12          | 250     | 154     |
| Bangkok      | 44=         | 335           | 14          | 214     | 122     |
| New Delhi    | 46=         | 333           | 11          | 323     | 273     |
| Moscow       | 46=         | 333           | 10          | 185     | 140     |

Table 24 | Details Of Assessments Of Green Finance Quality By Centre

| Centre        | GGFI 1 Rank | GGFI 1 Rating | Assessments |         |         |
|---------------|-------------|---------------|-------------|---------|---------|
|               |             |               | Number      | Average | St. Dev |
| London        | 1           | 437           | 95          | 539     | 229     |
| Amsterdam     | 2           | 385           | 45          | 492     | 243     |
| Brussels      | 3           | 383           | 28          | 463     | 218     |
| Hamburg       | 4           | 381           | 11          | 564     | 269     |
| Paris         | 5           | 379           | 72          | 490     | 270     |
| Stockholm     | 6=          | 378           | 22          | 559     | 265     |
| Luxembourg    | 6=          | 378           | 55          | 501     | 255     |
| Zurich        | 8           | 375           | 61          | 489     | 242     |
| Copenhagen    | 9           | 374           | 16          | 553     | 275     |
| San Francisco | 10=         | 369           | 18          | 511     | 249     |
| Washington DC | 10=         | 369           | 18          | 436     | 206     |
| Shanghai      | 12          | 364           | 27          | 450     | 237     |
| Shenzhen      | 13          | 362           | 13          | 469     | 279     |
| Singapore     | 14=         | 361           | 44          | 427     | 236     |
| Edinburgh     | 14=         | 361           | 22          | 409     | 237     |
| Geneva        | 16=         | 360           | 38          | 441     | 240     |
| Sydney        | 16=         | 360           | 18          | 425     | 270     |
| Los Angeles   | 16=         | 360           | 11          | 459     | 208     |
| Frankfurt     | 19          | 359           | 71          | 426     | 226     |
| Beijing       | 20=         | 357           | 33          | 442     | 240     |
| Jersey        | 20=         | 357           | 22          | 464     | 282     |
| Tokyo         | 22          | 356           | 25          | 432     | 291     |
| Guangzhou     | 23          | 354           | 11          | 386     | 218     |
| Munich        | 24=         | 353           | 13          | 458     | 292     |

| Centre       | GGFI 1 Rank | GGFI 1 Rating | Assessments |         |         |
|--------------|-------------|---------------|-------------|---------|---------|
|              |             |               | Number      | Average | St. Dev |
| Dublin       | 24=         | 353           | 44          | 393     | 254     |
| Rome         | 24=         | 353           | 11          | 341     | 228     |
| Vienna       | 24=         | 353           | 15          | 313     | 166     |
| Milan        | 28          | 352           | 17          | 409     | 232     |
| Hong Kong    | 29          | 348           | 51          | 379     | 229     |
| Boston       | 30=         | 347           | 21          | 369     | 209     |
| New York     | 30=         | 347           | 68          | 376     | 205     |
| Johannesburg | 32          | 343           | 10          | 390     | 274     |
| Cape Town    | 33          | 342           | 11          | 336     | 242     |
| Toronto      | 34=         | 341           | 21          | 371     | 243     |
| Seoul        | 34=         | 341           | 10          | 250     | 160     |
| New Delhi    | 36=         | 340           | 11          | 314     | 278     |
| Isle of Man  | 36=         | 340           | 19          | 321     | 216     |
| Madrid       | 36=         | 340           | 15          | 337     | 205     |
| Guernsey     | 39          | 339           | 13          | 327     | 256     |
| Chicago      | 40          | 338           | 19          | 305     | 169     |
| Dubai        | 41          | 332           | 21          | 331     | 258     |
| Mumbai       | 42          | 329           | 12          | 217     | 150     |
| Kuala Lumpur | 43=         | 328           | 11          | 145     | 65      |
| Mexico City  | 43=         | 328           | 11          | 332     | 232     |
| Bangkok      | 45          | 327           | 14          | 254     | 207     |
| Abu Dhabi    | 46          | 326           | 15          | 260     | 216     |
| Moscow       | 47          | 322           | 10          | 250     | 189     |

## Appendix 2: Interest, Impact And Drivers Details

**Table 25 | Interesting Areas Of Green Finance**

| Area of Green Finance       | Number of Mentions | Percentage of Total Mentions |
|-----------------------------|--------------------|------------------------------|
| Green Insurance             | 38                 | 2.9                          |
| Carbon Disclosure           | 42                 | 3.2                          |
| Natural Capital Valuation   | 42                 | 3.2                          |
| Carbon Markets              | 50                 | 3.8                          |
| Disinvestment from Fossil   | 55                 | 4.1                          |
| Climate Risk Stress Testing | 61                 | 4.6                          |
| Green Loans                 | 63                 | 4.7                          |
| SRI Investment              | 71                 | 5.3                          |
| Greentech Venture Capital   | 87                 | 6.6                          |
| Energy Efficient Investment | 92                 | 6.9                          |
| Environment, Social and     | 118                | 8.9                          |
| Social and Impact           | 126                | 9.5                          |
| Renewable Energy            | 152                | 11.4                         |
| Green Bonds                 | 160                | 12.0                         |
| Sustainable Infrastructure  | 171                | 12.9                         |
| <b>Totals</b>               | <b>1,328</b>       | <b>100.0</b>                 |

**Table 26 | Areas Of Green Finance With Most Impact On Sustainability**

| Area of Green Finance                                 | Number of Mentions | Percentage of Total Mentions |
|---|--------------------|------------------------------|
| Natural Capital Valuation                             | 22                 | 1.7                          |
| Green Insurance                                       | 40                 | 3.2                          |
| Carbon Markets  | 44                 | 3.5                          |
| Green Loans   | 54                 | 4.3                          |
| SRI Investment  | 59                 | 4.7                          |
| Carbon Disclosure                                     | 60                 | 4.8                          |
| Greentech Venture Capital                             | 64                 | 5.1                          |
| Climate Risk Stress Testing                           | 79                 | 6.3                          |
| Energy Efficient Investment                           | 93                 | 7.4                          |
| Disinvestment from Fossil<br>Fuels                    | 98                 | 7.8                          |
| Social and Impact Investment                          | 99                 | 7.9                          |
| Environment, Social and<br>Governance (ESG) Analytics | 105                | 8.3                          |
| Sustainable Infrastructure<br>Finance                 | 145                | 11.5                         |
| Green Bonds   | 146                | 11.6                         |
| Renewable Energy Investment                           | 152                | 12.1                         |
| <b>Totals</b>   | <b>1,260</b>       | <b>100.0</b>                 |



Table 27 | Drivers Of Green Finance

| Driver                           | Number of Mentions | Percentage of Total Mentions |
|----------------------------------|--------------------|------------------------------|
| Loss of Biodiversity             | 8                  | 0.6                          |
| Food Security                    | 8                  | 0.6                          |
| Insurance Industry Research      | 13                 | 1.0                          |
| Academic Research                | 17                 | 1.3                          |
| Water Quality                    | 17                 | 1.3                          |
| Voluntary Standards              | 20                 | 1.6                          |
| Air Quality                      | 28                 | 2.2                          |
| Finance Centre Activism          | 34                 | 2.7                          |
| Energy Efficiency                | 35                 | 2.7                          |
| Industry Activism                | 36                 | 2.8                          |
| Non-financial Reporting          | 37                 | 2.9                          |
| Risk Management Frameworks       | 38                 | 3.0                          |
| Renewables                       | 42                 | 3.3                          |
| NGO Activism                     | 43                 | 3.4                          |
| Sustainability Reporting         | 48                 | 3.8                          |
| Infrastructure Investment        | 50                 | 3.9                          |
| International Initiatives        | 61                 | 4.8                          |
| Mandatory Disclosure             | 65                 | 5.1                          |
| Tax Incentives                   | 68                 | 5.3                          |
| Technological Change             | 84                 | 6.6                          |
| Public Awareness                 | 104                | 8.1                          |
| Climate Change                   | 125                | 9.8                          |
| Investor Demand                  | 135                | 10.5                         |
| Policy and Regulatory Frameworks | 164                | 12.8                         |
| <b>Totals</b>                    | <b>1,280</b>       | <b>100.0</b>                 |

## Appendix 3: Respondents' Details

**Table 28 | Respondents By Industry Sector**

| Industry Sector         | Number Of  |
|-------------------------|------------|
| Banking                 | 43         |
| Debt Capital Market     | 14         |
| Equity Capital Markets  | 16         |
| Insurance               | 7          |
| Investment              | 35         |
| Knowledge               | 75         |
| Local Green Initiatives | 4          |
| Policy and Public       | 36         |
| Professional Services   | 83         |
| Trading                 | 2          |
| Other                   | 22         |
| <b>Total</b>            | <b>337</b> |

**Table 29 | Respondents By Engagement In Green Finance**

| Engagement In Green Finance | Number Of Respondents |
|-----------------------------|-----------------------|
| Working in Green Finance    | 167                   |
| Interested in Green Finance | 159                   |
| Other/not given             | 11                    |
| <b>Total</b>                | <b>337</b>            |

**Table 30 | Respondents By Region**

| Region                 | Number Of  |
|------------------------|------------|
| Western Europe         | 248        |
| Asia Pacific           | 36         |
| North America          | 17         |
| Middle East and Africa | 12         |
| Eastern Europe and     | 9          |
| Latin America and the  | 4          |
| Other                  | 11         |
| <b>Total</b>           | <b>337</b> |

**Table 31 | Respondents By Size Of Organisation**

| Size of Organisation | Number Of Respondents |
|----------------------|-----------------------|
| <100                 | 163                   |
| 100-500              | 52                    |
| 500-1000             | 5                     |
| 1000-2000            | 15                    |
| 2000-5000            | 21                    |
| >5000                | 68                    |
| Other/not given      | 13                    |
| <b>Total</b>         | <b>337</b>            |

**Table 32 | Respondents By Gender**

| Gender                | Number Of  |
|-----------------------|------------|
| Female                | 113        |
| Male                  | 211        |
| Other                 | 1          |
| Prefer not to say/Not | 12         |
| <b>Total</b>          | <b>337</b> |

**Table 33 | Respondents By Age**

| Age Band        | Number Of Respondents |
|-----------------|-----------------------|
| 18-30           | 48                    |
| 30-45           | 120                   |
| 45-60           | 122                   |
| 60+             | 39                    |
| Other/not given | 8                     |
| <b>Total</b>    | <b>337</b>            |

## Appendix 4: Methodology

The GGFI provides ratings for the depth and quality of the green finance offering of financial centres calculated by a factor assessment model that uses two distinct sets of input:

- **Financial centre assessments:** using an online questionnaire, respondents are asked to rate the penetration and quality of each financial centre's green finance offering using a ten point scale ranging from little penetration/very poor to mainstream/excellent. Responses are sought from a range of individuals drawn from the financial services sector, non-governmental organisations, regulators, universities and trade bodies.
- **Instrumental factors:** these are a range of quantitative data about each financial centre. These instrumental factors draw on data from 113 different sources and include:
  - ◇ The development of financial service activities in that centre, including data on sustainable and green finance;
  - ◇ The business environment, including legal and policy factors and statistics on economic performance;
  - ◇ Human capital, reflecting educational development and social factors;
  - ◇ Environment and infrastructure data that reflect the physical attributes of the centre, such as air quality and local carbon emissions, or telecommunications and public transport.

A full list of the instrumental factors used in the model is in Appendix 5. Due to the way in which the factor assessment model operates, several indices can be used for each area of interest. Neither of these sets of inputs in themselves would allow the creation of a valid index and we use an approach which combines these data in creating the GGFI.

### Factors Affecting The Inclusion Of Centres in the GGFI

The questionnaire lists a total of 108 financial centres which can be rated by respondents. The questionnaire also asks whether there are financial centres that will improve their green finance offering significantly over the next two to three years. Centres which are not currently within the questionnaire and which receive a number of mentions in response to this question will be added to the questionnaire for future editions.

With the initial publication of the GGFI, we will only give a financial centre a GGFI rating and ranking if it receives a statistically significant minimum number of assessments from individuals based in other geographical locations - at least ten in GGFI 1. This means that not all 108 centres in the questionnaire will receive a ranking. We will keep this number under review for further editions of the index as the number of assessments increases.

We will also develop rules as successive indices are published as to when a centre may be removed from the rankings, for example, if over a 24 month period, a centre has not received a minimum number of assessments.

### Financial Centre Assessments

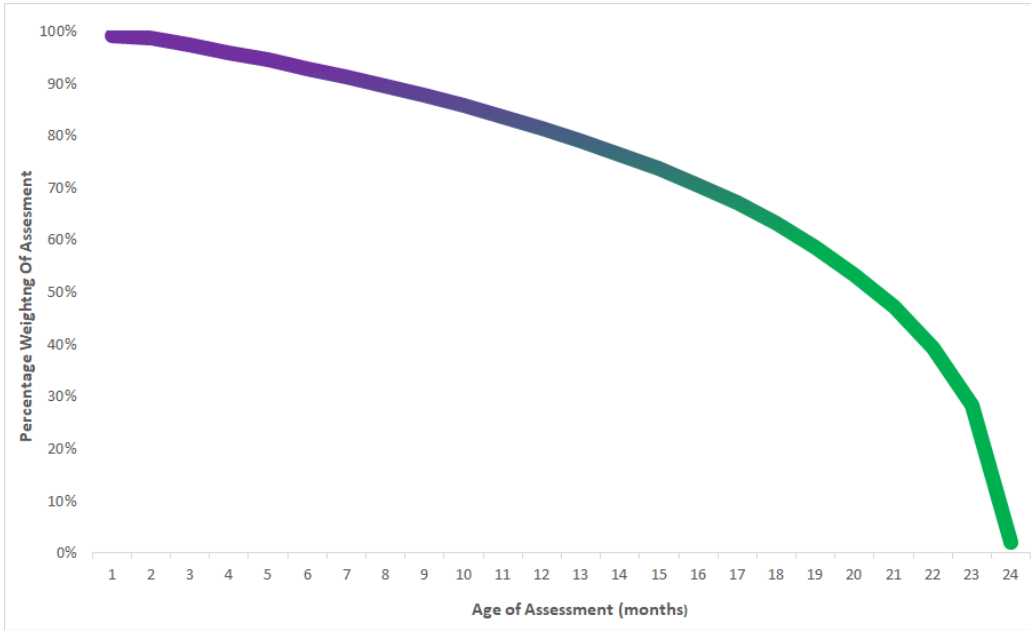
Financial centre assessments are collected via an online questionnaire which will run continuously and which is at [survey.greenfinanceindex.net/](https://survey.greenfinanceindex.net/). A link to this questionnaire is emailed to a target list of respondents at regular intervals and other interested parties can complete the questionnaire by following the link given in GGFI publications.

For the first and subsequent editions of the GGFI:

- the score given by a respondent to their home centre, and respondents who do not specify a home centre, are excluded from the model – this is designed to prevent home bias;

- financial centre assessments will be included in the GGFI model for 24 months after they have been received – we consider that assessments still have validity for a period after they have been given; and
- financial centre assessments from the month when the GGFI is created will be given full weighting with earlier responses given a reduced weighting on a logarithmic scale as shown in Chart 10 – this recognises that older ratings, while still valid, are less likely to be up-to-date.

**Chart 10 | Reduction In Weighting As Assessments Get Older**



## Instrumental Factor Data

For the instrumental factors, we have the following data requirements:

- data series should come from a reputable body and be derived by a sound methodology; and
- data series should be readily available (ideally in the public domain) and be regularly updated.

The rules on the use of instrumental factor data in the model are as follows:

- updates to the indices are collected and collated every six months;
- no weightings are applied to indices;
- indices are entered into the GGFI model as directly as possible, whether this is a rank, a derived score, a value, a distribution around a mean or a distribution around a benchmark;
- if a factor is at a national level, the score will be used for all centres in that country; nation-based factors will be avoided if financial centre (city)-based factors are available;
- if an index has multiple values for a city or nation, the most relevant value is used (and the method for judging relevance is noted);
- if an index is at a regional level, the most relevant allocation of scores to each centre is made (and the method for judging relevance is noted);
- if an index does not contain a value for a particular financial centre, a blank is entered against that centre (no average or mean is used).

## Factor Assessment

Neither the financial centre assessments nor the instrumental factors on their own can provide a basis for the construction of the GGFI.

The financial centre assessments rate centres on their green finance performance, but each individual completing the questionnaire will:

- be familiar with only a limited number of centres - probably no more than 10 or 15 centres out of the total number;
- rate a different group of centres making it difficult to compare data sets; and
- consider different aspects of centres' performance in their ratings.

The instrumental factors are based on a range of different models and using just these factors would require some system of totaling or averaging scores across instrumental factors. Such an approach would involve a number of difficulties:

- indices are published in a variety of different forms: an average or base point of 100 with scores above and below this; a simple ranking; actual values, e.g., \$ per square foot of occupancy costs; or a composite 'score';
- indices would have to be normalised, e.g., in some indices, a high score is positive while in others a low score is positive;
- not all centres are included in all indices;
- the indices would have to be weighted.

Given these issues, the GGFI uses a statistical model to combine the financial centre assessments and instrumental factors.

This is done by conducting an analysis to determine whether there is a correlation between the financial centre assessments and the instrumental factors we have collected about financial centres. This involves building a predictive model of the rating of centres’ green financial offerings using a support vector machine (SVM).

The details of the methodology can be accessed at <http://www.longfinance.net/programmes/the-global-green-finance-index/methodology.html>. The statistical model is developed in R, an open source language and environment for statistical computing and graphics.

An SVM is a supervised learning model with associated learning algorithms that analyses data used for classification and regression analysis. SVMs are based upon statistical techniques that classify and model complex historic data in order to make predictions on new data. SVMs work well on discrete, categorical data but also handle continuous numerical or time series data.

The SVM used for the GGFI provides information about the confidence with which each specific

rating is made and the likelihood of other possible ratings being made by the same respondent.

The model then predicts how respondents would have assessed centres with which they are unfamiliar, by answering questions such as:

*If a respondent gives Singapore and Sydney certain assessments then, based on the instrumental factors for Singapore, Sydney and Paris, how would that person assess Paris?*

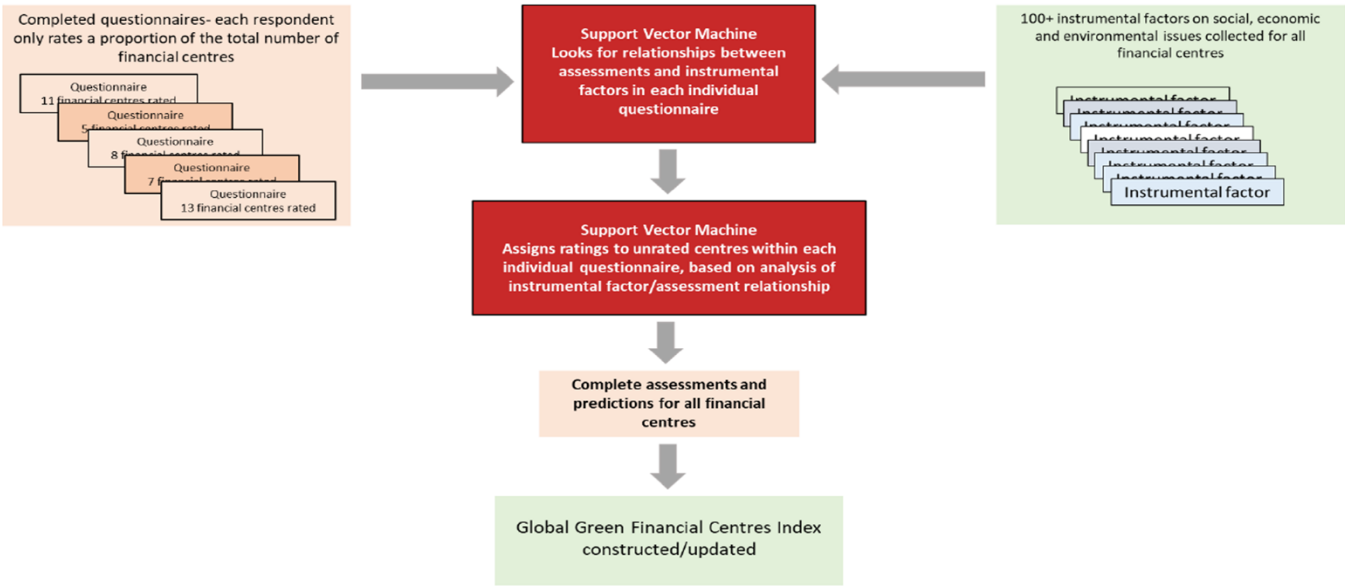
Or

*If Edinburgh and Munich have been given a certain assessment by this respondent, then, based on the instrumental factors for Edinburgh, Munich and Zurich, how would that person assess Zurich?*

Financial centre rating predictions from the SVM are re-combined with actual financial centre assessments to produce the GGFI – a set of ratings for financial centres’ green finance performance.

The process of creating the GGFI is outlined in Chart 11 below.

Chart 11 | The GGFI Process





## Validation

The rules on data use for both financial centre assessments and instrumental factors are a key part of data validation. In addition, we intend to scrutinise the data set for anomalous patterns, for example, exactly matching assessments given by respondents from the same region or multiple assessments given from the same source. Where there appears to be a discrepancy, we may ignore certain responses in compiling the index.

## Updating The Index

The GGFI will be published twice a year and dynamically updated either by updating and adding to the instrumental factors or through new financial centre assessments. These updates permit, for instance, a recently changed index of volumes of green bonds issued to affect the green credentials rating of financial centres.

## Use Of The Index

The GGFI produces a central index rating of financial centres' green finance credentials. The questionnaire collects other data and other analyses of the data are possible, for example:

- Sector-specific ratings are available using the business sectors represented by questionnaire respondents. This makes it possible to rate different centres in terms of their offering in, for example, insurance as opposed to their strength in debt capital.
- The factor assessment model can be queried in a 'what if' mode – for example, “how much would Singapore carbon emissions need to fall in order to increase Singapore’s ranking against Paris?”

## Appendix 5: Instrumental Factors

**Table 34 | Sustainability Instrumental Factor Correlation With Penetration Ratings - Highest 15 Factors**

| Instrumental Factors                                      | R-squared |
|---|-----------|
| IESE cities in motion index                               | 0.356     |
| Sustainable Cities Index                                  | 0.344     |
| Global Sustainable Competitiveness Index                  | 0.329     |
| Railways per Land Area                                    | 0.303     |
| Sustainable Economic Development                          | 0.282     |
| Logistics Performance Index                               | 0.271     |
| CBI labelled green bonds by exchange (preliminary data)   | 0.260     |
| Environmental Performance                                 | 0.255     |
| Shares of wind and solar in electricity                   | 0.218     |
| Air Quality Data  | 0.211     |
| Roadways per Land Area                                    | 0.182     |
| Human Freedom Index                                       | 0.165     |
| Energy Sustainability Index                               | 0.155     |
| City Commitment to Carbon Reduction (Cooperative Actions) | 0.136     |
| Financial Institutions Conventional to new Energy Data    | 0.118     |

**Table 35 | Sustainability Instrumental Factor Correlation With Quality Ratings - Highest 15 Factors**

| Instrumental Factors                                    | R-squared |
|---|-----------|
| CBI labelled green bonds by exchange (preliminary data) | 0.294     |
| Logistics Performance Index                             | 0.277     |
| Global Sustainable Competitiveness Index                | 0.253     |
| Sustainable Cities Index                                | 0.219     |
| IESE cities in motion index                             | 0.206     |
| Sustainable Economic Development                        | 0.197     |
| Railways per Land Area                                  | 0.193     |
| Quality of Domestic Transport Network                   | 0.129     |
| Financial institutions clean revenue to fossil-related  | 0.128     |
| Share of renewables in electricity production           | 0.128     |
| Shares of wind and solar in electricity                 | 0.123     |
| Environmental Performance                               | 0.115     |
| Air Quality Data  | 0.095     |
| Roadways per Land Area                                  | 0.094     |
| Climate-aligned Bond                                    | 0.092     |

**Table 36 | Sustainability Factors**

| Instrumental Factor  | Source                                   | Website   |
|--|--|---|
| Air Quality Data   | WHO                                      | <a href="http://www.who.int/entity/phe/health_topics/outdoorair/databases/who-aap-database-may2016.xlsx?ua=1">http://www.who.int/entity/phe/health_topics/outdoorair/databases/who-aap-database-may2016.xlsx?ua=1</a>   |
| Average precipitation in depth (mm per year)                   | The World Bank                           | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators">http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators</a>   |
| Buildings Energy Efficiency Policies Database                  | IEA                                      | <a href="https://www.iea.org/beep/">https://www.iea.org/beep/</a>   |
| CBI labelled green bonds by exchange (preliminary)             | CBI                                      | <a href="https://www.climatebonds.net">https://www.climatebonds.net</a>   |
| City Commitment to Carbon Reduction (Cooperative Actions)      | UNFCCC                                   | <a href="http://climateaction.unfccc.int/cities">http://climateaction.unfccc.int/cities</a>   |
| City Commitment to Carbon Reduction (Individual Actions)       | UNFCCC                                   | <a href="http://climateaction.unfccc.int/cities">http://climateaction.unfccc.int/cities</a>   |
| Climate-aligned Bonds Outstanding by Country of                | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| CO2 Emissions Per Capita                                       | World Bank                               | <a href="https://data.worldbank.org/indicator/EN.ATM.CO2E.PC">https://data.worldbank.org/indicator/EN.ATM.CO2E.PC</a>   |
| Energy Intensity of GDP  | Enerdata Statistical Yearbook            | <a href="https://yearbook.enerdata.net/download/">https://yearbook.enerdata.net/download/</a>   |
| Energy Sustainability Index                                    | World Energy Council                     | <a href="http://www.worldenergy.org/data/sustainability-index/">http://www.worldenergy.org/data/sustainability-index/</a>   |
| Environmental Performance                                      | Yale University                          | <a href="http://epi.yale.edu/epi/country-rankings">http://epi.yale.edu/epi/country-rankings</a>   |
| Financial Centre Carbon Intensity                              | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| Financial Centre Clean Revenue to Fossil-related               | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| Financial Centre Sustainability Disclosure                     | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| Financial Institutions Conventional to New Energy Finance Data | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| Financial system green alignment                               | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| Forestry Area  | World Bank                               | <a href="http://databank.worldbank.org/data/reports.aspx?source=2&amp;series=AG.LND.FRST.ZS&amp;country=">http://databank.worldbank.org/data/reports.aspx?source=2&amp;series=AG.LND.FRST.ZS&amp;country=</a>   |
| Global Sustainable Competitiveness Index                       | Solability                               | <a href="http://solability.com/the-global-sustainable-competitiveness-index/the-index">http://solability.com/the-global-sustainable-competitiveness-index/the-index</a>   |
| Green Bonds Issued by Country of Issuer                        | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| GREB Building Energy Intensity Score                           | Corporate Knights                        | <a href="http://www.finance-watch.org/our-work/dossiers?fid=192">http://www.finance-watch.org/our-work/dossiers?fid=192</a>   |
| IESE cities in motion index                                    | IESE                                     | <a href="http://citiesinmotion.iese.edu/indicecim/?lang=en">http://citiesinmotion.iese.edu/indicecim/?lang=en</a>   |
| Protected Land Area as Percentage of Land Area                 | The World Bank                           | <a href="http://databank.worldbank.org/data/reports.aspx?source=2&amp;series=ER.LND.PTLD.ZS&amp;country=">http://databank.worldbank.org/data/reports.aspx?source=2&amp;series=ER.LND.PTLD.ZS&amp;country=</a>   |
| Quality of Life Index  | Numbeo                                   | <a href="http://www.numbeo.com/quality-of-life/rankings.jsp">http://www.numbeo.com/quality-of-life/rankings.jsp</a>   |
| Quality of Living City Rankings                                | Mercer                                   | <a href="http://www.mercer.com">http://www.mercer.com</a>   |
| Share of renewables in electricity production                  | Enerdata Statistical Yearbook            | <a href="https://yearbook.enerdata.net/download/">https://yearbook.enerdata.net/download/</a>   |
| Shares of Wind and Solar in Electricity Production             | Enerdata Statistical Yearbook            | <a href="https://yearbook.enerdata.net/download/">https://yearbook.enerdata.net/download/</a>   |
| Sustainable Cities Index                                       | Arcadis                                  | <a href="https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2016/">https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2016/</a>   |
| Sustainable Economic Development                               | Boston Consulting Group                  | <a href="https://www.bcgperspectives.com/content/interactive/public_sector_globalization_interactive_map_sustainable_economic_development/">https://www.bcgperspectives.com/content/interactive/public_sector_globalization_interactive_map_sustainable_economic_development/</a> |
| Sustainable Stock Exchanges                                    | UN Sustainable Stock Exchange Initiative | <a href="http://www.sseinitiative.org/sse-partner-exchanges/list-of-partner-exchanges/">http://www.sseinitiative.org/sse-partner-exchanges/list-of-partner-exchanges/</a>   |

**Table 37 | Business Factors**

| Instrumental Factor                                   | Source                        | Website   |
|---|-------------------------------|---|
| Best Countries for Business                           | Forbes                        | <a href="http://www.forbes.com/best-countries-for-business/list/#tab:overall">http://www.forbes.com/best-countries-for-business/list/#tab:overall</a>   |
| Bilateral Tax Information Exchange Agreements         | OECD                          | <a href="http://www.oecd.org/document/7/0,3343,en_2649_33767_38312839_1_1_1_1,00.html">http://www.oecd.org/document/7/0,3343,en_2649_33767_38312839_1_1_1_1,00.html</a>   |
| Business Environment Rankings                         | EIU                           | <a href="http://www.eiu.com/public/thankyou_download.aspx?activity=download&amp;campaignid=bizenviro2014">http://www.eiu.com/public/thankyou_download.aspx?activity=download&amp;campaignid=bizenviro2014</a>   |
| Business Process Outsourcing Location Index           | Cushman & Wakefield           | <a href="http://www.cushmanwakefield.com/en/research-and-insight/2015/business-process-outsourcing-location-index-2015/">http://www.cushmanwakefield.com/en/research-and-insight/2015/business-process-outsourcing-location-index-2015/</a>                               |
| Capitalisation of Stock Exchanges                     | The World Federation of Stock | <a href="http://www.world-exchanges.org/home/index.php/statistics/monthly-reports">http://www.world-exchanges.org/home/index.php/statistics/monthly-reports</a>   |
| City GDP composition (Business/Finance)               | The Brookings Institution     | <a href="http://www.brookings.edu/research/interactives/global-metro-monitor-3">http://www.brookings.edu/research/interactives/global-metro-monitor-3</a>   |
| Common Law Countries                                  | CIA                           | <a href="https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html">https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html</a>   |
| Corporate Tax Rates                                   | PWC                           | <a href="http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/">http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/</a>   |
| Domestic Credit Provided by Banking Sector (% of      | The World Bank                | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators">http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators</a>   |
| Ease of Doing Business Index                          | The World Bank                | <a href="http://databank.worldbank.org/data/reports.aspx?source=doing-business">http://databank.worldbank.org/data/reports.aspx?source=doing-business</a>   |
| External Positions of Central Banks as a share of GDP | The Bank for International    | <a href="http://www.bis.org/statistics/bankstats.htm">http://www.bis.org/statistics/bankstats.htm</a>   |
| FDI Confidence Index                                  | AT Kearney                    | <a href="http://www.atkearney.com/research-studies/foreign-direct-investment-confidence-index">http://www.atkearney.com/research-studies/foreign-direct-investment-confidence-index</a>   |
| FDI Inward Stock as a Percentage of GDP               | UNCTAD                        | <a href="http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx">http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx</a>   |
| Financial Secrecy Index                               | Tax Justice Network           | <a href="http://www.financialsecrecyindex.com/">http://www.financialsecrecyindex.com/</a>   |
| Foreign Direct Investment Inflows                     | UNCTAD                        | <a href="http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx?sRF_ActivePath=P,5,27&amp;sRF_Expanded=P,5,27">http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx?sRF_ActivePath=P,5,27&amp;sRF_Expanded=P,5,27</a>                                     |
| Global Connectedness Index                            | DHL                           | <a href="http://www.dhl.com/en/about_us/logistics_insights/studies_research/global_connectedness_index/global_connectedness_index.html">http://www.dhl.com/en/about_us/logistics_insights/studies_research/global_connectedness_index/global_connectedness_index.html</a> |
| Global Enabling Trade Report                          | World Economic Forum          | <a href="http://www.weforum.org/issues/international-trade">http://www.weforum.org/issues/international-trade</a>   |
| Global Services Location                              | AT Kearney                    | <a href="http://www.atkearney.com/research-studies/global-services-location-index">http://www.atkearney.com/research-studies/global-services-location-index</a>   |
| Government Debt as % of GDP                           | CIA                           | <a href="https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html">https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html</a>   |
| Net External Positions of Banks                       | The Bank for International    | <a href="http://www.bis.org/statistics/bankstats.htm">http://www.bis.org/statistics/bankstats.htm</a>   |
| Office Occupancy Cost                                 | CBRE Research                 | <a href="http://www.cbre.com/research-and-reports/Global-Prime-Office-Occupancy-Costs-2016">http://www.cbre.com/research-and-reports/Global-Prime-Office-Occupancy-Costs-2016</a>   |
| Operational Risk Rating                               | EIU                           | <a href="http://www.viewswire.com/index.asp?layout=homePubTypeRK">http://www.viewswire.com/index.asp?layout=homePubTypeRK</a>   |
| Percentage of Firms Using Banks to Finance            | The World Bank                | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators">http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators</a>   |
| Real Interest Rate                                    | The World Bank                | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators">http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators</a>   |
| Total Net Assets of Regulated Open-End Funds          | Investment Company Institute  | <a href="http://www.icifactbook.org/">http://www.icifactbook.org/</a>   |
| Value of Bond Trading                                 | The World Federation of Stock | <a href="http://www.world-exchanges.org/home/index.php/statistics/monthly-reports">http://www.world-exchanges.org/home/index.php/statistics/monthly-reports</a>   |
| Value of Share Trading                                | The World Federation of Stock | <a href="http://www.world-exchanges.org/home/index.php/statistics/monthly-reports">http://www.world-exchanges.org/home/index.php/statistics/monthly-reports</a>   |
| Volume of Share Trading                               | The World Federation of Stock | <a href="http://www.world-exchanges.org/home/index.php/statistics/monthly-reports">http://www.world-exchanges.org/home/index.php/statistics/monthly-reports</a>   |
| World Competitiveness Scoreboard                      | IMD                           | <a href="http://www.imd.ch/research/publications/wcy/competitiveness_scoreboard.cfmue">http://www.imd.ch/research/publications/wcy/competitiveness_scoreboard.cfmue</a>   |

**Table 38 | Human Capital Factors**

| Instrumental Factor                                 | Source                          | Website   |
|---|---------------------------------|---|
| Citizens Domestic Purchasing Power                  | UBS                             | <a href="http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/">http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/</a>                     |
| Corruption Perception Index                         | Transparency International      | <a href="http://www.transparency.org/policy_research/surveys_indices/cpi">http://www.transparency.org/policy_research/surveys_indices/cpi</a>                             |
| Cost of Living City Rankings                        | Mercer                          | <a href="http://www.mercer.com">http://www.mercer.com</a>   |
| Crime Index   | Numbeo                          | <a href="http://www.numbeo.com/crime/rankings.jsp#">http://www.numbeo.com/crime/rankings.jsp#</a>   |
| GDP per Person Employed                             | The World Bank                  | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-">http://databank.worldbank.org/data/reports.aspx?source=world-development-</a>         |
| Global Cities Index                                 | AT Kearney                      | <a href="https://www.atkearney.com/research-studies/global-cities-index">https://www.atkearney.com/research-studies/global-cities-index</a>                               |
| Global Innovation Index                             | INSEAD                          | <a href="http://www.globalinnovationindex.org/content.aspx?page=GII-Home">http://www.globalinnovationindex.org/content.aspx?page=GII-Home</a>                             |
| Global Intellectual Property Index                  | Taylor Wessing                  | <a href="http://www.taylorwessing.com/ipindex/">http://www.taylorwessing.com/ipindex/</a>   |
| Global Peace Index                                  | Institute for Economics & Peace | <a href="http://www.visionofhumanity.org/">http://www.visionofhumanity.org/</a>   |
| Global Skills Index                                 | Hays                            | <a href="http://www.hays-index.com/">http://www.hays-index.com/</a>   |
| Global Terrorism Index                              | Institute for Economics & Peace | <a href="http://www.visionofhumanity.org/">http://www.visionofhumanity.org/</a>   |
| Good Country Index                                  | Good Country Party              | <a href="http://www.goodcountry.org/overall">http://www.goodcountry.org/overall</a>   |
| Government Effectiveness                            | The World Bank                  | <a href="http://info.worldbank.org/governance/wgi/index.aspx#home">http://info.worldbank.org/governance/wgi/index.aspx#home</a>   |
| Graduates in social Science, Business and Law (as % | The World Bank                  | <a href="http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics">http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics</a> |
| Gross Tertiary Graduation Ratio                     | The World Bank                  | <a href="http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics">http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics</a> |
| Health Care Index                                   | Numbeo                          | <a href="http://www.numbeo.com/health-care/rankings.jsp">http://www.numbeo.com/health-care/rankings.jsp</a>   |
| Homicide Rates                                      | UN Office of Drugs & Crime      | <a href="https://data.unodc.org/">https://data.unodc.org/</a>   |
| Human Development Index                             | UN Development Programme        | <a href="http://hdr.undp.org">http://hdr.undp.org</a>   |
| Human Freedom Index                                 | Cato Institute                  | <a href="https://www.cato.org/human-freedom-index">https://www.cato.org/human-freedom-index</a>   |
| ICT Development Index                               | United Nations                  | <a href="http://www.itu.int/net4/ITU-D/idi/2016/">http://www.itu.int/net4/ITU-D/idi/2016/</a>   |
| Individual Income Tax Rates                         | KPMG                            | <a href="https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-">https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-</a>       |
| Innovation Cities Global Index                      | 2ThinkNow Innovation Cities     | <a href="http://www.innovation-cities.com/">http://www.innovation-cities.com/</a>   |
| Legatum Prosperity Index                            | Legatum Institute               | <a href="http://www.prosperity.com/#!/ranking">http://www.prosperity.com/#!/ranking</a>   |
| Linguistic Diversity                                | Ethnologue                      | <a href="http://www.ethnologue.com/statistics/country">http://www.ethnologue.com/statistics/country</a>   |
| Lloyd's City Risk Index 2015-2025                   | Lloyd's                         | <a href="http://www.lloyds.com/cityriskindex/locations">http://www.lloyds.com/cityriskindex/locations</a>   |
| Number of High Net Worth Individuals                | Capgemini                       | <a href="https://www.worldwealthreport.com/">https://www.worldwealthreport.com/</a>   |
| Number of International Association Meetings        | World Economic Forum            | <a href="http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/">http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/</a>       |
| OECD Country Risk Classification                    | OECD                            | <a href="http://www.oecd.org/tad/xcred/crc.htm">http://www.oecd.org/tad/xcred/crc.htm</a>   |

**Table 38 | Human Capital Factors Continued**

| Instrumental Factor                                   | Source                          | Website   |
|---|---------------------------------|---|
| Open Data Barometer                                   | The World Wide Web Foundation   | <a href="http://opendatabarometer.org/?_year=2016&amp;indicator=ODB">http://opendatabarometer.org/?_year=2016&amp;indicator=ODB</a>   |
| Open Government                                       | World Justice Project           | <a href="http://worldjusticeproject.org/rule-of-law-index">http://worldjusticeproject.org/rule-of-law-index</a>   |
| Personal Tax Rates                                    | OECD                            | <a href="http://www.oecd.org/tax/tax-policy/tax-database.htm">http://www.oecd.org/tax/tax-policy/tax-database.htm</a>   |
| Political Stability and Absence of Violence/Terrorism | The World Bank                  | <a href="http://info.worldbank.org/governance/wgi/index.aspx#home">http://info.worldbank.org/governance/wgi/index.aspx#home</a>   |
| Press Freedom Index                                   | Reporters Without Borders (RSF) | <a href="http://en.rsf.org/">http://en.rsf.org/</a>   |
| Prime International Residential Index                 | Knight Frank                    | <a href="http://www.knightfrank.com/wealthreport">http://www.knightfrank.com/wealthreport</a>   |
| Regulatory Quality                                    | The World Bank                  | <a href="http://info.worldbank.org/governance/wgi/index.aspx#home">http://info.worldbank.org/governance/wgi/index.aspx#home</a>   |
| Tax as Percentage of GDP                              | The World Bank                  | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators">http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators</a>         |
| Top Tourism Destinations                              | Euromonitor                     | <a href="http://blog.euromonitor.com/2016/01/top-100-city-destinations-ranking-2016.html">http://blog.euromonitor.com/2016/01/top-100-city-destinations-ranking-2016.html</a>                 |
| Visa Restrictions Index                               | Henley Partners                 | <a href="http://www.henleyglobal.com/citizenship/visa-restrictions/">http://www.henleyglobal.com/citizenship/visa-restrictions/</a>   |
| Wage Comparison Index                                 | UBS                             | <a href="http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/prices_earnings.html">http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/prices_earnings.html</a> |
| World Talent Rankings                                 | IMD                             | <a href="http://www.imd.org/wcc/news-talent-report/">http://www.imd.org/wcc/news-talent-report/</a>   |

**Table 39 | Infrastructure Factors**

| Instrumental Factor                    | Source                        | Website   |
|--|-------------------------------|---|
| Crude oil input to refineries          | Enerdata Statistical Yearbook | <a href="https://yearbook.enerdata.net/download/">https://yearbook.enerdata.net/download/</a>   |
| Global Competitiveness Index           | World Economic Forum          | <a href="http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm">http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm</a>                     |
| JLL Real Estate Transparency Index     | Jones Lang LaSalle            | <a href="http://www.jll.com/greti/Pages/Rankings.aspx">http://www.jll.com/greti/Pages/Rankings.aspx</a>   |
| Liner Shipping Connectivity Index      | The World Bank                | <a href="http://databank.worldbank.org/data/reports.aspx?source=world-development-">http://databank.worldbank.org/data/reports.aspx?source=world-development-</a>   |
| Logistics Performance Index            | The World Bank                | <a href="http://lpi.worldbank.org/international/global">http://lpi.worldbank.org/international/global</a>   |
| Metro Network Length                   | Metro Bits                    | <a href="http://mic-ro.com/metro/table.html">http://mic-ro.com/metro/table.html</a>   |
| Networked Readiness Index              | World Economic Forum          | <a href="http://reports.weforum.org/global-information-technology-report-2016/">http://reports.weforum.org/global-information-technology-report-2016/</a>   |
| Networked Society Index                | Ericsson                      | <a href="https://www.ericsson.com/res/docs/2016/2016-networked-society-city-index.pdf">https://www.ericsson.com/res/docs/2016/2016-networked-society-city-index.pdf</a>                                       |
| Quality of Domestic Transport Network  | World Economic Forum          | <a href="http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/">http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/</a>   |
| Quality of Roads                       | World Economic Forum          | <a href="http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/">http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/</a>   |
| Railways per Land Area                 | CIA                           | <a href="https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html">https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html</a>                         |
| Roadways per Land Area                 | CIA                           | <a href="https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html">https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html</a>                         |
| Telecommunication Infrastructure Index | CIA                           | <a href="https://www.cia.gov/library/publications/the-world-factbook/">https://www.cia.gov/library/publications/the-world-factbook/</a>   |
| TomTom Traffic Index                   | TomTom                        | <a href="https://www.tomtom.com/en_gb/trafficindex/list?citySize=LARGE&amp;continent=ALL&amp;country=ALL">https://www.tomtom.com/en_gb/trafficindex/list?citySize=LARGE&amp;continent=ALL&amp;country=ALL</a> |

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