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.

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 21st 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.*" [1]

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*", [2] 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.*"[3]

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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[1] UNEP 2016 *Imagining a Sustainable Financial System* http://unepinquiry.org/wp-content/uploads/2016/02/Imagining_a_Sustainable_Financial_System.pdf

[2] 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

[3] 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".* [4] 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."*[5]

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.[6]

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.

[4.] G20 Green Finance Study Group 2016 *G20 Green Finance Synthesis Report* http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf

[5.] 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

[6.] Lindenberg, N. 2014 *Definition of Green Finance*, DIE, Bonn 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.[7] Vast investment is required for sustainable urbanisation in the face of a growing world population.[8]

Financial services, if properly regulated and sized, are an essential component of a sustainable economy,[9] 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"[10] (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.[11]

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.[12]

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*." [13]

[7.] 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?

[8.] Von Gunten, C. 2014 *Financing Tomorrow's Cities* Z/Yen, London http://www.longfinance.net/images/reports/pdf/COLC_FTCMetaAnalysis_2014.pdf

[9.] Mainelli, M & Mills, S 2018 *Financial Innovations & Sustainable Development* Z/Yen ltd, London

[10.] 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/

[11.] 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

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

[13.] 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

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,[14] UNEP's Financial Centres For Sustainability Initiative,[15] Climate KIC, I4CE and PwC's Benchmark,[16] and UN PRI's Sustainable Stock Exchanges Initiative.[17]

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.

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[14] UNEPFI 2017 *Positive Impact Initiative* http://www.unepfi.org/positive-impact/positive-impact/

[15] UNEP 2017 *Financial Centres For Sustainability* http://unepinquiry.org/wp-content/uploads/2017/06/Financial_Centres_for_Sustainability.pdf

[16] 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

[17] 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 ordered 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[18] - 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

[18.] 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.

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.

- 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. Tthis may reflect the interests of respondents, few of whom were from the insurance industry.

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 disinvestment 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		Centre	GGFI 1	
	Rank	Rating		Rank	Rating
London	1	402	Edinburgh	25	357
Luxembourg	2	389	Milan	26=	356
Copenhagen	3	385	Jersey	26=	356
Amsterdam	4	384	Geneva	26=	356
Paris	5	381	Cape Town	29	355
Shenzhen	6	380	Toronto	30=	353
Stockholm	7	379	Madrid	30=	353
Guangzhou	8=	376	Vienna	32	351
Zurich	8=	376	Rome	33=	350
Shanghai	10=	375	Johannesburg	33=	350
Beijing	10=	375	Boston	35	348
Brussels	12	374	Kuala Lumpur	36=	346
Hamburg	13	370	Dubai	36=	346
Sydney	14	367	Isle of Man	38=	343
Singapore	15	366	Chicago	38=	343
San Francisco	16	365	Abu Dhabi	38=	343
Munich	17=	364	Mexico City	41=	342
Seoul	17=	364	Guernsey	41=	342
Los Angeles	19=	361	New York	43	341
Frankfurt	19=	361	Mumbai	44=	335
Tokyo	19=	361	Bangkok	44=	335
Dublin	22	360	New Delhi	46=	333
Hong Kong	23	359	Moscow	46=	333
Washington DC	24	358			

Table 2 | Ranks and Ratings Of Green Finance Quality

Centre	GGFI 1		Centre	GGFI 1	
	Rank	Rating		Rank	Rating
London	1	437	Dublin	24=	353
Amsterdam	2	385	Rome	24=	353
Brussels	3	383	Vienna	24=	353
Hamburg	4	381	Milan	28	352
Paris	5	379	Hong Kong	29	348
Stockholm	6=	378	Boston	30=	347
Luxembourg	6=	378	New York	30=	347
Zurich	8	375	Johannesburg	32	343
Copenhagen	9	374	Cape Town	33	342
San Francisco	10=	369	Toronto	34=	341
Washington DC	10=	369	Seoul	34=	341
Shanghai	12	364	New Delhi	36=	340
Shenzhen	13	362	Isle of Man	36=	340
Singapore	14=	361	Madrid	36=	340
Edinburgh	14=	361	Guernsey	39	339
Geneva	16=	360	Chicago	40	338
Sydney	16=	360	Dubai	41	332
Los Angeles	16=	360	Mumbai	42	329
Frankfurt	19	359	Kuala Lumpur	43=	328
Beijing	20=	357	Mexico City	43=	328
Jersey	20=	357	Bangkok	45	327
Tokyo	22	356	Abu Dhabi	46	326
Guangzhou	23	354	Moscow	47	322
Munich	24=	353			

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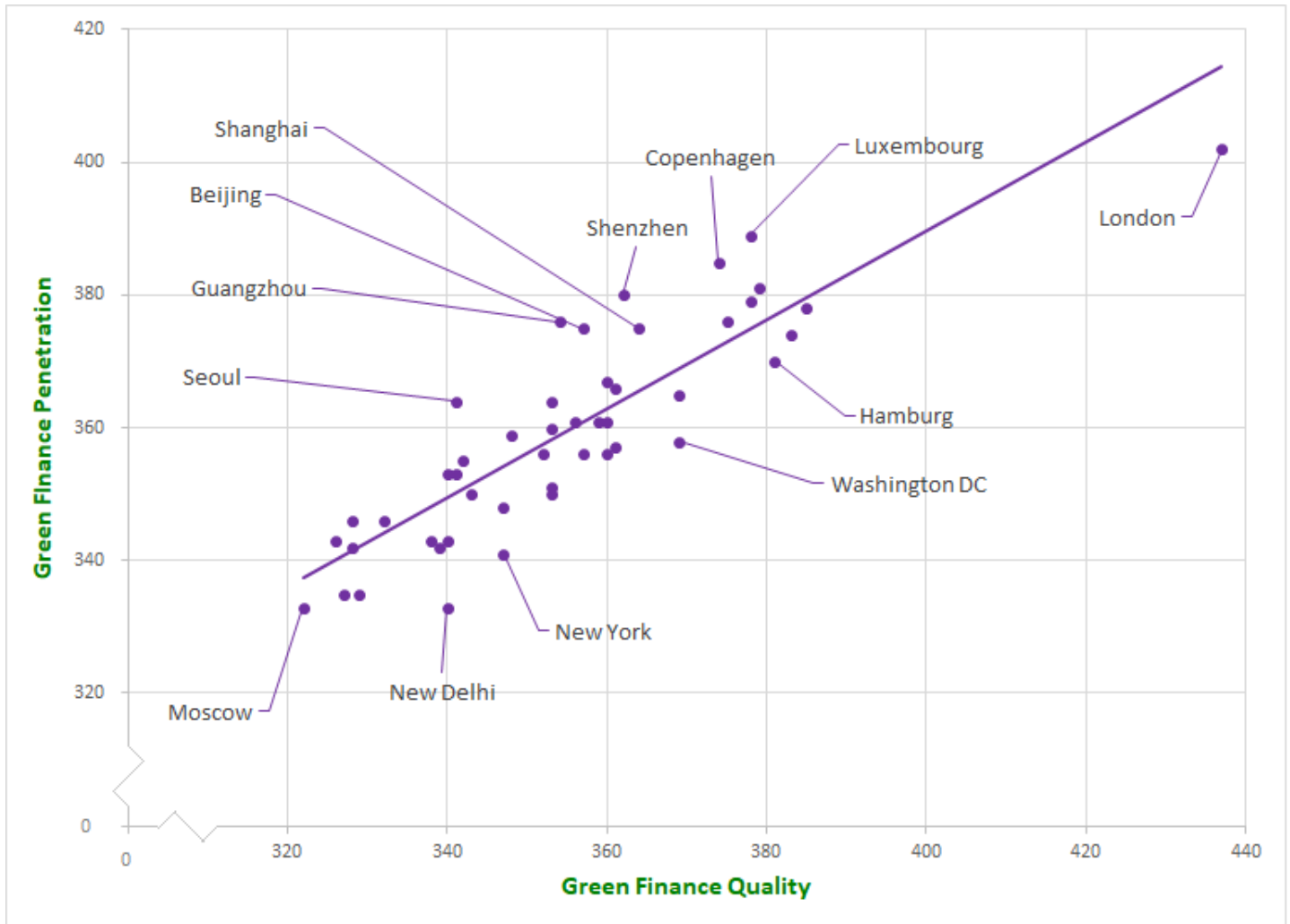
"Many more people are gaining exposure to green finance and so the skill set is developing. As knowledge grows the confidence grows too."

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
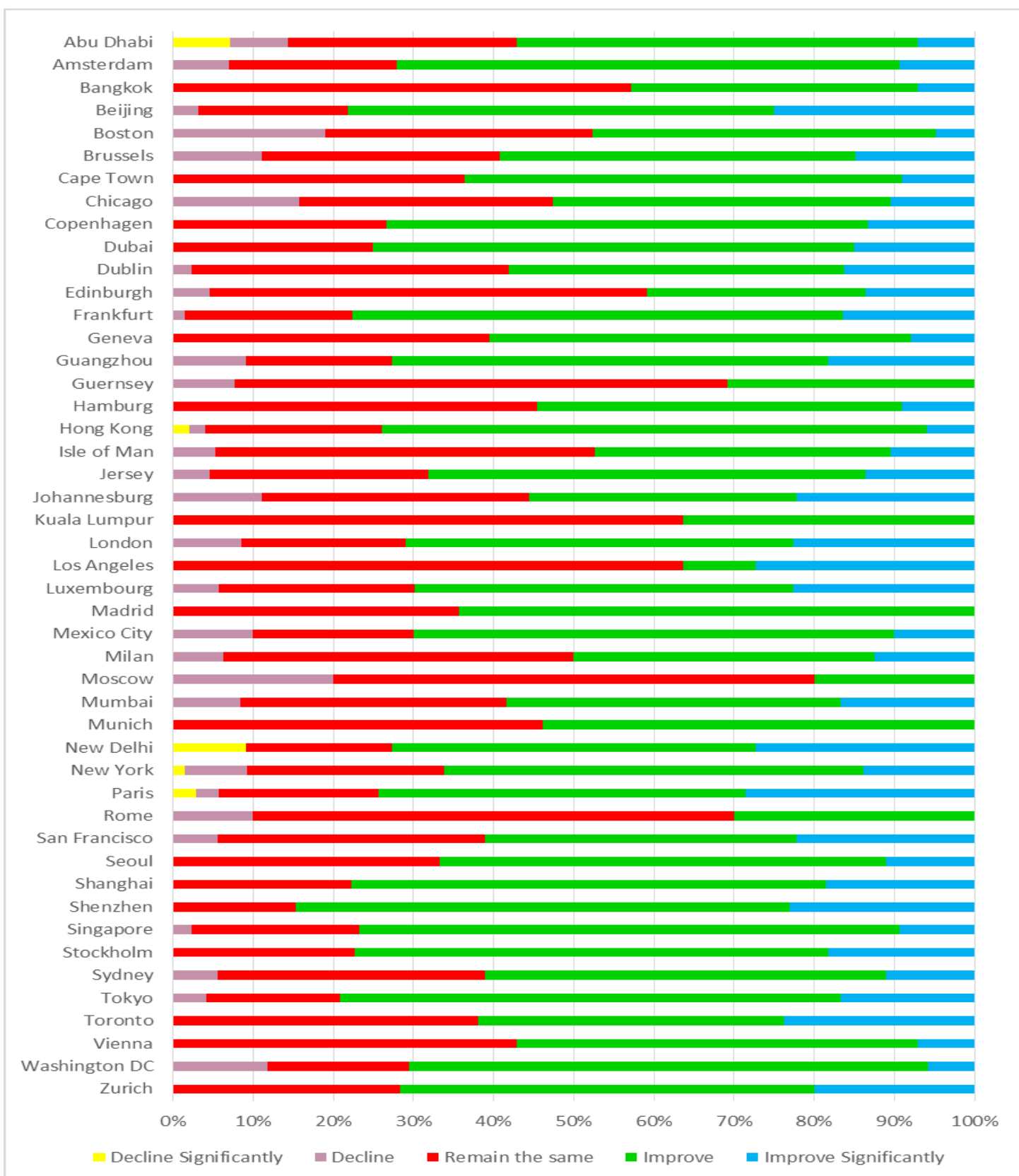
Instrumental Factors

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

	All Factors		Green Factors	
Rank	**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	• There is a need for transparency and disclosure • International standards are important • Stability in the regulatory framework would be helpful • Article 173 in France has been influential
Taxation	112	• Tax incentives are required • A carbon tax is required • Tax incentives would be detrimental
The Availability of Skills in Green Finance	108	• Growing but still niche • Universally recognised credentials would help movement of people

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
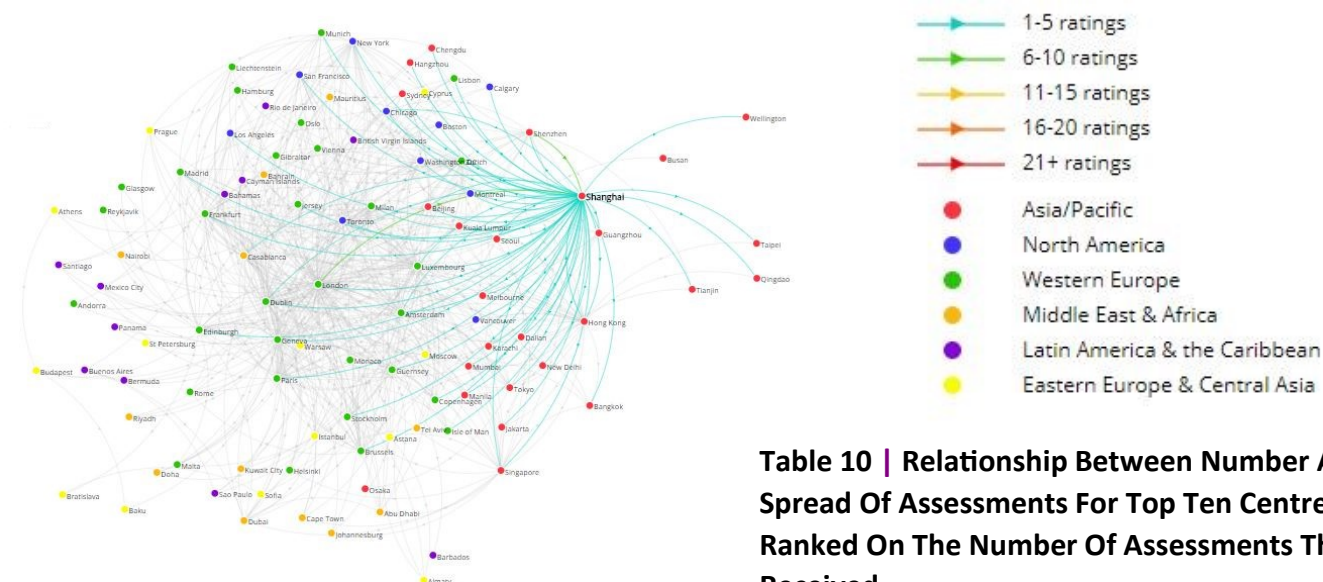
Chart 4 | GGFI 1 Connectivity - Guangzhou

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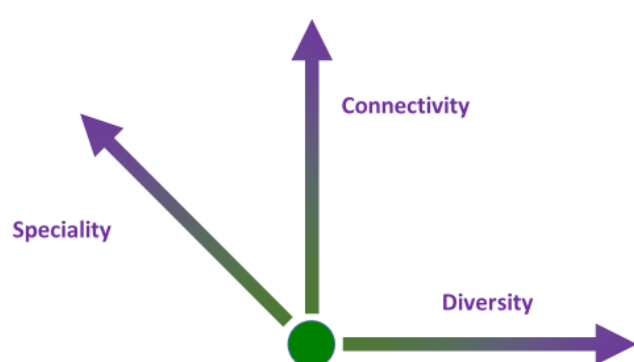
'Connectivity' – the extent to which a centre is well known around the world, and how much non-resident professionals believe it is connected to other green financial centres.

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			
Local	**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	**Global Leaders**	**Global Diversified**	**Global Specialists**	**Global Contenders**
	London	Frankfurt	Luxembourg	Brussels
	Amsterdam	Toronto	Shanghai	Geneva
	Paris	New York	Dublin	
	Zurich		Hong Kong	
International	**Established International**	**International Diversified**	**International Specialists**	**International Contenders**
	San Francisco	Seoul	Shenzhen	Beijing
	Los Angeles	Milan		Singapore
	Tokyo	Madrid		Dubai
	Washington DC			Guernsey
	Edinburgh			
Local	**Established Players**	**Local Diversified**	**Local Specialists**	**Evolving Centres**
	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

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10/20

17/34

19/22

10/12

8/23

36/41

46/36

6/13

38/46

22/29

44/42

44/45

36/43

15/14

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14/16

29/33
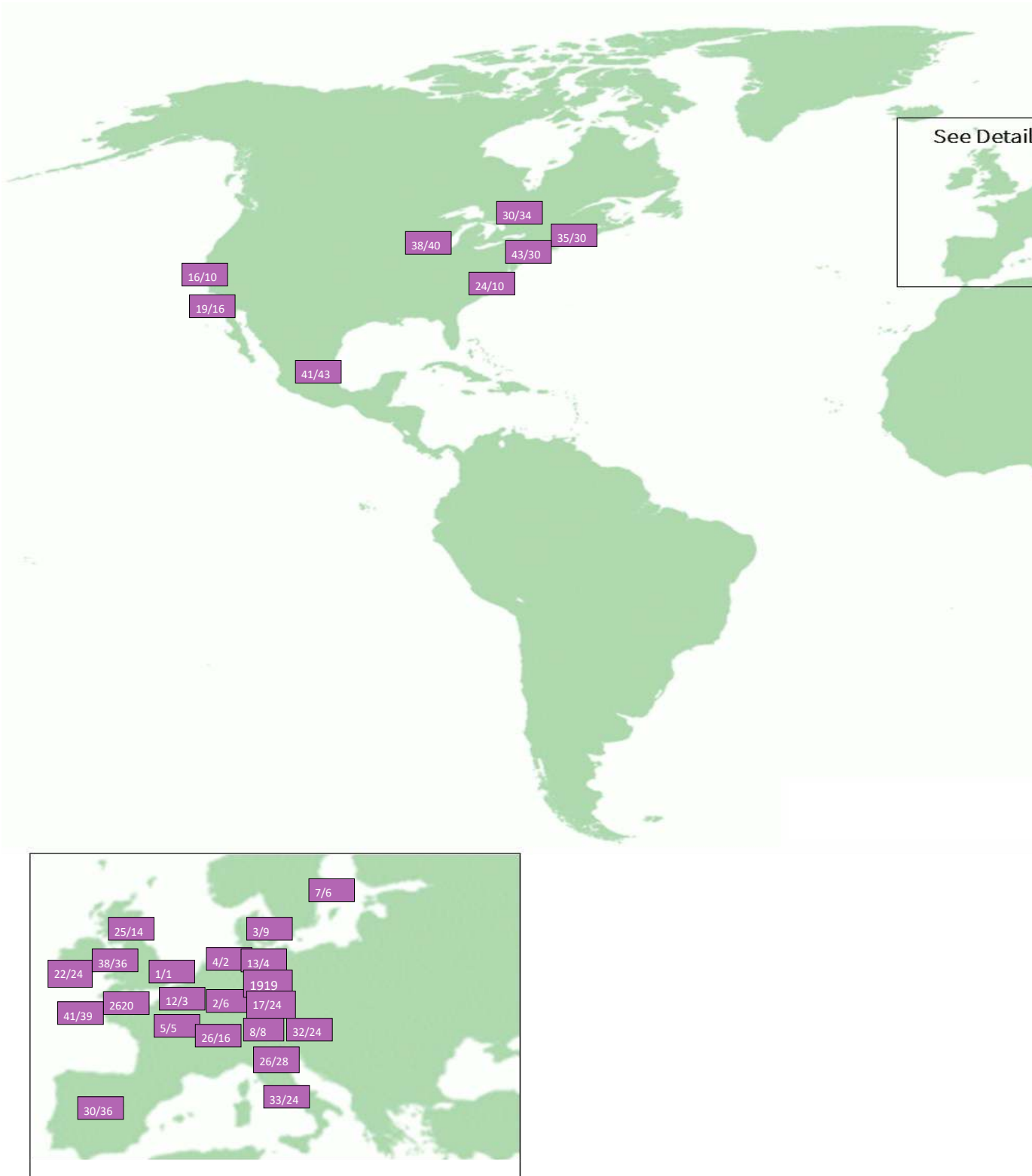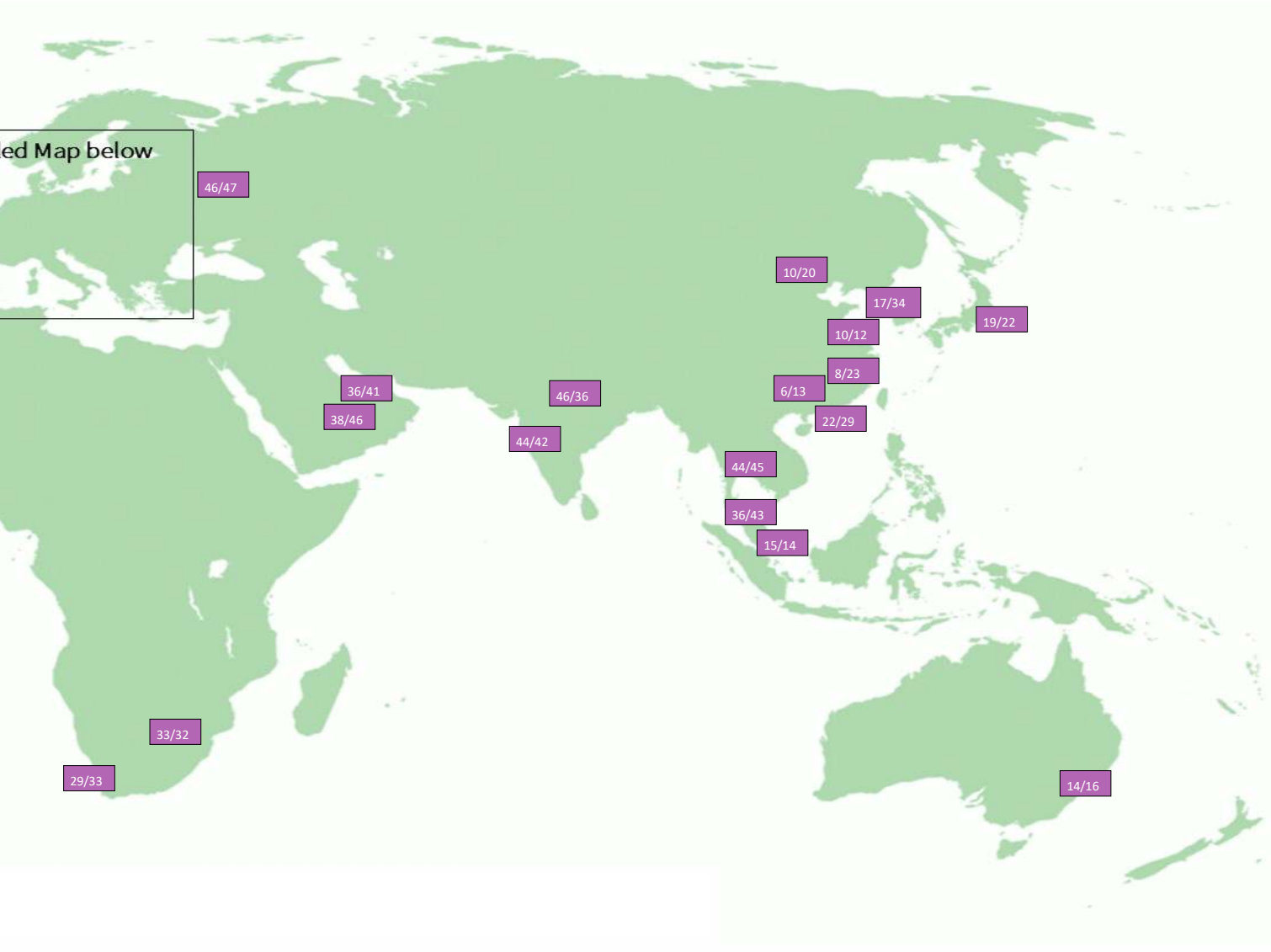
The numbers on the map indicate the rankings first for penetration and second for quality in GGFI 1

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

| Centre | Penetration | | Centre | Quality | |
| | GGFI 1 | | | GGFI 1 | |
	Rank	Rating		Rank	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		
		GGFI 1				GGFI 1	
Centre	Rank	Rating		Centre	Rank	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		
		GGFI 1				GGFI 1	
Centre	Rank	Rating	Centre	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		
		GGFI 1				GGFI 1	
Centre	Rank	Rating	Centre	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

| Centre | Penetration | | Centre | Quality | |
| | GGFI 1 | | | GGFI 1 | |
	Rank	Rating		Rank	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

| Centre | Penetration | | Centre | Quality | |
| | GGFI 1 | | | GGFI 1 | |
	Rank	Rating		Rank	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**
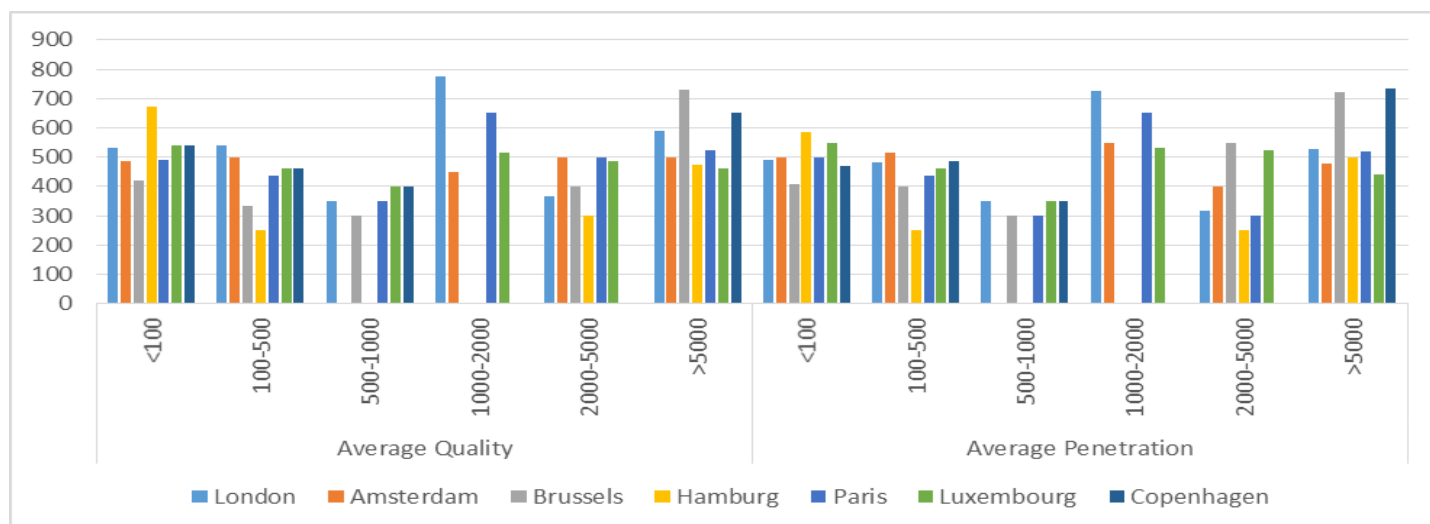
Reputation Analysis

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

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

Tables 21 and 22 show the 15 centres with the greatest reputational disadvantage – an indication that respondents' perceptions of a centre are less favourable than the quantitative measures alone would suggest.

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 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/
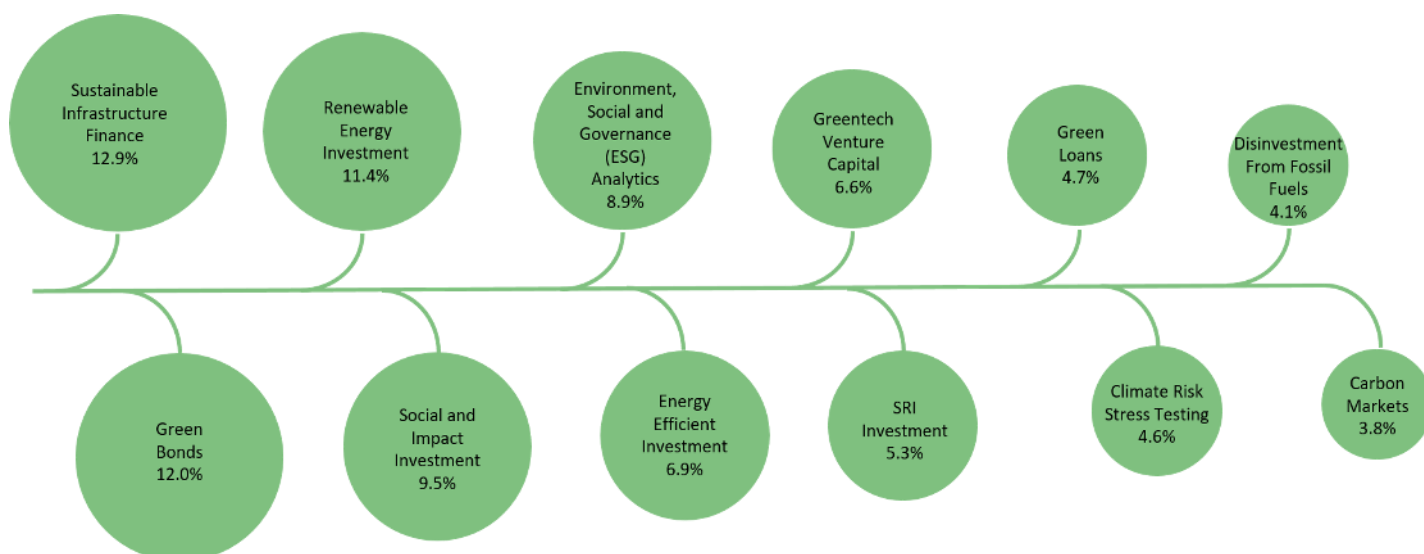
Areas Of Interest In Green Finance

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
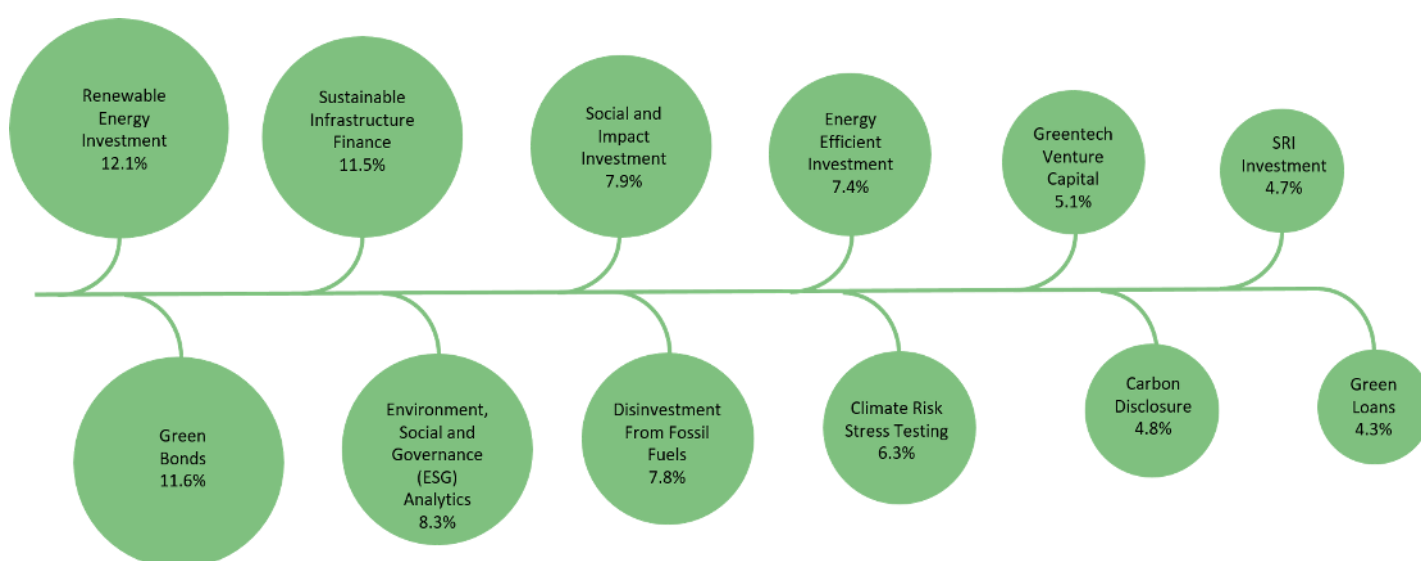
Green Finance Innovation: Amsterdam - Sustainable Finance Platform

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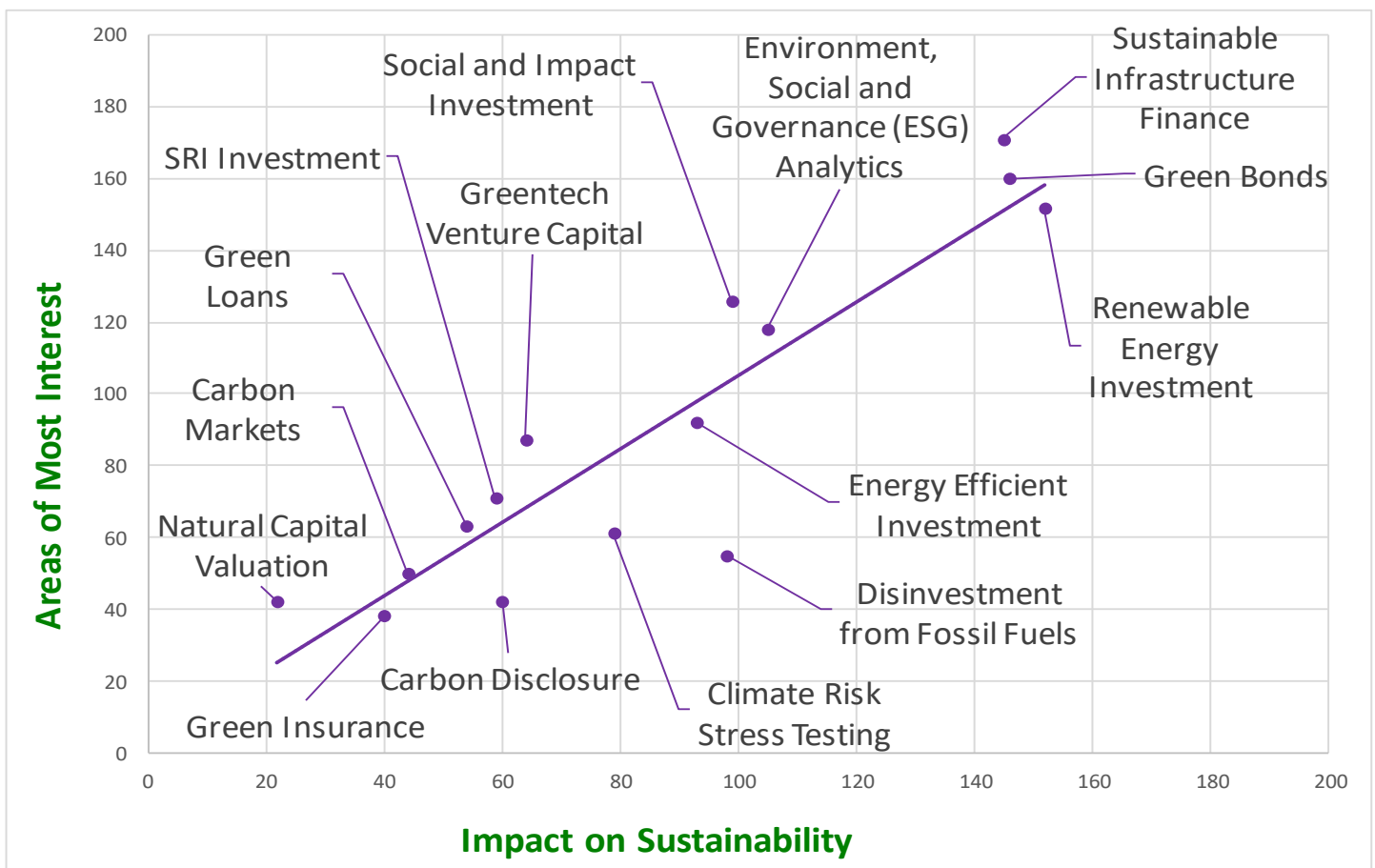
"Various regulators are asking questions on the degree of climate change risk in bank portfolios which will drive awareness by senior management."

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

Policy and Regulatory Frameworks 12.8%

Climate Change 9.8%

Technological Change 6.6%

Mandatory Disclosure 5.1%
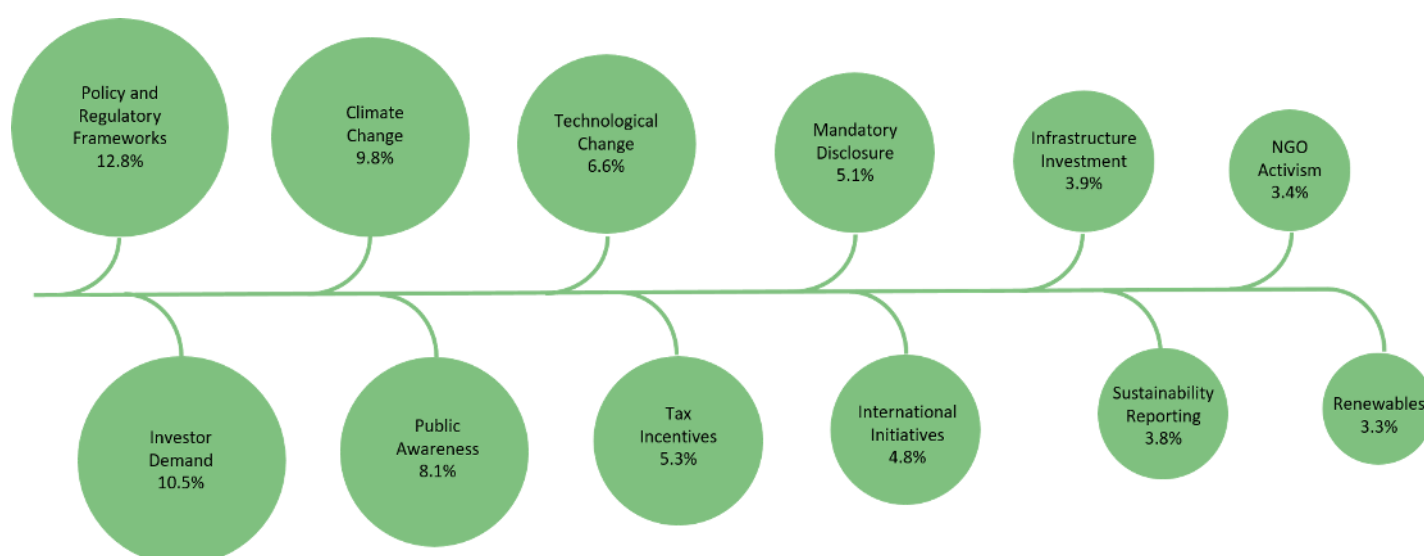
Infrastructure Investment 3.9%

NGO Activism 3.4%

Investor Demand 10.5%

Public Awareness 8.1%

Tax Incentives 5.3%

International Initiatives 4.8%

Sustainability Reporting 3.8%

Renewables 3.3%

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

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 ———			Centre	GGFI 1 Rank	GGFI 1 Rating	——— Assessments ———		
			Number	Average	St. Dev				Number	Average	St. Dev
London	1	437	95	539	229	Dublin	24=	353	44	393	254
Amsterdam	2	385	45	492	243	Rome	24=	353	11	341	228
Brussels	3	383	28	463	218	Vienna	24=	353	15	313	166
Hamburg	4	381	11	564	269	Milan	28	352	17	409	232
Paris	5	379	72	490	270	Hong Kong	29	348	51	379	229
Stockholm	6=	378	22	559	265	Boston	30=	347	21	369	209
Luxembourg	6=	378	55	501	255	New York	30=	347	68	376	205
Zurich	8	375	61	489	242	Johannesburg	32	343	10	390	274
Copenhagen	9	374	16	553	275	Cape Town	33	342	11	336	242
San Francisco	10=	369	18	511	249	Toronto	34=	341	21	371	243
Washington DC	10=	369	18	436	206	Seoul	34=	341	10	250	160
Shanghai	12	364	27	450	237	New Delhi	36=	340	11	314	278
Shenzhen	13	362	13	469	279	Isle of Man	36=	340	19	321	216
Singapore	14=	361	44	427	236	Madrid	36=	340	15	337	205
Edinburgh	14=	361	22	409	237	Guernsey	39	339	13	327	256
Geneva	16=	360	38	441	240	Chicago	40	338	19	305	169
Sydney	16=	360	18	425	270	Dubai	41	332	21	331	258
Los Angeles	16=	360	11	459	208	Mumbai	42	329	12	217	150
Frankfurt	19	359	71	426	226	Kuala Lumpur	43=	328	11	145	65
Beijing	20=	357	33	442	240	Mexico City	43=	328	11	332	232
Jersey	20=	357	22	464	282	Bangkok	45	327	14	254	207
Tokyo	22	356	25	432	291	Abu Dhabi	46	326	15	260	216
Guangzhou	23	354	11	386	218	Moscow	47	322	10	250	189
Munich	24=	353	13	458	292						

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 Fuels	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 Governance (ESG) Analytics	118	8.9
Social and Impact Investment	126	9.5
Renewable Energy Investment	152	11.4
Green Bonds	160	12.0
Sustainable Infrastructure Finance	171	12.9
Totals	**1,328**	**100.0**

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 Fuels	98	7.8
Social and Impact Investment	99	7.9
Environment, Social and Governance (ESG) Analytics	105	8.3
Sustainable Infrastructure Finance	145	11.5
Green Bonds	146	11.6
Renewable Energy Investment	152	12.1
Totals	**1,260**	**100.0**

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
Totals	**1,280**	**100.0**

Appendix 3: Respondents' Details

Table 28 | Respondents By Industry Sector

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

Table 30 | Respondents By Region

Region	Number Of Respondents
Western Europe	248
Asia Pacific	36
North America	17
Middle East and Africa	12
Eastern Europe and Central Asia	9
Latin America and the Caribbean	4
Other	11
Total	**337**

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
Total	**337**

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
Total	**337**

Table 32 | Respondents By Gender

Gender	Number Of Respondents
Female	113
Male	211
Other	1
Prefer not to say/Not given	12
Total	**337**

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
Total	**337**

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/. 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
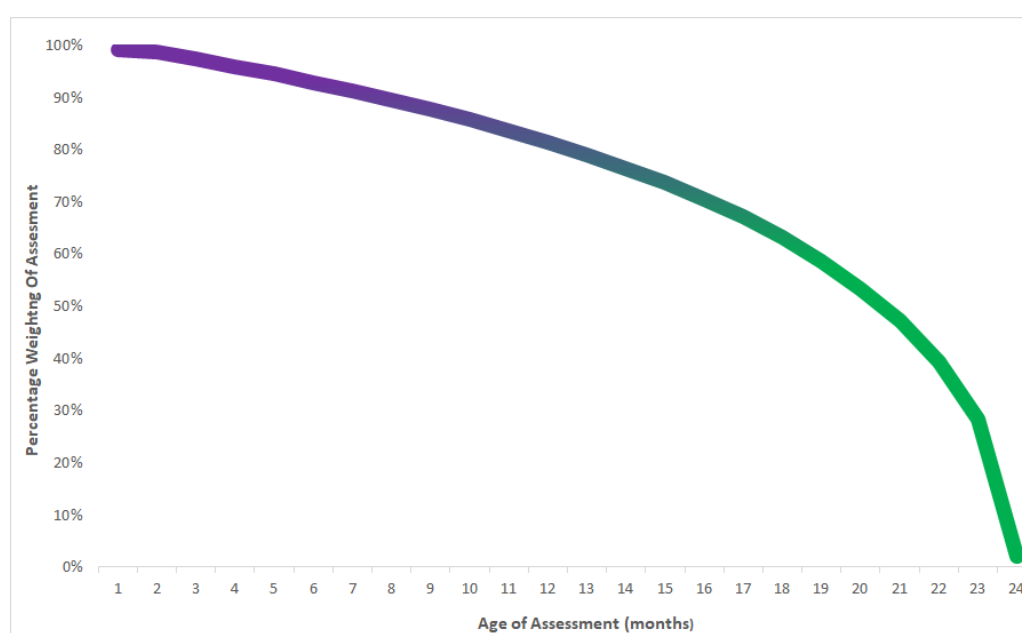
Instrumental Factor Data

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 not 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
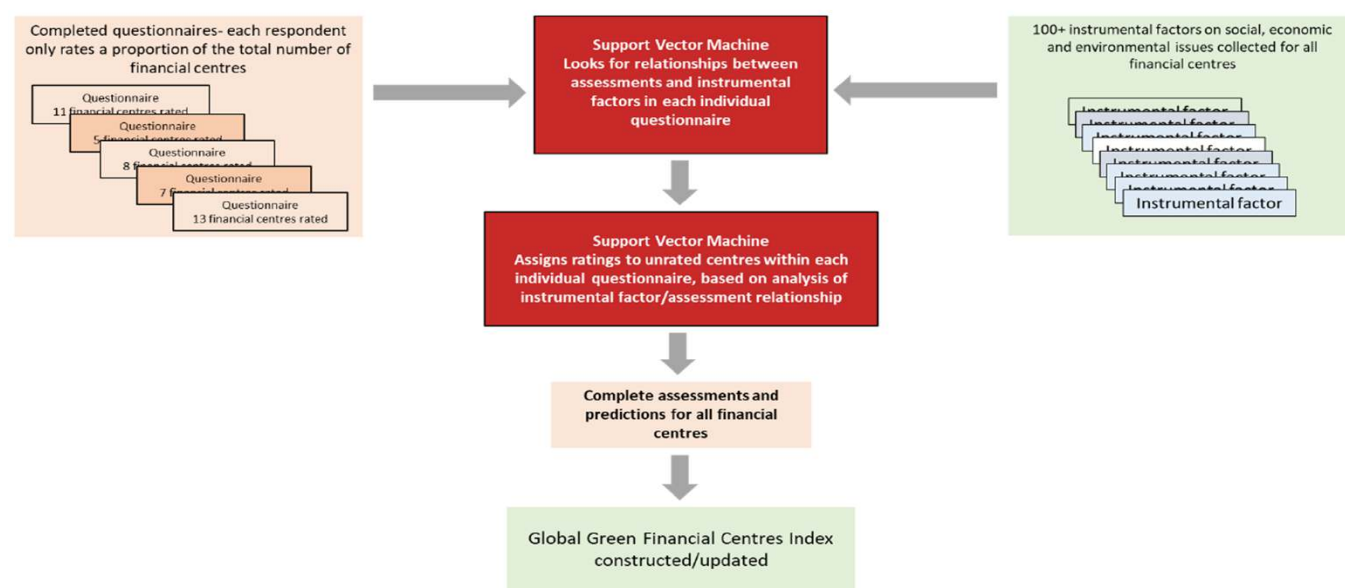
Validation

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

Table 37 | Business Factors

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

Table 38 | **Human Capital Factors**

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

Table 38 | Human Capital Factors Continued

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

Table 39 | Infrastructure Factors

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

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