



The Global Green Finance Index 2



September 2018





We are pleased to present the second edition of the Global Green Finance Index (GGFI 2).

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

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

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

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

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



Foreword

I am pleased to introduce the second edition of the Global Green Finance Index. It is one of many important steps on the path to creating resilient and regenerative societies. The release of the new index comes at a time when the full cost of a rapidly changing climate system is moving from scientific consensus to observable reality. This is not a far distant reality. To stabilise global temperatures at any safe level, we must transition right now towards a zero-carbon economy.

As this report demonstrates, the share of financial markets that can be considered sustainable remains very low. Progress is being made, with more financial centres entering the index this year and, with the support of the MAVA Foundation, improvements to the methodology are promising. Yet the pace of the deployment of innovation and the mobilisation of finance remain a long way off, both in terms of urgency and of scale.

We need to change the behaviors of billions and release investment in the trillions. We need to do this across complex agricultural, transport, energy, infrastructure and production systems, and of course across the financial system itself. So how do we scale quickly enough? How can we unlock innovation? How can we give actors within the financial system the confidence and the courage to change? Will another index enable the required paradigm shift away from sectoral and incremental to transformative and systemic approaches?

At EIT Climate-KIC, our work increasingly focuses on connecting ecosystems of innovative partners and activities to accelerate complex, systems-level solutions. We consider the development of metrics that aim to improve the visibility of climate information, such as the Global Green Finance Index or the Financial Centres for Sustainability, as important elements, but we know that together we need to go further, and we need to go faster.

I welcome this contribution and look forward to supporting the next steps as we work to press policy makers and regulators, institutional investors and citizens to join with us to contribute to mobilising investment, shifting the paradigm, and creating the pathway towards a zero-carbon future for all.



Dr Kirsten Dunlop
Chief Executive Officer
EIT Climate-KIC



Preface

The Global Green Finance Index (GGFI) project was launched in Spring 2017, with the first publication in Spring 2018, not just to measure how 'green' financial centres are, but to catalyse growth in this sector, improve policy makers' understanding of what makes a financial centre 'green', and shape the financial system to support sustainability goals.

We were pleased that the first publication got a bit more attention than we anticipated. We anticipate that further publications will attract more attention as positions alter, endure some attacks, and then hopefully motivate improvement.

Some have criticised the GGFI as starting measurement too early. In fact, the project waited on the shelves for over a decade until the team felt the time was right. I've been involved in the environmental movement since the mid-1970s. If beginning to measure financial centres forty years later is far too early, then all our environmental efforts will be far too late.

It would be nice to wait and wait until all we measure is success. As I mentioned in a 2005 lecture on measurement, Garrison Keillor welcomes you to Lake Wobegon, "where all the women are strong, all the men are good-looking, and all the children are above average." Unfortunately, measurement brings on comparison, and all comparisons are not favourable.

**"The track of Quality preselects what data we're going to be conscious of, and it makes this selection in such a way as to best harmonize what we are with what we are becoming."
[Robert M Pirsig, *Zen and the Art of Motorcycle Maintenance*, 1974].**

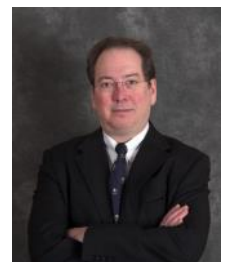
GGFI combines instrumental factors with subjective professional assessments. One line of attack is the subjectivity of those providing the assessments. People. Yet there is no scientific way of measuring 'best'. Ultimately, people decide instrumental factor weightings indirectly, as a community over time. GGFI hopes to help our community accelerate its discussion on what instrumental factors matter, and how much.

'Success measures' suffer from the complexity of measuring not what level of success was achieved, but what level of success should have been achieved. GGFI allows us to see how a centre would fare without a strong reputation, based on just fundamentals. GGFI hopes to provide continuous index improvement by including hypotheses about success backed by instrumental factors to measure them.

In evaluating any green centre, a core question is probably whether the centres themselves are lucky or skilful, and how would they measure the difference? Pirsig echoes Protagoras, "Man is the measure of all things".



Professor Michael Mainelli
Executive Chairman, Z/Yen Group



SUMMARY AND HEADLINES

Overview

Welcome to the second edition of the Global Green Finance Index (GGFI 2). The GGFI is based on a worldwide survey of finance professionals' views on the quality and depth of green finance offerings across 110 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 will be sampled for the next edition of the GGFI. The more responses that are collected, the more significant the results.

The 59 centres listed in this second edition of the Index (GGFI 2) are those which received a minimum of 15 assessments from survey respondents. Assessments of respondents' home centres were excluded from the data, in order to avoid home centre bias. For comparison, GGFI 1 collected survey data on 108 financial centres, of which 47 received sufficient responses to be included.

The assessments were combined with 126 Instrumental factors (113 in GGFI 1) to give an overall rating for each centre. These instrumental factors are quantitative measures provided by third parties, including Corporate Knights, the Climate Bonds Initiative, the World Health Organisation, the World Bank, and many others.

We received 3,100 ratings from 535 individual respondents in the period up to 30 June 2018 – a 60 per cent increase in responses compared with GGFI 1. Details of the profile of these respondents can be found in Appendix 3. The survey will be sampled every six months in order to generate further editions of the index.

In the first edition of the index, published in March 2018, we set out our intention that the index should 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. The combination of instrumental factors and perceptions measured in this index, as in many other areas, can be a leading indicator of future activity. We believe that the index is one element of the work required to measure the development of green finance, by showing how green finance centres are evolving.

Results

- Amsterdam and Copenhagen took the top places in the depth index, with London falling to third place. London retained its place at the top for quality, although its advantage in the ratings over the second placed centre, Paris, has almost halved from 52 to 27;
- In the quality index, Paris moved up three places to second place;
- There were 12 new entrants to the index: British Virgin Islands, Calgary, Casablanca, Cayman Islands, Istanbul, Malta, Mauritius, Montréal, Prague, São Paulo, Vancouver, and Warsaw;
- This shows the growth in interest in green finance worldwide. Twelve further centres received just under the number of assessments required for inclusion in the index. Details of these are given in the regional analysis;
- A number of centres moved up more than five places in the indices. San Francisco, Toronto, and Vienna moved up five or more places in the depth index. Munich, Copenhagen, Toronto, and Madrid moved up five or more places for quality;
- Perceptions of green finance are ahead of market reality. The ratings for depth of green finance in a centre's overall financial offering range between 307 and 435 out of 1,000, equivalent to between three and four out of ten on a ten point scale. By contrast, actual green bond issuance in H1 2018 was around only 2.1 % of the global debt capital market activity in the period. As in GGFI 1, these assessments suggest that survey respondents may perceive green finance to be more prevalent than it is. This underlines the scale of transition needed, the attention it is receiving, and that respondents expect green finance to be growing rapidly in significance;
- Overall ratings are still low. There is significant room for growth in the range and quality of green finance products on offer. The ratings for quality given to centres range between 315 and 481 out of 1,000;
- Narrow margins separate ranked centres. 166 points separate the top and bottom centres in the quality index and 128 points separate them for depth. Among the top five centres in each index, the spread of ratings has narrowed to 12 points for depth (21 in GGFI 1) and 41 for quality (58 in GGFI 1). This suggests that relative positions in the rankings may be fluid in future editions, especially at the top of the table.

GGFI New Entrant—Montréal

Montréal has an excellent track record in ESG analytics, carbon reduction, and renewables financing, and its green bonds market has been given a boost by the issuance, by the Government of Quebec of a \$500 Million Green Bond focussed on carbon reduction and climate change adaptation.

Further Information:

<https://fsi-efd.org/>

Leading Centres

- Leading Centres in the index were generally rated higher for the quality of their green finance than for depth, indicating both the scale of transition facing larger centres and the potential for smaller financial centres to advance through specialisation;
- While leading centres in the index all increased their ratings from GGFI 1, some accelerated faster than others. This has led to adjustments in the ranking of centres;
- The average rating for the top five centres in all regions increased. The increase in the depth index was lower for Asia/Pacific than other regions. In the quality index, Eastern Europe & Central Asia overtook Latin America & the Caribbean to take fifth place in the regional rankings.

Western Europe

- Western Europe performed well, featuring nine of the top ten centres in the quality index and seven of the top ten in the depth index;
- Twenty-two of the 59 centres in the index were in Western Europe.
- It is notable that in both GGFI 1 and GGFI 2, Paris came top of the table of centres likely to become more significant and the new ratings show that it is narrowing the gap with London;
- Malta entered the index for the first time.

North America

- San Francisco retained its leading place for quality in North America, moving into the top ten in the overall index;
- New entrants from Canada performed well, with Vancouver entering at second place in North America and 16th overall for quality;
- In the depth index, another new entrant, Montréal, came first in North America and eighth overall, with Vancouver tenth overall and second in North America for depth, beating San Francisco into 11th place;
- Calgary also entered the index for the first time.

Asia/Pacific

- Shanghai consolidated its position, coming first in the region for both quality and depth and improving to seventh place overall for depth;
- A number of centres fell in the rankings, although Beijing and Tokyo made slight gains in the quality measure and Seoul gained three places in the depth ranking to 14th overall;
- Three of the top five Asia Pacific centres for depth and two of the top five centres for quality are Chinese.

Middle East & Africa

- Casablanca joined the index for the first time and was ranked top for quality and depth in the Middle East & Africa, coming 16th for depth and 28th for quality overall;
- Other centres in the region fell in the rankings, with the exception of Dubai;
- Alongside Casablanca, Mauritius joined the index for the first time.

Latin America & The Caribbean

- New entrant São Paulo scored highest in both depth and quality in the region, ranking 43rd and 40th respectively overall;
- Mexico City fell slightly in the rankings;
- The British Virgin Islands and Cayman Islands joined the index for the first time.

Eastern Europe & Central Asia

- New entrant Prague topped the depth and quality rankings in the region, coming 44th and 13th respectively overall;
- Alongside Prague, Warsaw and Istanbul were new entrants to the index.

Other Results

- There is a closer correlation in this edition than in GGFI 1 between the instrumental factor data and the index results, as shown by a comparison between the weighted average assessments and the final ratings. This shows a closer relationship between the data measures in the instrumental factors and the ratings given to centres by respondents to the questionnaire;
- There is a discernible link between composite sustainability factors and the index ratings. This may indicate that leadership on quality of life issues is an enabling factor for the growth of green finance.

Additional Findings

As part of the questionnaire, respondents were asked for their views on the future prospects of green financial centres; which areas of green finance 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, London, and Luxembourg led the centres whose green finance offerings were expected to improve significantly over the next two to three years based on the proportion of responses rating their prospects;
- Paris, Frankfurt, and Singapore led the centres most cited as likely to become more significant over the next two to three years;
- Calgary, Malta, and Prague were the centres most expected to decline or decline significantly in green finance over the next two to three years.

Areas Of Interest And Areas with Most Impact On Sustainability

- Renewable energy investment, sustainable infrastructure finance, and green bonds remained the areas of most interest and were cited as the areas which had most impact on sustainability. This overlap shows the importance of these areas to green finance;
- Respondents showed more interest in areas that could be moving from niche to mainstream. The number of mentions of divestment from fossil fuels increased to 7.5% (up from 4.1%), carbon disclosure increased to 5.3% (3.2%), and green insurance increased to 4.5% (2.9%);
- There was a slight fall in the proportion of respondents citing interest in carbon markets and green loans;
- Natural capital valuation remained the area seen as having least impact.

Drivers of Green Finance

- Two themes continued to arise from respondents' views on the drivers of the uptake of green finance:
 - ◇ First, an enabling policy framework - at national and international level, driving tax and regulatory incentives, mandatory disclosure, and technological change. This underlines the importance of Environmental, Social and Governance (ESG) Analytics, and Carbon Disclosure;
 - ◇ 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 continue to score low as drivers of green finance.

Conclusions

This is the second 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:

- Respondents recognised the importance of policy frameworks and investor demand in fuelling the growth of green finance markets. They commented that the uptake of green finance is most strongly influenced by policy and regulation, closely followed by investor demand and climate change itself. The clear message to policymakers from respondents is not to be afraid to use policy and regulatory interventions to promote green finance. To employ a mixed metaphor, the invisible hand of the free market does not have green fingers;
- Larger centres may suffer from negative perceptions linked to their legacy brown assets. Centres with large volumes of non-green finance, such as New York, London and Paris, tended to fare worse in the index for depth than for quality. Smaller specialist centres, such as Luxembourg, Casablanca or Montréal, are valued and are building a reputation for green finance;
- Centres with a broad approach to sustainability do best. What drives people's perceptions of financial centre greenness appears to be an overall impression of sustainability, rather than a single "green bullet" factor. The relatively high correlations between GGFI rankings and composite sustainability indices, and the relatively low correlations between GGFI rankings and specific green finance markets, such as green bonds, suggests that financial centres need to perform on a wide range of factors – from quality of life and robust policy to infrastructure and green finance markets - in order to be perceived as leading green financial centres;
- Green finance is perceived as being more prevalent than market data suggest. This shows the strong interest in green finance and may indicate future growth;
- The relative positions of financial centres show that financial centres can improve their green finance offerings through specialisation, collaboration, and leadership, all of which can be encouraged by policy frameworks.

GGFI New Entrant - Malta

Whilst the Maltese Stock Exchange is not a Sustainable Stock Exchange signatory, the island has extensive experience in the financing of renewables and is poised to enter the green bonds market.

Further Information:

<https://www.mfsa.com.mt/>

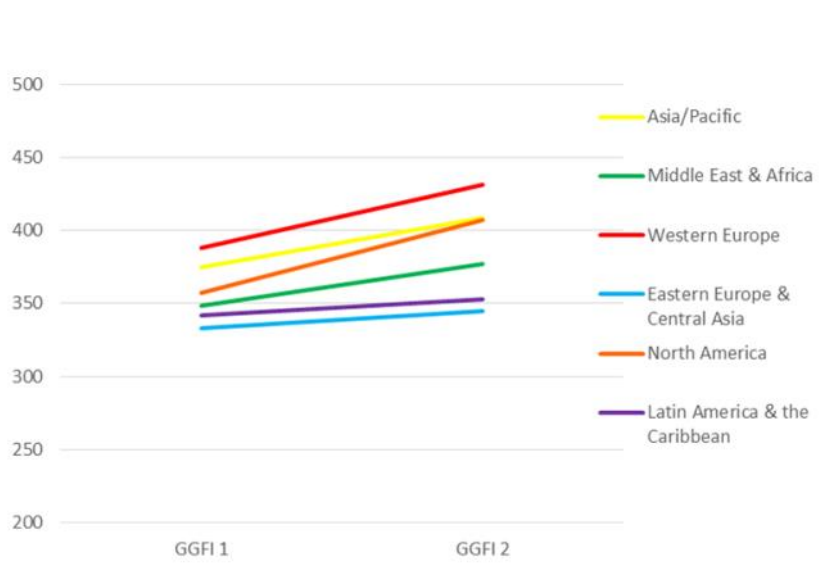
Overview

Green Finance Outlook

There continues to be a great deal of interest in green finance, although the pace of growth and development of green finance at a global level has slowed in some areas. For example, while total green bond issuance to date now exceeds \$430bn, the \$74.6bn issued in the first half of 2018 represents an increase of only 4% on the same period last year, compared with a 78% increase between the full years 2016 and 2017¹. Nevertheless, recruitment agencies are reporting unprecedented demand globally for SRI analysts and green bond specialists.

Meanwhile, the ratings of the top centres in all regions have increased. Charts 1 and 2 show the change in the mean rating of the top 5 centres in each region between GGFI 1 and GGFI 2, first for depth and then for quality.

Chart 1 | Mean Rating Of The Top Five Centres In Each Region For Depth

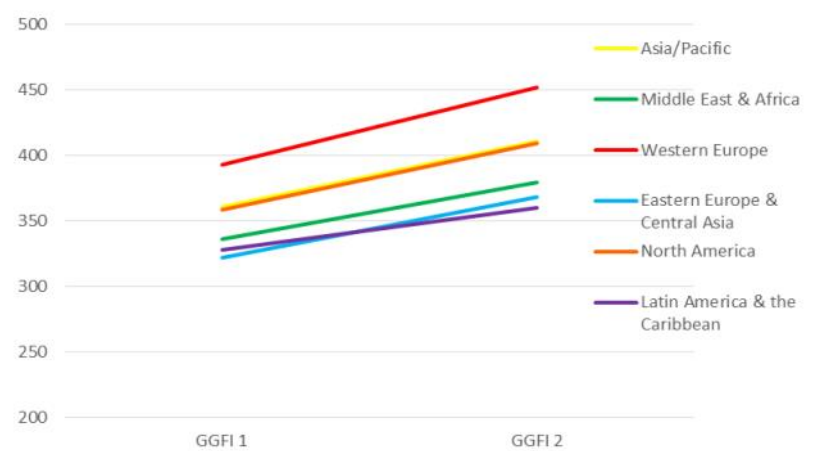


In North America, despite the fact that the US Government has cut its contribution to the Global Environment Facility, raising concerns about access to finance for environmental protection in the developing world, interest in green bonds is exploding. Commentators suggest that green finance could be used to help meet America's substantial infrastructure funding requirements.

¹ Data from Carbon Bonds Initiative. See also *CBI's Green Bonds Market Summary H1 2018*, July 2018 https://www.climatebonds.net/files/files/H1%202018%20Highlights_12072018.pdf

In Europe, the drive towards green finance continues apace, with the European Commission's ambitious ten point action plan² suggesting, amongst other things, that new green labels could be developed for funds in order to assist consumers in investment decisions, and that fund managers will have a new duty to consider 'sustainability' in investment decisions. Centres such as Guernsey, where the regulator has set green fund standards to enable its Guernsey Green Fund initiative, are looking to carve out niche markets.

Chart 2 | Mean Rating Of The Top Five Centres In Each Region For Quality



In Eastern Europe, the loss of EU structural funds and carbon market revenues have left a funding gap for renewable and energy efficiency projects, which is being filled by green bonds.

In Africa, leadership by centres such as Casablanca, reinforced by a renewed focus on sustainability by Chinese and other international development banks, has fuelled demand for green bonds and sustainable infrastructure development. The world's six largest multilateral development banks committed \$35.2 billion to climate financing for developing and emerging economies in 2017, with a significant rise in funds projected for 2018³.

In South America, the Brazilian state-run bank Banco do Brasil and the Inter-American Development Bank (IDB) signed a cooperation agreement to evaluate and support green investment through South and Central America, whilst a number of national banks have raised green bonds to support renewable energy projects.

² https://ec.europa.eu/info/publications/180308-action-plan-sustainable-growth_en

³ Clean Technica 2018 World's 6 Largest Multilateral Development Banks Committed \$35.2 Billion To Climate Financing In 2017 <https://cleantechnica.com/2018/06/18/worlds-six-largest-multilateral-development-banks-committed-35-2-billion-to-climate-financing-in-2017/>

The Measurement Of Green Finance

We recognised in our first report that hard data on green finance is incomplete. We published alongside the first edition of the index a set of data drawn from analysis from Corporate Knights. We are pleased that with the assistance of the Climate Bonds Initiative, we are publishing alongside this second edition a set of data on green bond issuance and certification (<https://www.finance-watch.org/ggfi-global-green-finance-index/>).

Both these datasets have been used as instrumental factors in the current edition of the index. We intend to continue to increase the range of data on green finance that we publish and use in the construction of the index.

This issue is key, as our analysis shows that the new data we have published are significant in terms of its correlation with the index results in terms of the sustainability measures which we use in the development of the rankings.

Our approach in the index uses advanced statistical techniques to bridge the gaps in existing data by using quantitative factors to complete the dataset of perceptions of financial services professionals and other experts. The survey asks for views on the *depth* of green finance in a financial centre's overall financial activities. This question reflects our view that the mix of financing activities, such as the ratio between green and brown financing, is important both for sustainability; and for measuring progress away from unsustainable activities. The survey also asks about the *quality* of green finance, enabling respondents to rate a financial centre independently from its market volumes, for example taking into account the robustness of green labelling and standards, among other things.

We consider perceptions as an important complement to hard data, especially when market metrics are still emerging. People's tendency is to look forward when asked about their perceptions – to focus on what they currently know and expect in the near future. People's perceptions and thinking both influence and allow changes in behaviour, making perception both a forward-looking indicator and a useful contrast / complement to hard market data.

In summary, quantitative data is crucial for measurement, but perception and data combined give a more complete image of what is happening.

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 impact of their decisions and identify and fill data gaps.

We intend to add more financial centres to the index as we build the number and geographical spread of survey respondents. We are very pleased that 12 new centres feature in this second edition of the index. Other centres gained just under the minimum number of assessments required for inclusion in this edition and we hope they too will join the index in the near future.

We are also pleased that this edition of the index includes assessments from some 60 per cent more respondents than GGFI 1. We will continue to work to publicise the questionnaire and to increase the number of responses on which our assessments are based.

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

Collaboration In Green Finance

We are keenly aware of the interest in collaboration between financial centres in relation to green finance. Many leading green finance centres are involved in outreach to other centres and networks of centres are growing in importance, such as the Financial Centres for Sustainability Network (FC4S).

Networks of financial centres can promote integrity and commitment to green finance, as well as developing common metrics and standards to accelerate the development of green finance in all financial centres. Collaboration plays a key role in turning local best practices into industry standards that benefit all.

Collaboration can help financial centres to address concerns about the role of sustainability in maintaining global relevance (for example, three quarters of market participants in a Hong Kong survey said sustainable finance was important for their centre's future but that Hong Kong was falling behind)⁴.

The GGFI 2 survey results, on average, reveal a positive correlation between being a member of the FC4S network and perceptions of the depth and quality of the green finance in FC4S member centres, strengthening the case for centres to cooperate as part of their green finance development strategy. The level of correlation was similar to that observed for metrics such as the total issuance of labelled green bonds or membership of the Sustainable Stock Exchange Initiative.

This is a useful reminder that green finance is competing with other forms of finance for market share and influence, and that working together is a key aspect of the development of green finance.

⁴ Mapping Sustainable Finance in Hong Kong, January 2018, RS Group, <http://sustainablefinance.hk/mapping-sustainable-finance-in-hong-kong-survey/#newsletterreport>

While collaboration is a powerful lever for change, it is not the only one. As financial centres take action to promote green finance in their local context, tools that compare outcomes between centres - and across time - can provide useful feedback. We thus see collaboration and comparison through tools such as the GGFI and market data as complementary, provided that the measurement tools are used to strengthen the relationships on which collaboration depends.

One of the goals of the Global Green Finance Index is to enable financial centres to track how they are perceived in green finance in relation to their peers. In turn, we believe that this will improve policy makers' understanding of the drivers of green growth in their markets, and assist them in shaping both individual and collaborative financial systems that support sustainability goals.

GGFI New Entrant—Calgary

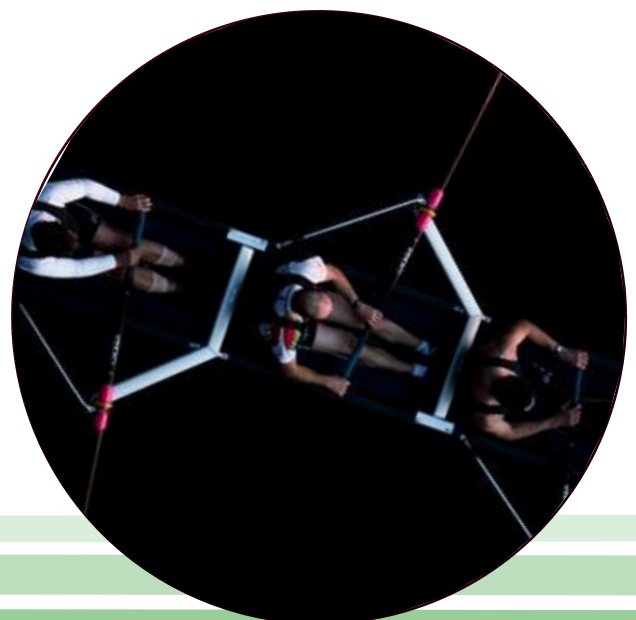
Calgary is a leading North American centre for green energy, with the green energy economy responsible for generating \$3.63 billion in gross output, \$1.78 billion in gross domestic product, and employing 1.8 per cent of all workers in the Calgary Economic Region. The financing of renewables, energy storage, grid infrastructure, energy efficiency, and green transportation provide a solid base for the growth of the green finance sector.

Further Information:

<https://www.calgaryeconomicdevelopment.com/industries/focus-areas/financial-services/>

“More knowledge of impact measurement and quantifying actual environmental impacts is necessary”

Sustainable finance and corporate risk specialist, London



GGFI 2 Ranks And Ratings

Table 1 | Ranks And Ratings Of The Depth Of Green Finance

Centre	GGFI 2		GGFI 1		Change in Rank		Change in Rating	
	Rank	Rating	Rank	Rating				
Amsterdam	1	435	4	384	▲	3	▲	51
Copenhagen	2	433	3	385	▲	1	▲	48
London	3=	432	1	402	▼	-2	▲	30
Luxembourg	3=	432	2	389	▼	-1	▲	43
Stockholm	5=	423	7	379	▲	2	▲	44
Paris	5=	423	5	381	▶	0	▲	42
Shanghai	7	420	10=	375	▲	3	▲	45
Montréal	8	417	New	New	New		New	
Zürich	9	415	8=	376	▼	-1	▲	39
Vancouver	10	412	New	New	New		New	
San Francisco	11	411	16	365	▲	5	▲	46
Hamburg	12	410	13	370	▲	1	▲	40
Beijing	13	409	10=	375	▼	-3	▲	34
Seoul	14=	408	17=	364	▲	3	▲	44
Brussels	14=	408	12	374	▼	-2	▲	34
Casablanca	16	407	New	New	New		New	
Munich	17	405	17=	364	▶	0	▲	41
Sydney	18	403	14	367	▼	-4	▲	36
Los Angeles	19=	401	19=	361	▶	0	▲	40
Shenzhen	19=	401	6	380	▼	-13	▲	21
Frankfurt	21=	398	19=	361	▼	-2	▲	37
Singapore	21=	398	15	366	▼	-6	▲	32
Toronto	23	395	30=	353	▲	7	▲	42
Geneva	24	393	26=	356	▲	2	▲	37
Jersey	25=	388	26=	356	▲	1	▲	32
Vienna	25=	388	32	351	▲	7	▲	37
Milan	27	386	26=	356	▼	-1	▲	30
Dublin	28	383	22	360	▼	-6	▲	23
Tokyo	29=	382	19=	361	▼	-10	▲	21
Madrid	29=	382	30=	353	▲	1	▲	29

Table 1 (continued) | Ranks And Ratings Of The Depth Of Green Finance

Centre	GGFI 2		GGFI 1		Change in Rank	Change in Rating
	Rank	Rating	Rank	Rating		
Guangzhou	31	381	8=	376	▼ -23	▲ 5
Washington DC	32	380	24	358	▼ -8	▲ 22
Dubai	33	377	36=	346	▲ 3	▲ 31
Boston	34	376	35	348	▲ 1	▲ 28
Rome	35	375	33=	350	▼ -2	▲ 25
Hong Kong	35	375	23	359	▼ -12	▲ 16
Edinburgh	37	374	25	357	▼ -12	▲ 17
Isle of Man	38	373	38=	343	▶ 0	▲ 30
New York	39	372	43	341	▲ 4	▲ 31
Cape Town	40	370	29	355	▼ -11	▲ 15
Chicago	41	368	38=	343	▼ -3	▲ 25
Mauritius	42	367	New	New	New	New
São Paulo	43	366	New	New	New	New
Prague	44=	364	New	New	New	New
Abu Dhabi	44=	364	38=	343	▼ -6	▲ 21
Warsaw	46=	362	New	New	New	New
Malta	46=	362	New	New	New	New
Mexico City	48	360	41=	342	▼ -7	▲ 18
Calgary	49	356	New	New	New	New
Guernsey	50	351	41=	342	▼ -9	▲ 9
British Virgin Islands	51	347	New	New	New	New
Cayman Islands	52=	339	New	New	New	New
Johannesburg	52=	339	33=	350	▼ -19	▼ -11
Mumbai	54	337	44=	335	▼ -10	▲ 2
Kuala Lumpur	55	330	36=	346	▼ -19	▼ -16
Istanbul	56	329	New	New	New	New
Bangkok	57	328	44=	335	▼ -13	▼ -7
Moscow	58	324	46=	333	▼ -12	▼ -9
New Delhi	59	307	46=	333	▼ -13	▼ -26

Table 2 | Ranks And Ratings Of Green Finance Quality

Centre	GGFI 2		GGFI 1		Change in Rank		Change in Rating	
	Rank	Rating	Rank	Rating				
London	1	481	1	437	▶	0	▲	44
Paris	2	454	5	379	▲	3	▲	75
Amsterdam	3=	441	2	385	▼	-1	▲	56
Copenhagen	3=	441	9	374	▲	6	▲	67
Stockholm	5	440	6=	378	▲	1	▲	62
Luxembourg	6	434	6=	378	▶	0	▲	56
Zürich	7	433	8	375	▲	1	▲	58
Hamburg	8	431	4	381	▼	-4	▲	50
Munich	9	425	24=	353	▲	15	▲	72
San Francisco	10	424	10=	369	▶	0	▲	55
Shanghai	11	423	12	364	▲	1	▲	59
Brussels	12	422	3	383	▼	-9	▲	39
Prague	13	415	New	New	New		New	
Geneva	14=	414	16=	360	▲	2	▲	54
Edinburgh	14=	414	14=	361	▶	0	▲	53
Vancouver	16	412	New	New	New		New	
Beijing	17	411	20=	357	▲	3	▲	54
Tokyo	18=	408	22	356	▲	4	▲	52
Frankfurt	18=	408	19	359	▲	1	▲	49
Sydney	18=	408	16=	360	▼	-2	▲	48
Los Angeles	21	406	16=	360	▼	-5	▲	46
Vienna	22	405	24=	353	▲	2	▲	52
Singapore	23	404	14=	361	▼	-9	▲	43
Shenzhen	24=	402	13	362	▼	-11	▲	40
Washington DC	24=	402	10=	369	▼	-14	▲	33
Toronto	24=	402	34=	341	▲	10	▲	61
Montréal	27	401	New	New	New		New	
Casablanca	28	400	New	New	New		New	
Madrid	29=	398	36=	340	▲	7	▲	58
New York	29=	398	30=	347	▲	1	▲	51

Table 2 (continued) | Ranks And Ratings Of Green Finance Quality

Centre	GGFI 2		GGFI 1		Change in Rank		Change in Rating	
	Rank	Rating	Rank	Rating				
Milan	29=	398	28	352	▼	-1	▲	46
Dublin	32	394	24=	353	▼	-8	▲	41
Boston	33	392	30=	347	▼	-3	▲	45
Jersey	34	391	20=	357	▼	-14	▲	34
Warsaw	35	386	New	New		New		New
Chicago	36=	384	40	338	▲	4	▲	46
Mauritius	36=	384	New	New		New		New
Dubai	38	383	41	332	▲	3	▲	51
Hong Kong	39	382	29	348	▼	-10	▲	34
São Paulo	40	371	New	New		New		New
Guangzhou	41	370	23	354	▼	-18	▲	16
Seoul	42=	368	34=	341	▼	-8	▲	27
Rome	42=	368	24=	353	▼	-18	▲	15
Cape Town	44	367	33	342	▼	-11	▲	25
Guernsey	45=	366	39	339	▼	-6	▲	27
Malta	45=	366	New	New		New		New
Johannesburg	47=	364	32	343	▼	-15	▲	21
Mexico City	47=	364	43=	328	▼	-4	▲	36
Calgary	49	360	New	New		New		New
Isle of Man	50	354	36=	340	▼	-14	▲	14
British Virgin Islands	51	353	New	New		New		New
Cayman Islands	52	351	New	New		New		New
Abu Dhabi	53	350	46	326	▼	-7	▲	24
Istanbul	54	341	New	New		New		New
Bangkok	55=	339	45	327	▼	-10	▲	12
Mumbai	55=	339	42	329	▼	-13	▲	10
Moscow	57	331	47	322	▼	-10	▲	9
New Delhi	58	329	36=	340	▼	-22	▼	-11
Kuala Lumpur	59	315	43=	328	▼	-16	▼	-13

Chart 3 shows the relationship between ratings of depth and quality in the index. The ratings are low on both depth and quality. However, this chart shows the generally close correlation between the assessments of each factor by respondents.

Chart 3 | Relationship Between Ratings Of Depth And Quality



GGFI New Entrant - São Paulo

São Paulo is a centre of expertise in green bonds, with Brazil passing BRL11 billion in issuances in 2017. Brazil has seen 9 green bond issuances, five of them in the international market. Green finance is seen as a priority in Brazil and a great deal of political capital has been poured into the launch of the UK-Brazil Green Finance Partnership, in a commitment to promote sustainable economic growth.

Further Information:
<http://cebds.org/en/>

GGFI 2 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 centres that were mentioned ten or more times. Paris, New York, and Shanghai have improved their GGFI rankings compared with six months ago. Singapore was listed as expected to improve in GGFI 1, though has fallen in the rankings in GGFI 2.

Table 3 | Centres That Will Become More Significant

Centre	Number Of Mentions
Paris	24
Frankfurt	16
Singapore	13
New York	12
Shanghai	11
London	10

“Human capital development is critical, e.g. the presence of the University of Toronto in the Global Research Alliance for Sustainable Finance and Investment is helpful.”

Legal Professional, Toronto

Expected Change In Centres

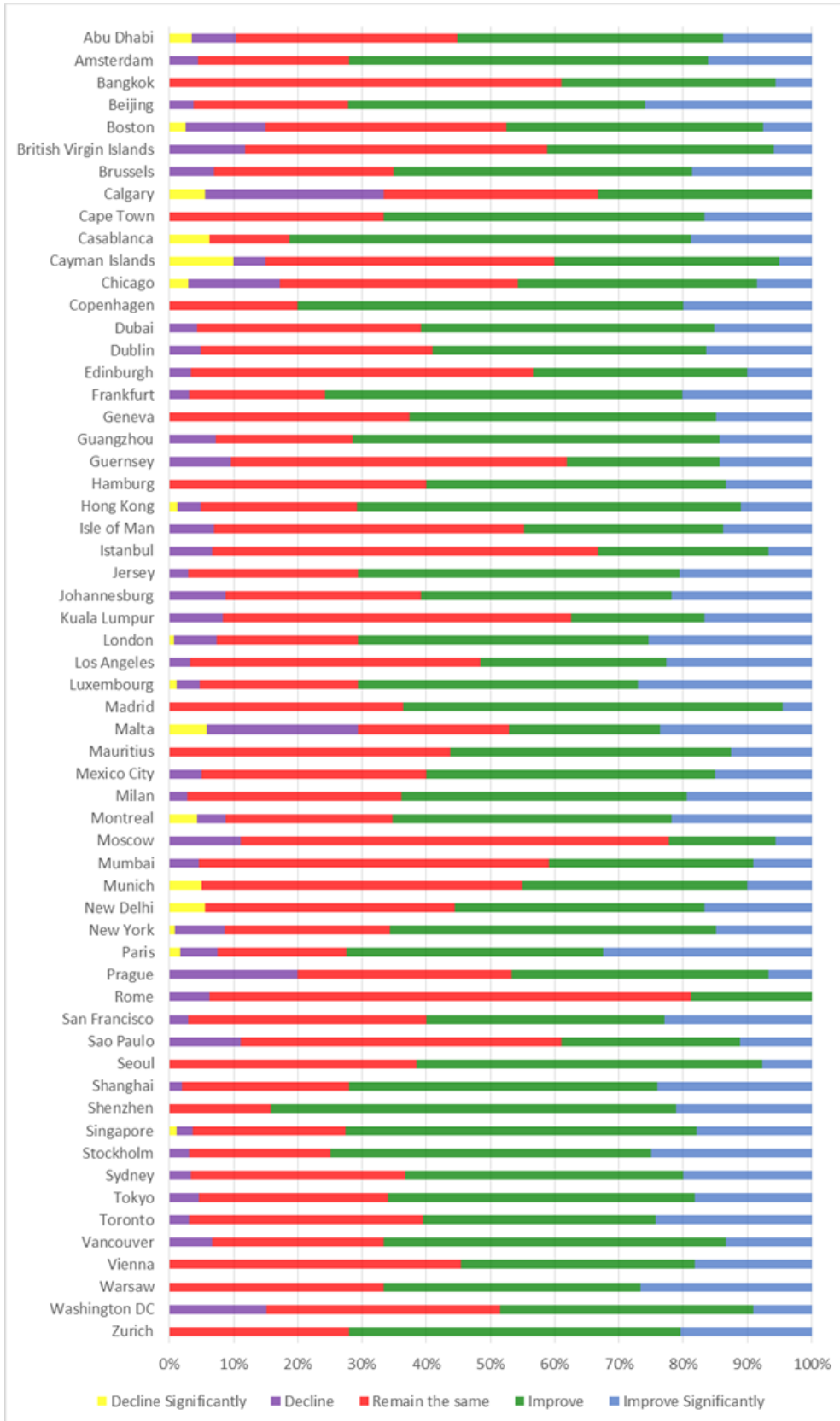
We asked respondents to the questionnaire to give a view as to whether the centres they rated would improve, decline, or stay the same in relation to their Green Finance offering over the next two to three years. The results are displayed in Chart 4.

Forty of the 59 centres in the index are considered likely to improve by over half the respondents who rated them. For 16 centres, over 70 per cent of those who commented expected them to improve their green finance offering over the next two to three years. This reflects a generally optimistic picture.

Centres whose green finance offerings were expected to improve significantly over the next two to three years by at least 20 per cent of those who commented included Paris, Jersey, Johannesburg, London, Los Angeles, Luxembourg, Malta, Montréal, Shanghai, Shenzhen, Stockholm, Toronto, and Warsaw.

Centres whose green finance offerings were expected to decline or significantly decline over the next two to three years by at least 10 per cent of those who commented included Boston, the British Virgin Islands, Calgary, Cayman Islands, Chicago, Malta, Moscow, Prague, São Paulo, and Washington DC.

Chart 4 | Expected Change In Green Finance Offering



Instrumental Factors

The GGFI is created using 126 instrumental factors which relate to a range of aspects of competitiveness, including sustainability measures.

Table 4 shows the top ten instrumental factors in terms of their correlation with the ranking of depth 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

Depth	R Squared	Quality	R Squared
IESE Cities In Motion Index	0.427	Legatum Prosperity Index	0.530
Networked Society City Index	0.390	Quality Of Living City Rankings	0.528
Quality Of Living City Rankings	0.386	IESE Cities In Motion Index	0.522
Global Innovation Index	0.384	Environmental Performance Index	0.467
Legatum Prosperity Index	0.383	Open Government	0.446
Environmental Performance Index	0.376	Global Enabling Trade Report	0.445
Global Enabling Trade Report	0.356	Global Intellectual Property Index	0.414
Global Intellectual Property Index	0.339	Networked Society City Index	0.406
Global Sustainable Competitiveness Index	0.324	Best Countries For Business	0.402
Best Countries For Business	0.285	Regulatory Quality	0.383

GGFI New Entrant - British Virgin Islands

The British Virgin Islands Government's focus on climate change adaptation and mitigation, particularly de-carbonisation of energy generation on the Island, has stimulated the establishment of a number of green energy funds.

Further Information:

<http://www.bvifsc.vg/>

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 Sustainability Instrumental Factors By R Squared Correlation

Depth	R Squared	Quality	R Squared
Sustainable Cities Index	0.436	Quality Of Living City Rankings	0.528
IESE Cities In Motion Index	0.427	Sustainable Cities Index	0.527
Quality Of Living City Rankings	0.386	IESE Cities In Motion Index	0.522
Environmental Performance Index	0.376	Environmental Performance Index	0.467
Water Quality	0.358	Sustainable Economic Development	0.444
Sustainable Economic Development	0.342	Energy Sustainability Index	0.368
Global Sustainable Competitiveness Index	0.324	Global Sustainable Competitiveness Index	0.338
Energy Sustainability Index	0.233	Water Quality	0.330
Air Quality Data	0.219	Quality Of Life Index	0.296
Quality Of Life Index	0.214	Air Quality Data	0.253

GGFI New Entrant - Casablanca

Casablanca has developed an excellent reputation as a regional lead on green finance. In addition to the boost the centre was given by hosting the launch of the Financial Centres for Sustainability Programme, Casablanca has an excellent track record in financing renewables (assisted by the EBRD funded Morocco Sustainable Energy Financing Facility), and is likely to be a gateway centre for green bonds issuance across Africa.

Further Information:

<https://www.ebrd.com/cs/Satellite?c=Content&cid=1395258375529&d=Mobile&pagename=EBRD%2FContent%2FContentLayout>

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: good governance and regulation, a positive trade environment, and effective infrastructure. However, a focus on sustainability features prominently, particularly with respect to market depth.

When the scope is narrowed to instrumental factors with a focus on sustainability, the first four factors are the same for depth and quality. And air and water quality enter the list. Of the top four factors for both measures, three are related to composite measures:

- 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 index 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 Mercer Quality of Living City Rankings. This index ranks cities taking account of a range of factors including political, economic, environmental, personal safety, health, education, transportation, and public service factors.

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.

The other index that has a high correlation with both depth and quality is the Environmental Performance Index, which ranks 180 countries on 24 performance indicators across ten issue categories, covering environmental health; and ecosystem vitality. These metrics provide a gauge at a national scale of how close countries are to established environmental policy goals.

We have also conducted an analysis of the assessments provided by respondents using only the instrumental factors that have a direct relationship to sustainability. This analysis produces slightly different results to the main index, as shown in the comparison in Table 6.

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

Rank	All Factors		Green Factors	
	Depth	Quality	Depth	Quality
1	Amsterdam	London	London	London
2	Copenhagen	Paris	Luxembourg	Paris
3	Luxembourg	Amsterdam	Paris	Amsterdam
4	London	Copenhagen	Copenhagen	Stockholm
5	Stockholm	Stockholm	Amsterdam	Luxembourg
6	Paris	Luxembourg	Shanghai	Zürich
7	Shanghai	Zürich	Zürich	Copenhagen
8	Montréal	Hamburg	Stockholm	Edinburgh
9	Zürich	Munich	Munich	Hamburg
10	Vancouver	San Francisco	Hamburg	Geneva
11	San Francisco	Shanghai	Toronto	Munich
12	Hamburg	Brussels	Brussels	San Francisco
13	Beijing	Prague	Frankfurt	Tokyo
14	Seoul	Geneva	Sydney	Sydney
15	Brussels	Edinburgh	Montréal	Frankfurt

GGFI New Entrant - Cayman Islands

The Cayman Islands reputation as a centre for offshore funds and corresponding light-touch regulatory and commercial approaches has made the jurisdiction particularly attractive for renewable energy generation and low carbon infrastructure funds.

Further Information:

<http://www.caymanfinance.gov.ky/portal/page/portal/pruhome>

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 depth and quality in each sub-index are shown in Tables 7 and 8.

Table 7 | Top 15 Centres For Depth By Areas Of Competitiveness

Rank	Sustainability	Business	Human Capital	Infrastructure
1	London	Luxembourg	Stockholm	London
2	Luxembourg	London	London	Paris
3	Paris	Amsterdam	Luxembourg	Amsterdam
4	Copenhagen	Stockholm	Copenhagen	Luxembourg
5	Amsterdam	Paris	Amsterdam	Stockholm
6	Shanghai	Copenhagen	Paris	Zürich
7	Zürich	Shanghai	Shanghai	Madrid
8	Stockholm	Zürich	Zürich	Shanghai
9	Munich	Seoul	Beijing	Montréal
10	Hamburg	Beijing	Montréal	Vienna
11	Toronto	Sydney	Singapore	Singapore
12	Brussels	Shenzhen	Brussels	Hamburg
13	Frankfurt	Geneva	Toronto	Brussels
14	Sydney	Munich	Munich	Frankfurt
15	Montréal	Vienna	Vancouver	Toronto

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

Rank	Sustainability	Business	Human Capital	Infrastructure
1	London	London	London	London
2	Paris	Paris	Paris	Paris
3	Luxembourg	Amsterdam	Stockholm	Stockholm
4	Copenhagen	Stockholm	Amsterdam	Zürich
5	Amsterdam	Luxembourg	Zürich	Luxembourg
6	Zürich	Zürich	Luxembourg	Amsterdam
7	Hamburg	Copenhagen	Copenhagen	Madrid
8	Brussels	Edinburgh	Brussels	Hamburg
9	Munich	Hamburg	San Francisco	Vienna
10	Stockholm	Geneva	Vancouver	Vancouver
11	Vienna	Munich	Hamburg	Brussels
12	Prague	San Francisco	Geneva	Montréal
13	Sydney	Tokyo	Toronto	Toronto
14	Frankfurt	Sydney	Vienna	Copenhagen
15	Shanghai	Frankfurt	Sydney	Shanghai

Commentary On Factors

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.

On regulation, there was overall support for policy and regulatory measures to drive green finance, with some saying that governments were not acting fast enough. It was noted that Governments can create markets (as with Article 173 in France and the disclosure work around it) but policies must be stable. Many respondents favoured mandatory disclosure. Capital measures were mentioned by some respondents, with some people in support of a green supporting factor and others in support of a brown penalising factor. There were also mentions for green public banks, carbon pricing, and measures to avoid predatory practices.

Regarding taxation, there was strong support for tax incentives to subsidise green investments, and for tax penalties to address the externalities of fossil fuels. In contrast to the results in GGFI 1, fewer people opposed using tax measures or thought they would be ineffective. Several people gave priority to abolishing existing fossil fuel subsidies. Other ideas included a financial transaction tax, tax breaks

for new green technologies, a carbon tax, and tax breaks aimed towards green funds. Respondents warned against changing tax policies (as happened in the United Kingdom), and against encouraging a race to the bottom through tax cuts or other measures that invite international tax arbitrage.

Those commenting on skills generally supported more specialist training and qualifications in green finance, with education seen as important or very important for building green finance. Several people said a lack of skills was limiting the market, with only a few respondents suggesting that education was not a strong factor or that there was already a lot of knowledge in the market. Existing expertise was seen as strongest in specialist firms. Respondents said education on green finance should be provided by business schools, universities, banks, and the European Commission; and that topics could focus on Greenhouse Gas emissions, measuring impact, regulatory environment, due diligence, accounting, Islamic finance, and a multi-disciplinary approach.

Other issues raised included the UN Sustainable Development Goals and 2030 agenda, which some respondents thought could drive private investment. More public-private partnerships, and more impact investing would be welcome. Some felt that investors needed to see new technologies being proven before they invest. Finally, it was suggested that consumers' voices must be heard more.

Table 9 | Commentary On Areas Of Competitiveness

Area Of Competitiveness	Number Of Mentions	Main Themes
Regulatory Environment	179	<ul style="list-style-type: none"> • General support for regulatory measures to drive the development of green finance • Mandatory disclosure generally supported
Taxation	157	<ul style="list-style-type: none"> • Tax incentives generally seen as useful • A carbon tax or tax incentives aimed towards green technology or green finance instruments might be helpful • Some of those commenting suggested that tax incentives would be detrimental
The Availability Of Skills In Green Finance	159	<ul style="list-style-type: none"> • Support for more training and qualifications • Lack of skills may limit the market

“Regulation is key, but it might be a mistake if the central bank comes out with regulation from one day to another when the banks are not properly prepared. It is necessary to have a transition period eventually agreed between the regulator and the banks or other actors from the financial sector”

Director, Civil Society Organisation, Buenos Aries

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 5 and 6 use Paris and Madrid as examples to contrast the different levels of connectivity that the two centres enjoy.

Chart 5 | GGFI 2 Connectivity - Paris

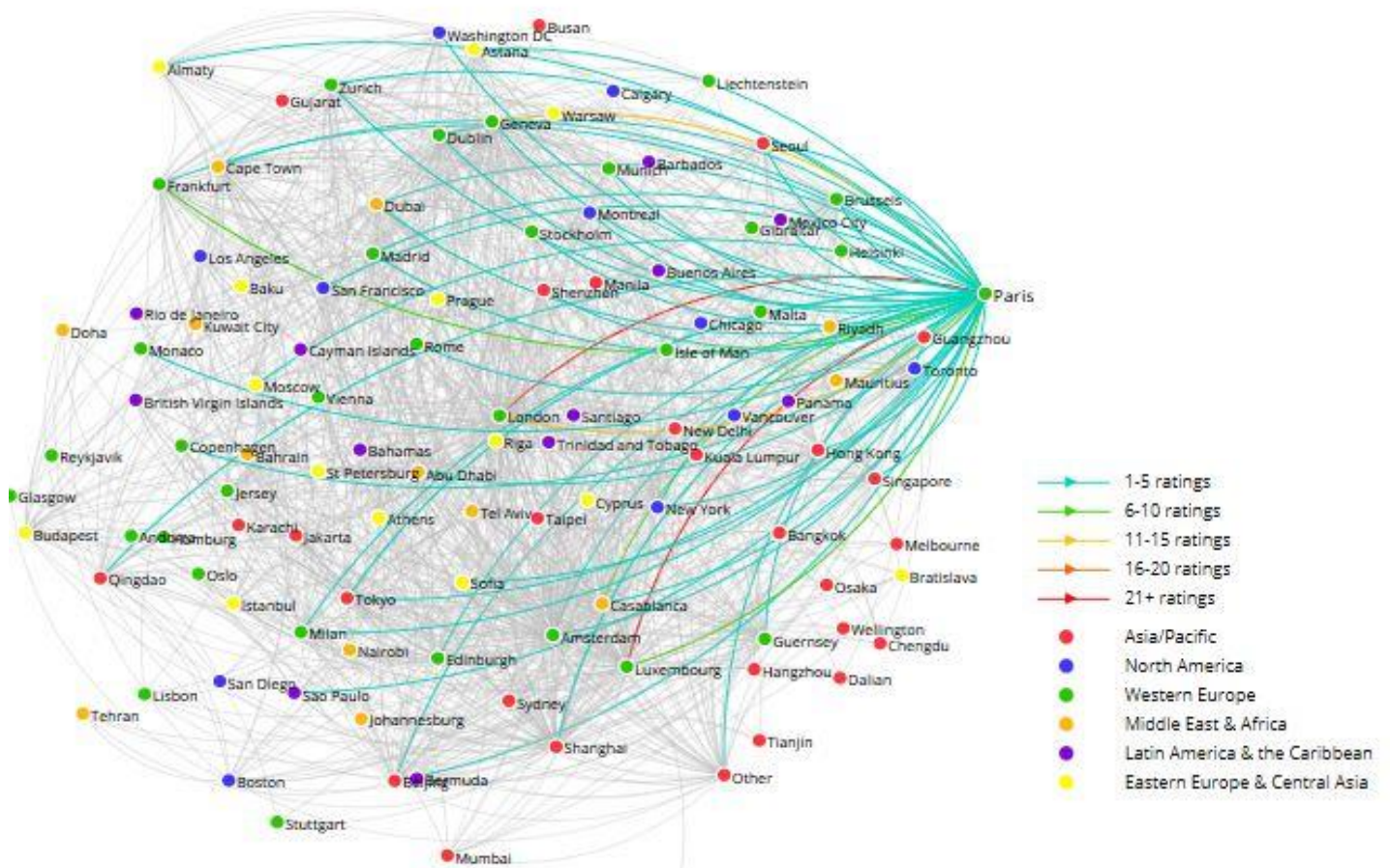
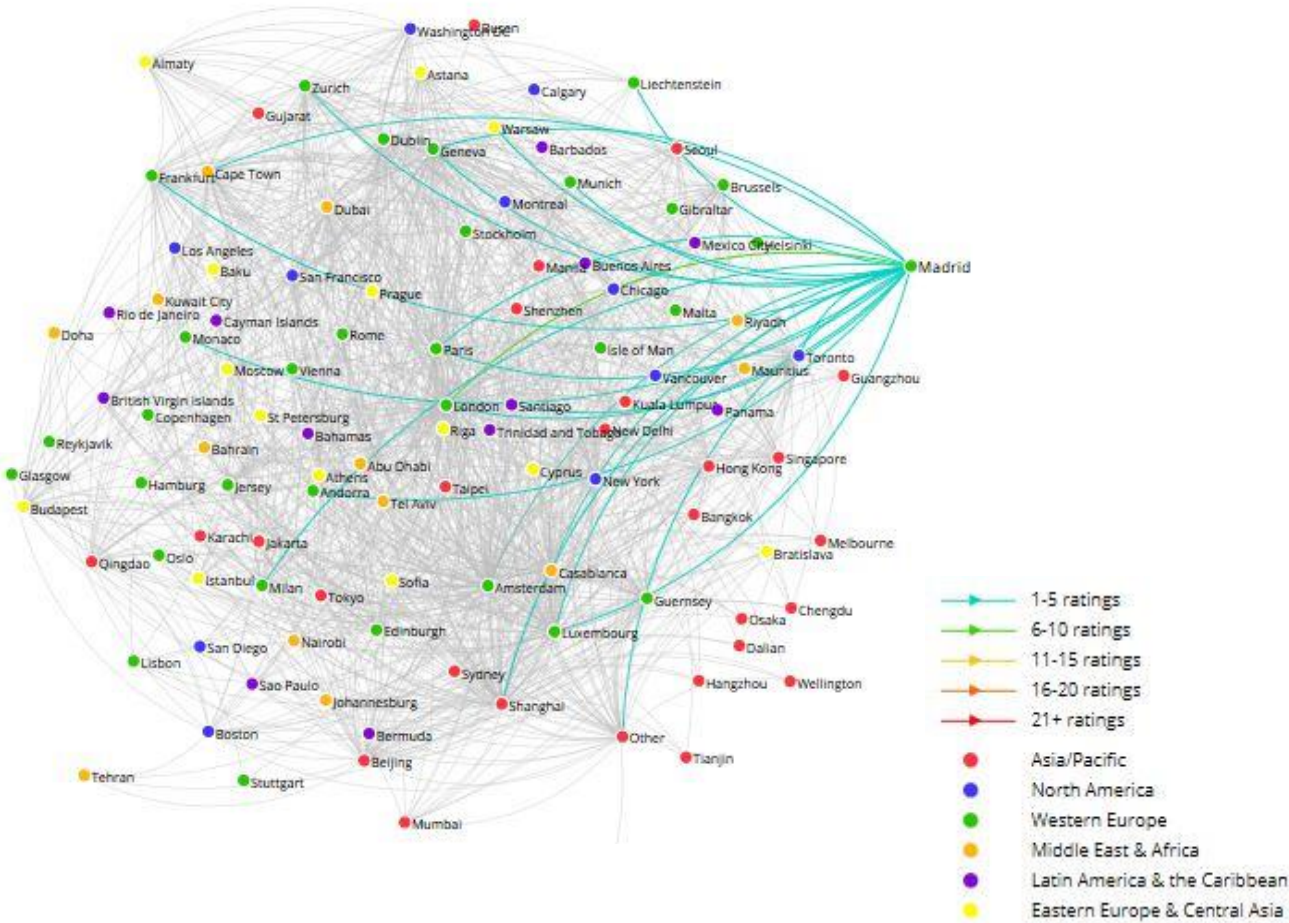


Chart 6 | GGFI 2 Connectivity - Madrid



GGFI New Entrant - Warsaw

Poland leads the world in the issuance of sovereign green bonds, becoming the first country in the world to sell sovereign green bonds, with a €750m issue in late 2017, and the first to issue a second green bond worth €1.75bn in in early 2018. However, a lack of political support for firm action on climate change may slow the growth of Warsaw’s green finance sector.

Further Information:

<https://www.mf.gov.pl/documents/766655/55f24831-2a54-460e-8559-8bd522632359>

Another view of connectivity is to look at the number of assessments received by centres and the number of centres that provided assessments. Table 10 shows the relationship between these factors for the centres receiving the highest number of assessments.

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	153	32
New York	132	34
Paris	122	26
Frankfurt	103	24
Zurich	95	23
Luxembourg	88	25
Hong Kong	85	22
Singapore	85	22
Amsterdam	70	22
Geneva	67	24

GGFI New Entrant - Istanbul

SUNREF Turkey Project's first Organized Industrial Zone (OIZ) visit has started in İstanbul İkitelli OIZ on September 13, 2017, introducing Halkbank and Agence Française de Développement (AFD) credit facility. The main objective of the project is to provide financing for green and social investments in Turkish industries.

Further Information:

https://www.sunref.org/wp-content/uploads/2017/10/OIZ_Presentation_SUNREF_12_ENG.pdf

Financial Centre Profiles

Z/Yen has conducted an analysis based on three measures (axes) that determine a financial centre's profile in relation to three different dimensions.

'Connectivity' – the extent to which a centre is well known among GGFI survey respondents, based on the number 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 assessments for a centre are provided by over 23 other centres, this centre is deemed to be 'Global'. If the assessments are provided by ten other centres, this centre is deemed to be 'International'.

'Diversity' – the instrumental factors used in the GGFI model give an indication of a broad range of factors that influence the richness and evenness of factors that characterise any particular financial centre. We consider this span of factors 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, taking account of the range of factors against which the centre has been assessed – the 'richness' of the centre's business environment; and the 'evenness' of the distribution of that centre's scores. 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 overall GGFI rating and the ratings when the model is calculated 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 depth and second for quality. The 59 centres in GGFI 2 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.

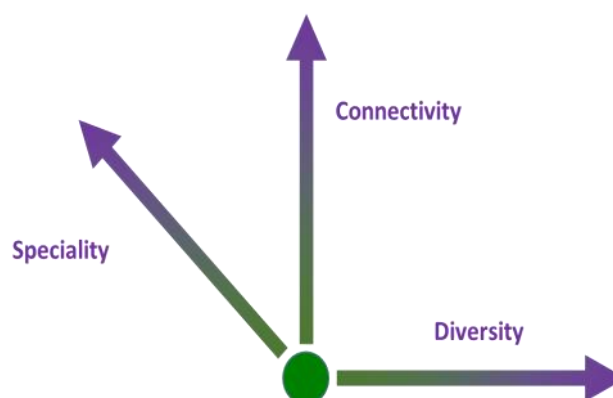


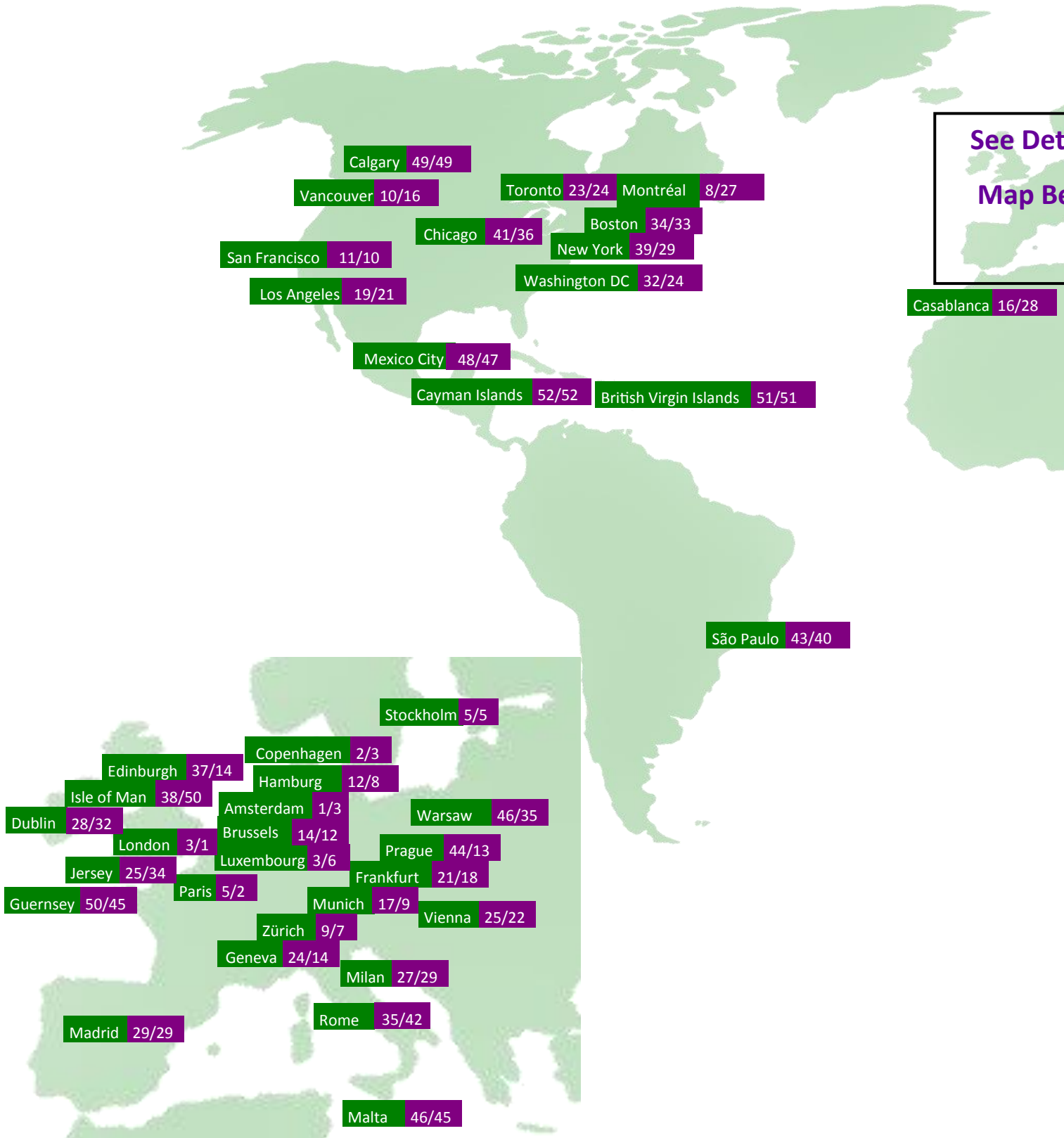
Table 11 | Financial Centre Profiling - Depth

	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
Global	Global Leaders	Global Diversified	Global Specialists	Global Contenders
	Amsterdam	Frankfurt	Luxembourg	Geneva
	London	New York	Shanghai	Dubai
	Paris			
	Zürich			
	Dublin			
International	Established International	International Diversified	International Specialists	International Contenders
	San Francisco	Toronto	Seoul	Abu Dhabi
	Brussels	Washington DC	Beijing	Guernsey
	Los Angeles	Madrid	Casablanca	Istanbul
	Milan	Boston	Shenzhen	
	Tokyo	Chicago	Singapore	
	Edinburgh		Jersey	
			Hong Kong	
			Cape Town	
Local	Established Players	Local Diversified	Local Specialists	Evolving Centres
	Stockholm	Munich	Copenhagen	Guangzhou
	Montréal	Vienna	Isle of Man	São Paulo
	Vancouver	Warsaw	Mauritius	Prague
	Hamburg	Mexico City	Malta	Calgary
	Sydney		British Virgin Islands	Mumbai
	Rome		Cayman Islands	Johannesburg
			New Delhi	Kuala Lumpur
				Bangkok
				Moscow

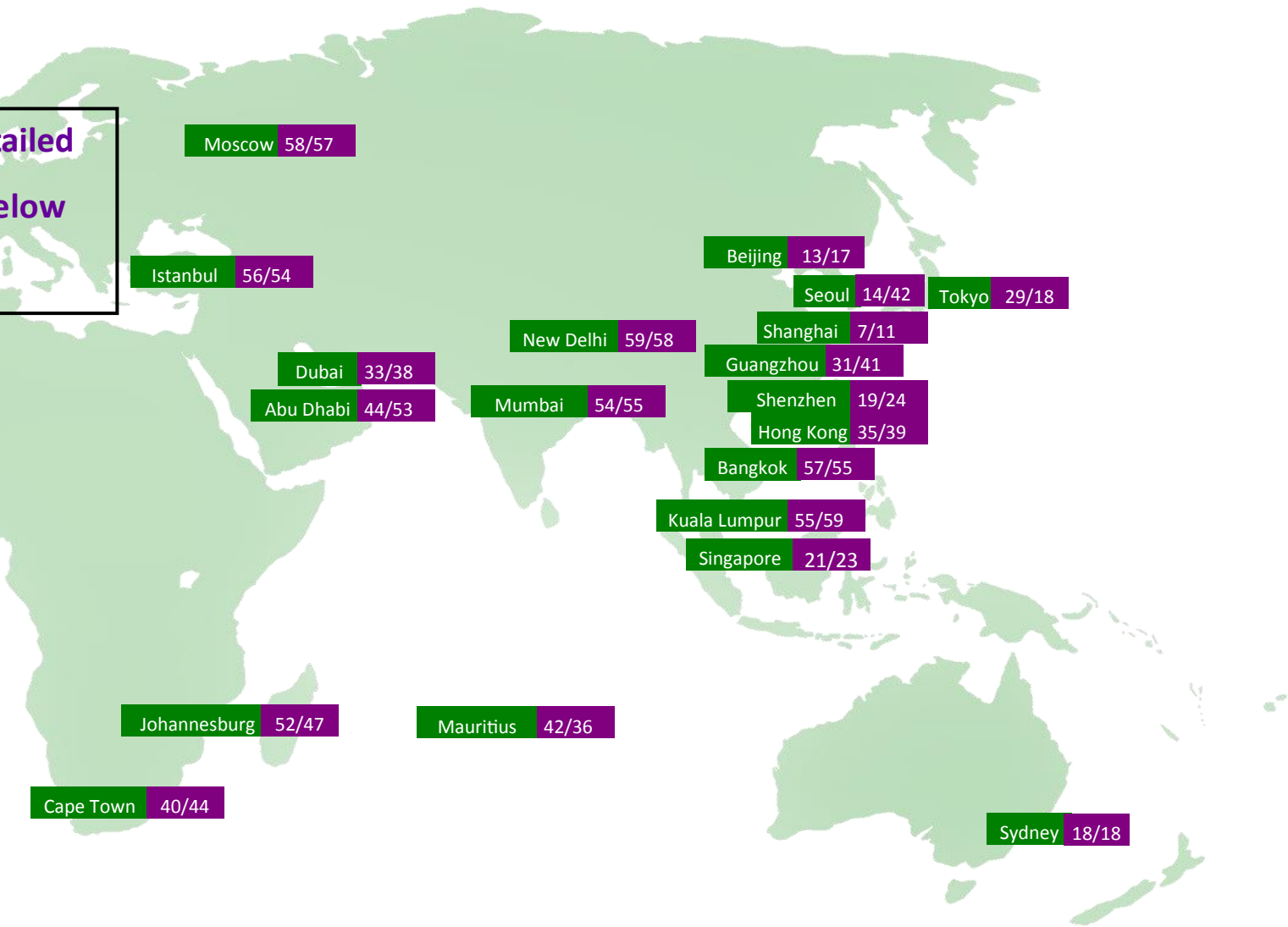
Table 12 | Financial Centre Profiling - Quality

	Broad and Deep	Relatively Broad	Relatively Deep	Emerging
Global	Global Leaders	Global Diversified	Global Specialists	Global Contenders
	Amsterdam	Frankfurt	Shanghai	Luxembourg
	London	Dublin	Geneva	
	Paris	New York	Dubai	
	Zürich			
International	Established International	International Diversified	International Specialists	International Contenders
	San Francisco	Brussels	Seoul	Singapore
	Los Angeles	Toronto	Beijing	Abu Dhabi
	Tokyo	Milan	Casablanca	Istanbul
	Madrid	Washington DC	Shenzhen	
	Boston	Chicago	Jersey	
	Edinburgh		Hong Kong	
			Cape Town	
			Guernsey	
Local	Established Players	Local Diversified	Local Specialists	Evolving Centres
	Stockholm	Sydney	Copenhagen	São Paulo
	Montréal	Vienna	Guangzhou	Prague
	Vancouver	Rome	Isle of Man	Calgary
	Hamburg	Mexico City	Mauritius	Kuala Lumpur
	Munich		Malta	
	Warsaw		British Virgin Islands	
			Cayman Islands	
			Mumbai	
			Johannesburg	
			Bangkok	
			Moscow	
			New Delhi	

The GGFI 2 World - Centres In The Index



See Det
Map Be



The numbers beside each centre indicate the rankings first for depth and second for quality in GGFI 2.

An interactive map showing the data for each centre is at <https://greenfinanceindex.net/GGFI2/map/>

Focus On Climate: Transitioning To A Sustainable Economy

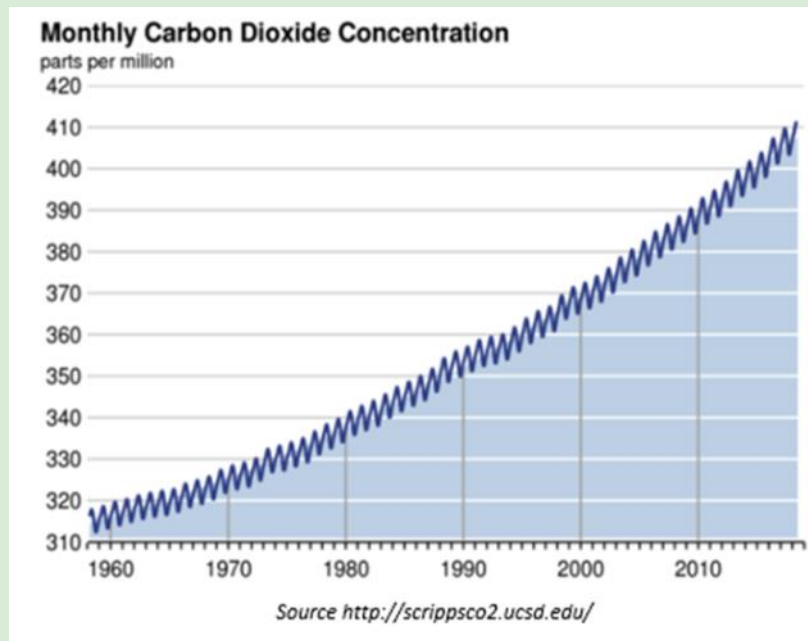
The Challenge

Atmospheric concentrations of greenhouse gases have risen precipitously since the beginning of the Industrial Revolution. For carbon dioxide, the average concentration has increased from 282 parts per million (ppm) in 1800 to 412ppm in 2017.

The last time CO₂ levels were this high was the middle Pliocene, 3.6 million years ago. During this period, global temperatures were 2° to 3° C higher than today¹. Forests grew across the Arctic² and global sea levels were 25 metres higher than today³.

Inertia built into climatic systems means there is a lag between rising CO₂ concentrations and the impact on global temperatures. The full impact of carbon emissions today will not be felt for half a century⁴. However, if all known reserves of fossil fuels were burnt, average global temperatures would rise by 10° C⁵, rendering 99% of life on earth extinct.

To survive, society not only has to transition economic growth onto a low carbon path that keeps temperature increases below 2° C; it must also adapt infrastructure and services to cope with the impacts of climate change.



- 1 Robinson, M.; Dowsett, H. J.; Chandler, M. A. (2008). "Pliocene role in assessing future climate impacts" *Eos*. 89 (49): 501–502 <http://adsabs.harvard.edu/abs/2008EOSTr..89..501R>
- 2 Ogburn S 2013, "Ice-Free Arctic in Pliocene, Last Time CO₂ Levels above 400 PPM", *Nature Magazine*, May 10, 2013 <https://www.scientificamerican.com/article/ice-free-arctic-in-pliocene-last-time-co2-levels-above-400ppm/>
- 3 Dwyer, G. S.; Chandler, M. A. (2009). "Mid-Pliocene sea level and continental ice volume based on coupled benthic Mg/Ca palaeotemperatures and oxygen isotopes" (PDF). *Philosophical Transactions of the Royal Society A*. 367 (1886): 157–168 https://web.archive.org/web/20111021024807/http://pubs.giss.nasa.gov/docs/2009/2009_Dwyer_Chandler.pdf
- 4 IPCC 2001 Climate Change 2001: Synthesis Report <https://www.ipcc.ch/ipccreports/tar/vol4/011.htm>
- 5 Tokarska K et al 2016 The climate response to five trillion tonnes of carbon *Nature Climate Change* volume 6, pages 851–855 (2016) <https://www.nature.com/articles/nclimate3036>

The Role Of Financial Services

The financial sector is a critical means for price signals, regulation, and civil society pressure to create and direct financial capital to more or less sustainable economic activity. International and regional financial institutions, finance ministries and central banks all have crucial parts to play in achieving the goals set out in the Paris agreement and the Sustainable Development Goals⁶.

Financial services affect development paths in three main ways:

- Pricing assets and exercising ownership;
- Pricing risk; and
- Flows of finance.

Policy makers, finance ministries, regulatory agencies and central banks have an enabling role in ensuring adequate transparency and governance, providing a level playing field and ensuring a stable policy environment, in which long-term investment can take place.

Are Financial Services Living Up To The Challenge?

Pricing Assets And Exercising Ownership

It is estimated that world-wide, 20 per cent of all funds are now managed on Socially Responsible Investment (SRI) principles⁷. Globally there are now \$22.89 trillion of assets being professionally managed under responsible investment strategies, an increase of 25 per cent since 2014⁸. Impact investment funds grew from \$25.4 billion to \$35.5 billion between 2013 and 2015.

Pressure is ramping up on businesses. The Carbon Disclosure Project now collects information on climate risks and low carbon opportunities from the world's largest companies on behalf of over 650 institutional investor signatories with a combined US\$87 trillion in assets.

Shareholder activism is also increasing, with pressure being placed on fossil fuel companies for disclosure of risks associated with 'stranded assets'⁹.

6 Stern N 2016 "The roles of financial institutions and finance ministries in delivering the Paris Agreement on climate change" <http://www.lse.ac.uk/GranthamInstitute/news/the-roles-of-financial-institutions-and-finance-ministries-in-delivering-the-paris-agreement-on-climate-change/>

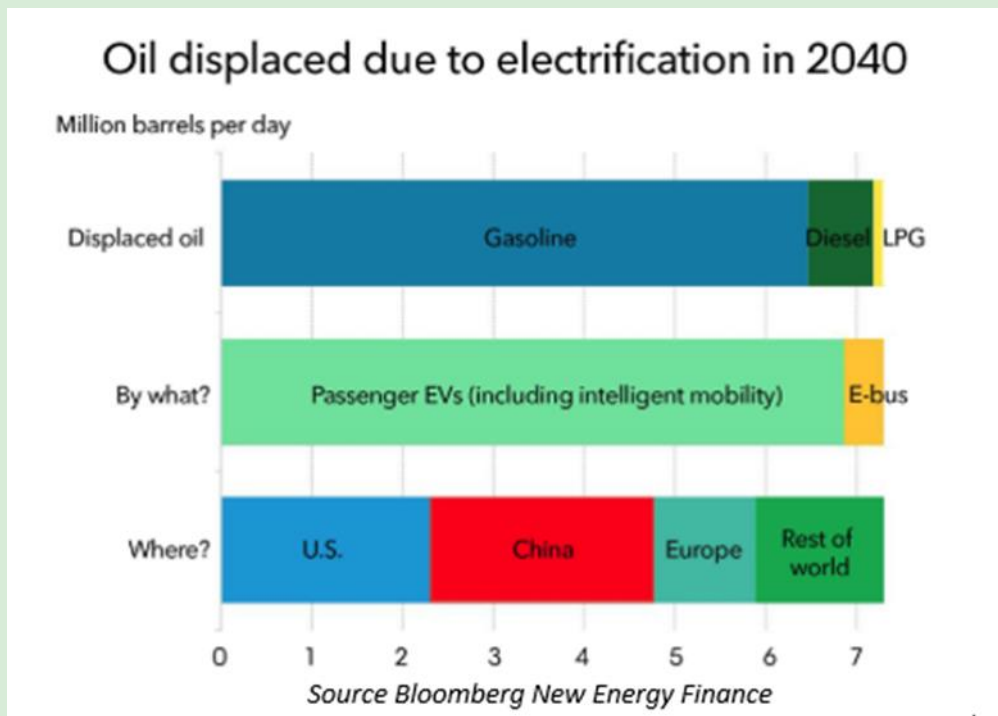
7 www.ussif.org/trends

8 GSI 2016 Global Sustainable Investment Review http://www.gsi-alliance.org/wp-content/uploads/2017/03/GSIR_Review2016.F.pdf

9 Byrd J & Cooperman E 2016 "Shareholder Activism for Stranded Asset Risk: An Analysis of Investor Reactions for Fossil Fuel Companies" Business School, University of Colorado Denver <https://corporate-sustainability.org/wp-content/uploads/Shareholder-Activism.pdf>

Pricing Risk

Climate concerns and technological changes are creating new pricing risks, dramatically illustrated by the collapse in value and bankruptcies of several US coal companies in recent years¹⁰. Overcapacity, the rise of electric vehicles¹¹, stranded assets, and pricing issues are still major risks for fossil fuel and related industries¹².



It is no surprise that Stock Exchanges around the world are embracing market transparency on climate and other impacts – 23 stock exchanges currently incorporate reporting on environmental, social, and governance (ESG) information into their listing rules and 15 provide formal guidance to issuers¹³.

ESG analytics has long been a key tool for specialist SRI funds. Increasingly, it is being used in relation to mainstream investment analysis and is becoming a factor used by rating agencies¹⁴.

10 <https://rhg.com/research/the-hidden-cause-of-americas-coal-collapse/>

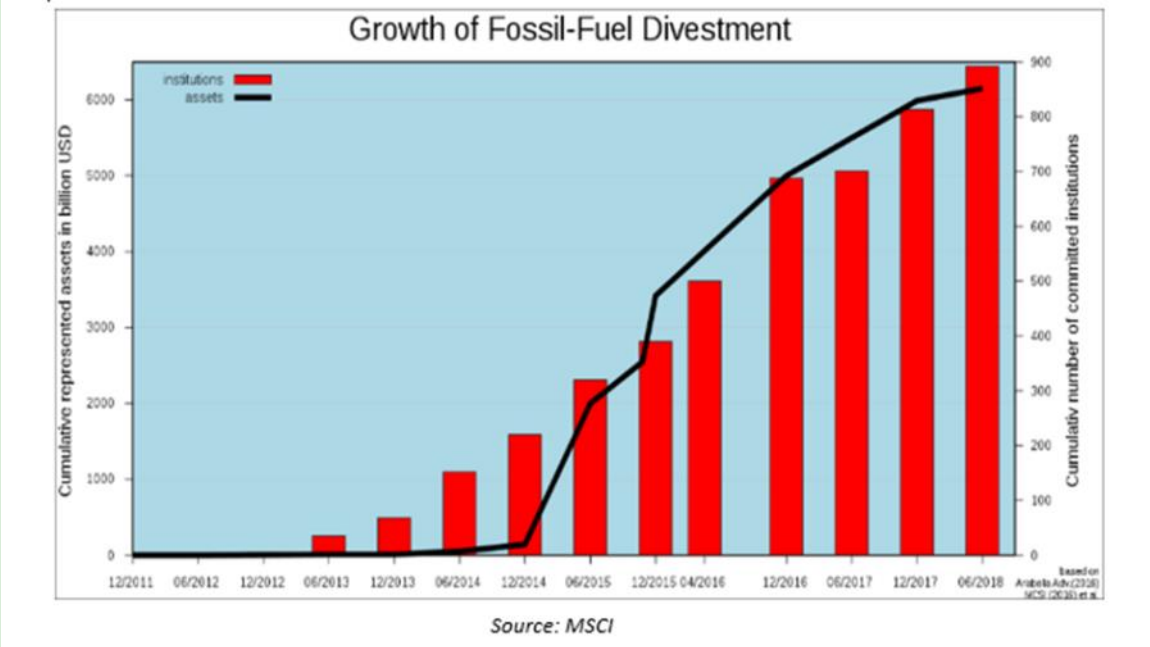
11 Bloomberg New Energy Finance 2018 “Electric Vehicle Outlook 2018” <https://about.bnef.com/electric-vehicle-outlook/#toc-download>

12 <https://www.carbontracker.org/reports/mind-the-gap/>

13 SSE 2016 Report on Progress http://unctad.org/en/PublicationsLibrary/unctad_sse_2016d1.pdf

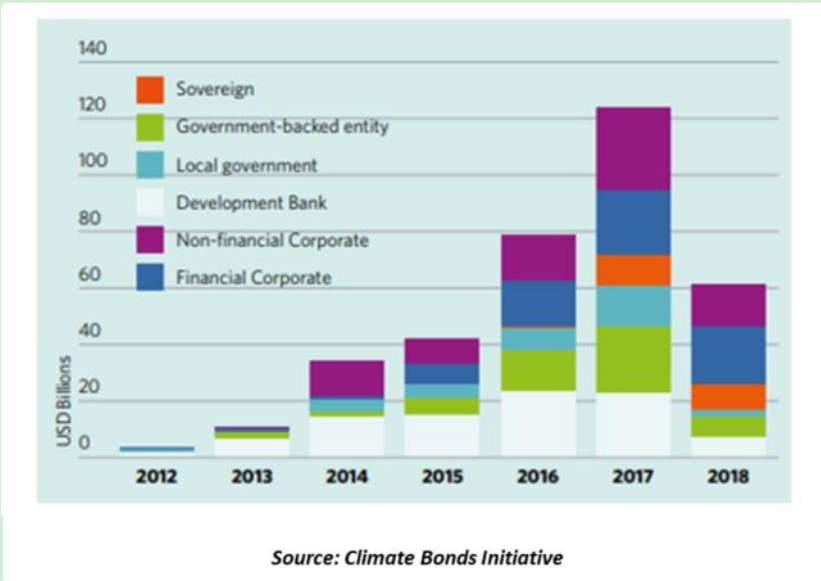
14 PRI 2017 “What rating agencies are doing on ESG factors” <https://www.unpri.org/fixed-income/what-rating-agencies-are-doing-on-esg-factors/81.article>

Momentum is growing on divestment and structured divestment, with a number of high profile sovereign funds, including Ireland and Norway, reducing or completely cutting their holdings in fossil fuel companies.



Flows Of Finance

The global growth of green bond markets has played a significant role in raising the profile of green finance. Globally, 14 stock exchanges now have dedicated segments for green or sustainable bonds¹⁵, and there has been strong growth in the issuance of green bonds - with 2016 seeing the issuance of the first sovereign green bonds.



15 See "CBI Data for GGFI 2" at <https://www.finance-watch.org/ggfi-global-green-finance-index/>

Financial Centre Leadership

Whilst national policy-makers seek to capitalise on what is perceived as a new market opportunity, through a variety of national programmes, for financial centres the emphasis is very much on collaboration, cooperation, and the sharing of best practice. Initiatives such as Financial Centres for Sustainability¹⁶, the Sustainable Stock Exchange Initiative¹⁷, and UNEP FI¹⁸ continue to provide valuable resources which are encouraging the growth of the green finance sector.

A Mountain Yet To Climb

The transition to a green economy, required if the world is to meet the targets laid down in the Paris Agreement and avoid catastrophic climate change, is a huge global investment opportunity: the International Energy Agency (IEA) estimates that \$26 trillion of additional investment is needed just in renewables and energy efficiency between 2015 and 2040 to achieve the 2°C target – around \$1 trillion a year – not including the large amounts also needed for climate mitigation¹⁹.

However, green finance has a long way to go if it is to penetrate and displace the enormous amounts of finance for carbon intensive activities, or ‘brown finance’. In 2016, global climate finance flows were \$383 billion, less than half the \$ 1 trillion a year needed under the IEA estimate²⁰. Only five to ten percent of bank loans are ‘green’²¹ (based on data from the few countries where national definitions of green loans are available), and ‘brown’ finance flows still massively overshadow green finance even in the public sector: G20 countries alone received USD 72 billion in annual public financing for fossil fuel energy production between 2013 and 2015, and only \$18.7 billion for clean energy²².

In 1960, the carbon intensity of the world’s GDP was 1,000 gr CO₂ per \$. By 2000 this had dropped to 500 gr CO₂ per \$. In 2010 this had reduced to 400 gr CO₂ per \$. Despite this rapid progress, if we are to have any hope of attaining the Paris target of limiting global warming to 1.5°C, the carbon intensity of GDP must be below 60 gr CO₂ per \$ by 2050.

The progress made by the centres listed in the Global Green Finance Index is heartening, but there is a mountain yet to climb.

16 <http://sdg.iisd.org/events/inaugural-meeting-of-the-international-network-of-financial-centres-for-sustainability/>

17 <http://www.sseinitiative.org/>

18 <http://www.unepfi.org/>

19 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>

20 <https://climatepolicyinitiative.org/wp-content/uploads/2017/10/2017-Global-Landscape-of-Climate-Finance.pdf>

21 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/>

22 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

Regional Analysis

In our analysis of the GGFI data, we look at six regions of the world to explore their financial centres’ green finance depth and quality.

Alongside the ranks and ratings of centres, we investigate the average assessments received by regions and centres in more detail.

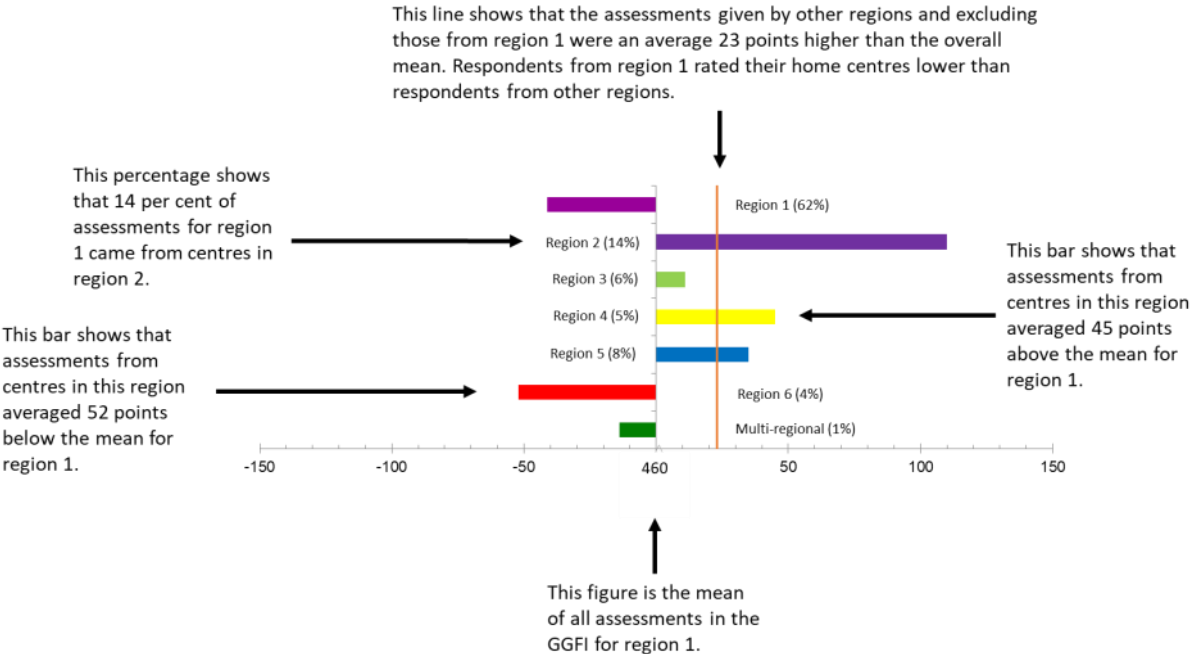
We display this analysis in charts, either for a region or an individual centre. These charts show:

- The mean assessment provided to that region or centre;
- The difference in the mean assessment when home region assessments are removed from the analysis;
- The difference between the mean and the assessments provided by other regional centres;
- The proportion of assessments provided by each region.

Chart 7 shows an example of this analysis. Coloured bars to the left of the vertical axis indicate that respondents from that region gave lower than average assessments. Bars to the right indicate respondents from that region gave higher than average assessments. Assessments given to a centre by people based in that centre are excluded to remove ‘home’ bias.

The additional vertical axis (in red) shows the mean of assessments when assessments from the home region are removed. The percentage figure noted by each region indicates the percentage of the total number of assessments that are from that region.

Chart 7 | Example: Assessments Compared With The Mean For A Region



North America

- Ten North American centres now feature in the index, with three new entrants, all from Canada – Montréal, Vancouver, and Calgary;
- Canadian centres outperform the USA in the index;
- New York still trails other USA centres in the rankings;
- People from Western Europe and North America gave North American centres a lower than average rating. Respondents from other regions gave North American centres a higher than average rating.

Table 13 | North America Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
Montréal	8	417	San Francisco	10	424
Vancouver	10	412	Vancouver	16	412
San Francisco	11	411	Los Angeles	21	406
Los Angeles	19=	401	Washington DC	24=	402
Toronto	23	395	Toronto	24=	402
Washington DC	32	380	Montréal	27	401
Boston	34	376	New York	29=	398
New York	39	372	Boston	33	392
Chicago	41	368	Chicago	36=	384
Calgary	49	356	Calgary	49	360

Chart 8 | North American Regional Assessments For Depth – Difference From The Mean

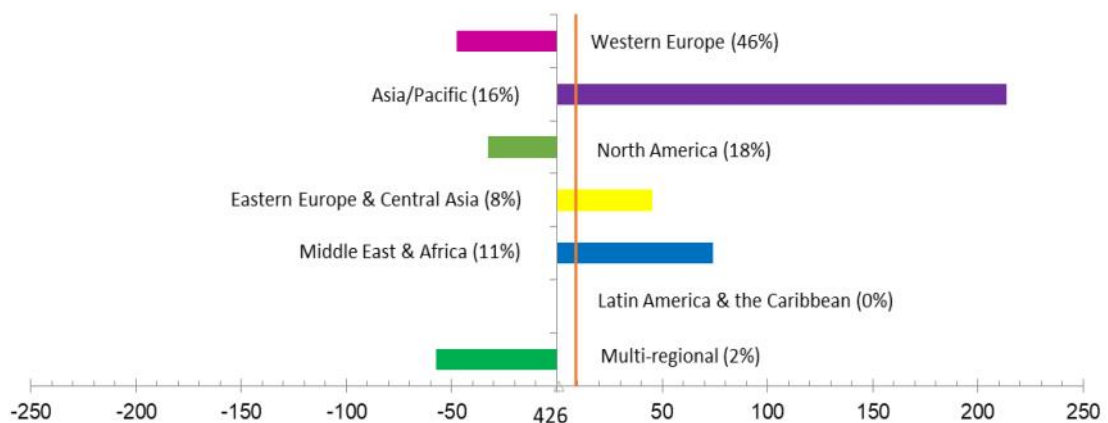


Chart 9 | North American Regional Assessments For Quality – Difference From The Mean

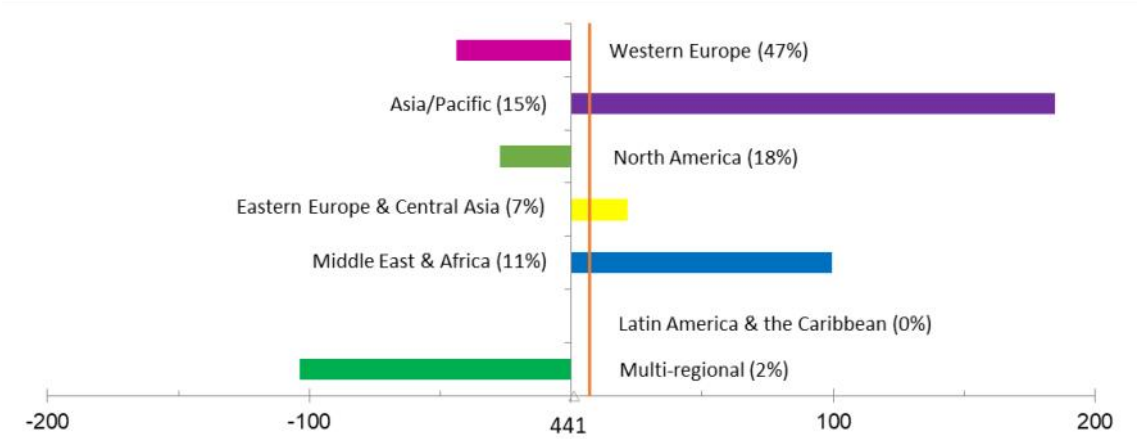


Chart 10 | Regional Assessments For Depth For Montréal – Difference From The Mean

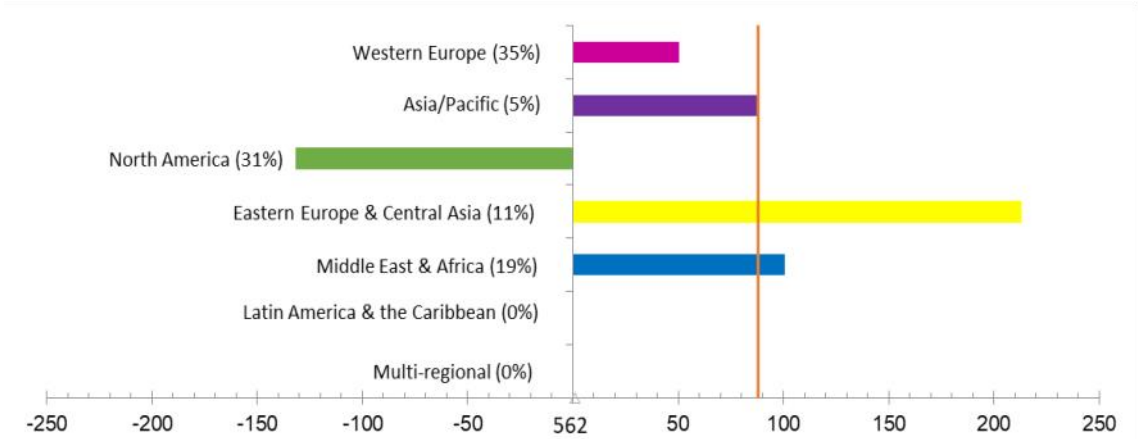
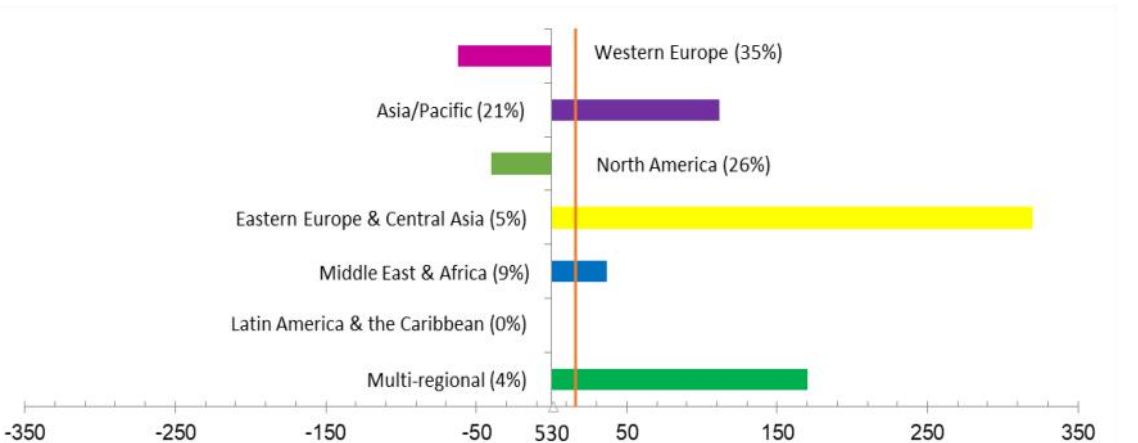


Chart 11 | Regional Assessments For Quality For San Francisco – Difference From The Mean



Middle East & Africa

- Six centres in the Middle East and Africa are now included in the index, with Casablanca and Mauritius entering the index for the first time;
- Casablanca took first place in the region for both depth and quality;
- Dubai was the only centre in the region that has risen, and outperformed Abu Dhabi in the Middle East;
- South African centres fell in the rankings;
- Nairobi and Tel Aviv were close to inclusion in the index, but did not receive the required number of assessments;
- Respondents from the Middle East and Africa rated their home region centres more favourably than the mean. Respondents from Western Europe and North America gave centres in the region lower ratings than the average.

Table 14 | Middle Eastern & African Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
Casablanca	16	407	Casablanca	28	400
Dubai	33	377	Mauritius	36=	384
Cape Town	40	370	Dubai	38	383
Mauritius	42	367	Cape Town	44	367
Abu Dhabi	44=	364	Johannesburg	47=	364
Johannesburg	52=	339	Abu Dhabi	53	350

Chart 12 | Middle East & Africa Regional Assessments For Depth – Difference From The Mean

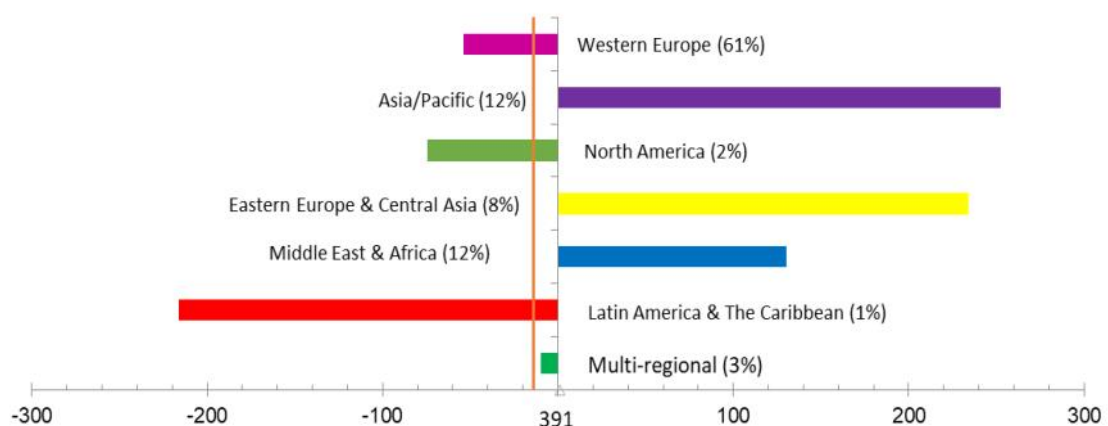


Chart 13 | Middle East & Africa Regional Assessments For Quality – Difference From The Mean

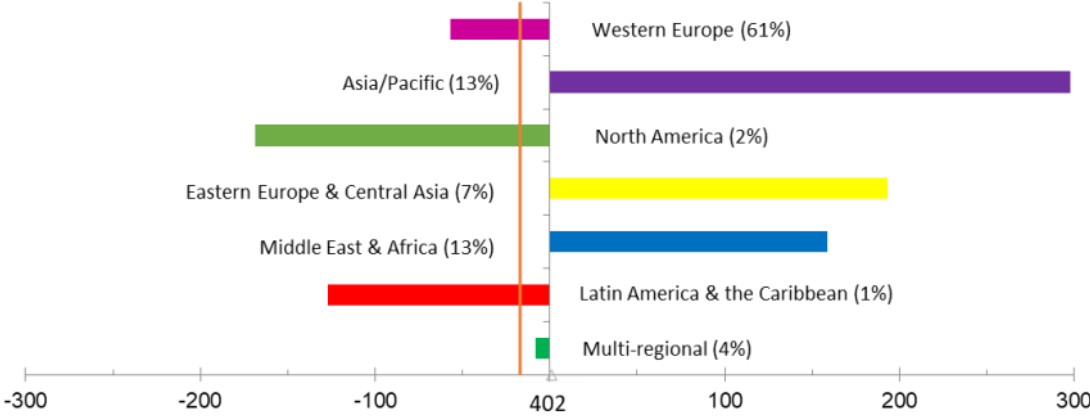


Chart 14 | Regional Assessments For Depth For Casablanca – Difference From The Mean

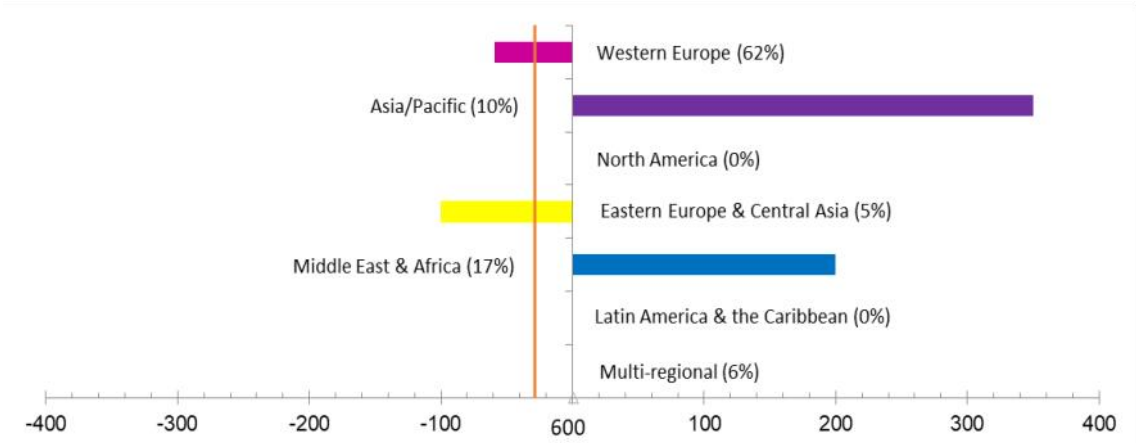
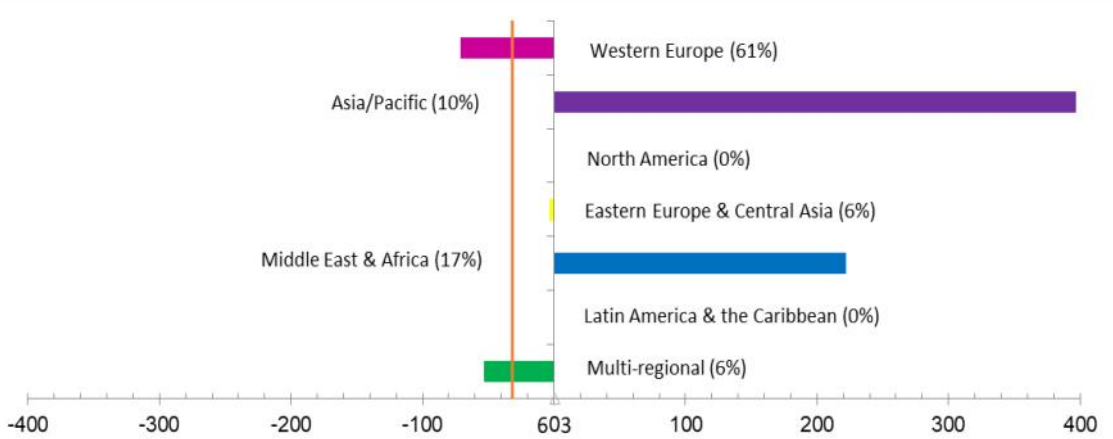


Chart 15 | Regional Assessments For Quality For Casablanca – Difference From The Mean



Eastern Europe & Central Asia

- Four centres from Eastern Europe & Central Asia are now featured in the index, with three new entrants – Prague, Warsaw, and Istanbul;
- Moscow has been overtaken by the new centres in the index;
- Prague scored particularly high on quality and entered the index as 13th overall;
- Respondents in all regions other than Western Europe and North America gave centres in the region higher than average ratings.

Table 15 | Eastern European & Central Asian Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
Prague	44=	364	Prague	13	415
Warsaw	46=	362	Warsaw	35	386
Istanbul	56	329	Istanbul	54	341
Moscow	58	324	Moscow	57	331

Chart 16 | Eastern European & Central Asian Regional Assessments For Depth – Difference From The Mean

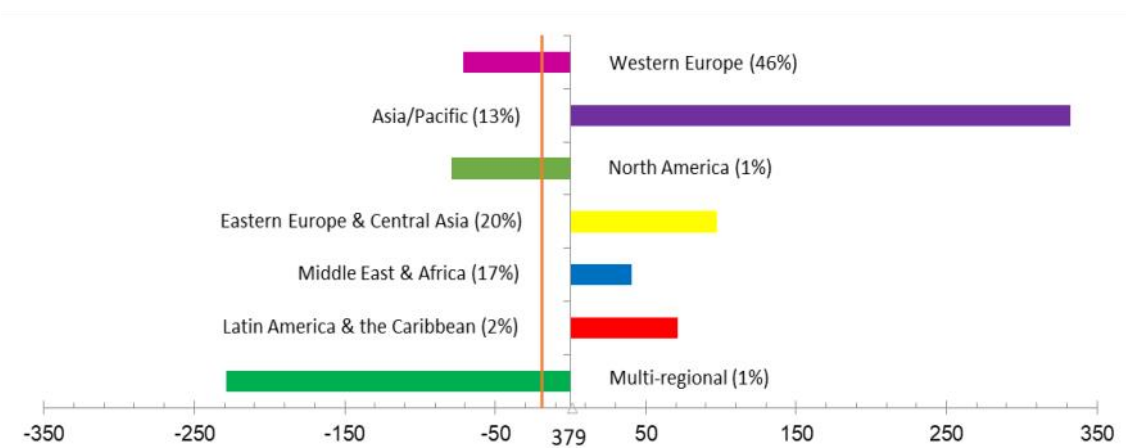


Chart 17 | Eastern European & Central Asian Regional Assessments For Quality – Difference From The Mean

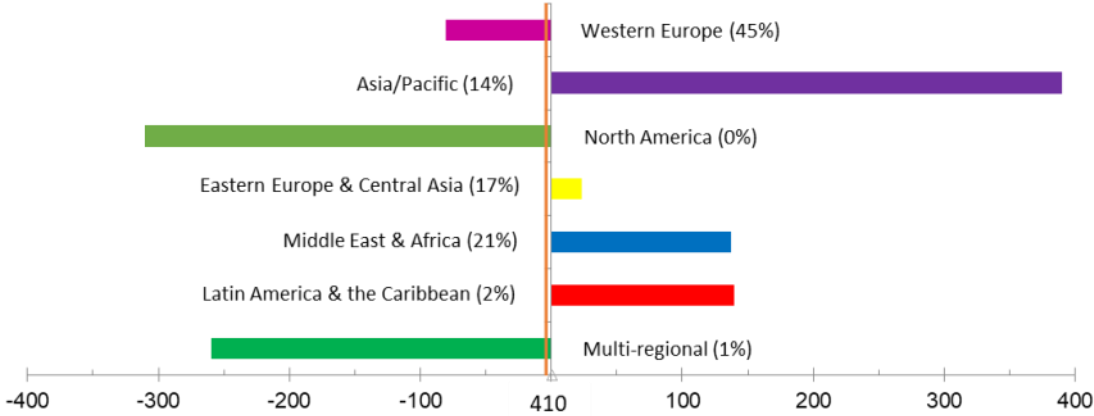


Chart 18 | Regional Assessments For Prague For Depth – Difference From The Mean

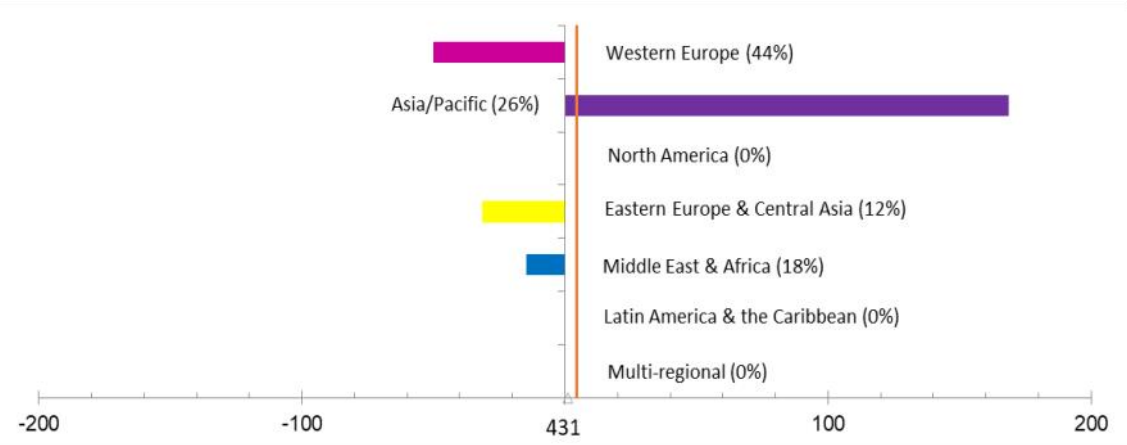
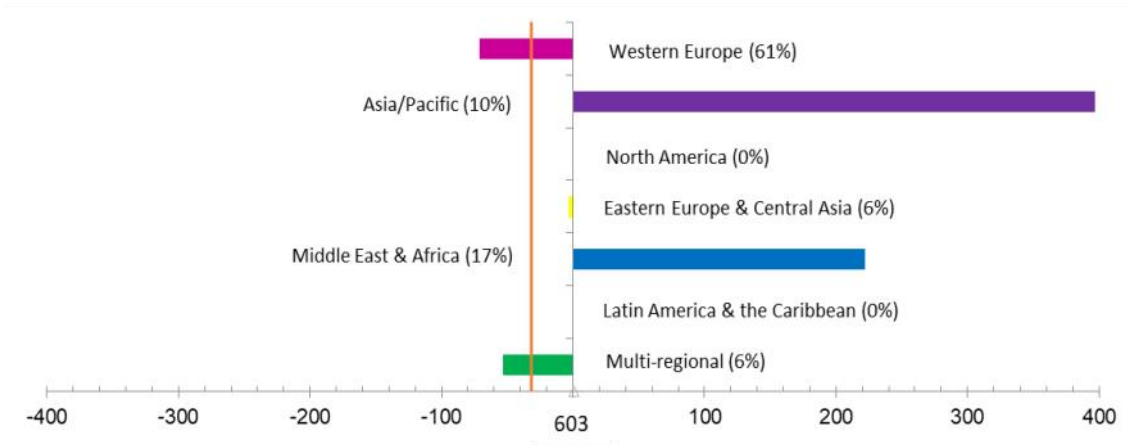


Chart 19 | Regional Assessments For Prague For Quality – Difference From The Mean



Western Europe

- Amsterdam and Copenhagen moved ahead of London in the depth index;
- Paris is closing the gap on quality moving to second place in the quality index;
- Twenty-two of the 59 centres in the index are from Western Europe, with Malta entering the index for the first time. The list of top ten Western European centres is virtually unchanged although Munich has replaced Edinburgh in the top ten for quality;
- Munich rose significantly on the quality index - up 15 places, with Madrid rising seven places for quality. Vienna rose seven places in the rankings for depth;
- Brussels, Dublin, and Rome declined relative to other centres in the region;
- Gibraltar, Liechtenstein, Athens, Glasgow, and Lisbon received nearly sufficient assessments to be included in the index;
- Respondents in Western Europe and Latin America & the Caribbean gave Western European centres lower ratings than the average.

Table 16 | Western European Top 10 Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
Amsterdam	1	435	London	1	481
Copenhagen	2	433	Paris	2	454
London	3=	432	Amsterdam	3=	441
Luxembourg	3=	432	Copenhagen	3=	441
Paris	5=	423	Stockholm	5	440
Stockholm	5=	423	Luxembourg	6	434
Zürich	9	415	Zürich	7	433
Hamburg	12	410	Hamburg	8	431
Brussels	14=	408	Munich	9	425
Munich	17	405	Brussels	12	422

Chart 20 | Western Europe Regional Assessments For Depth – Difference From The Mean

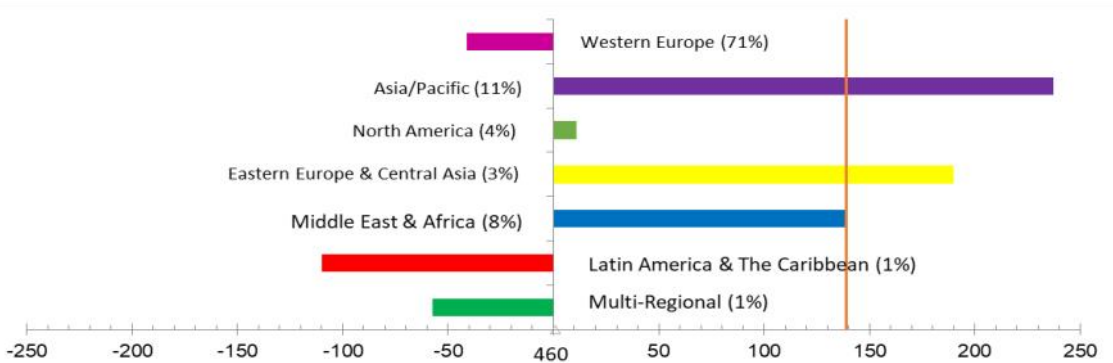


Chart 21 | Western Europe Regional Assessments For Quality – Difference From The Mean

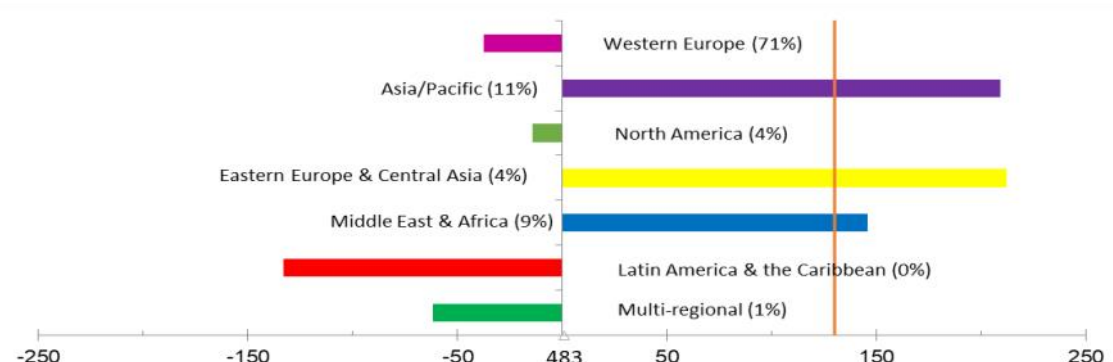


Chart 22 | Regional Assessments For Amsterdam For Depth – Difference From The Mean

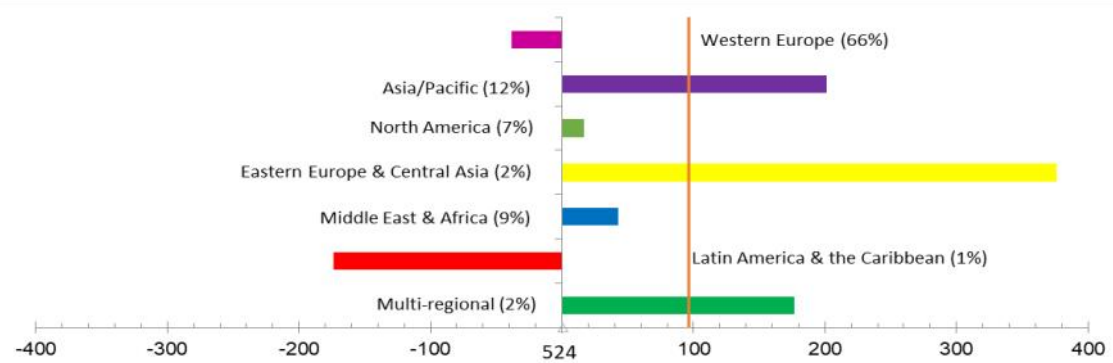
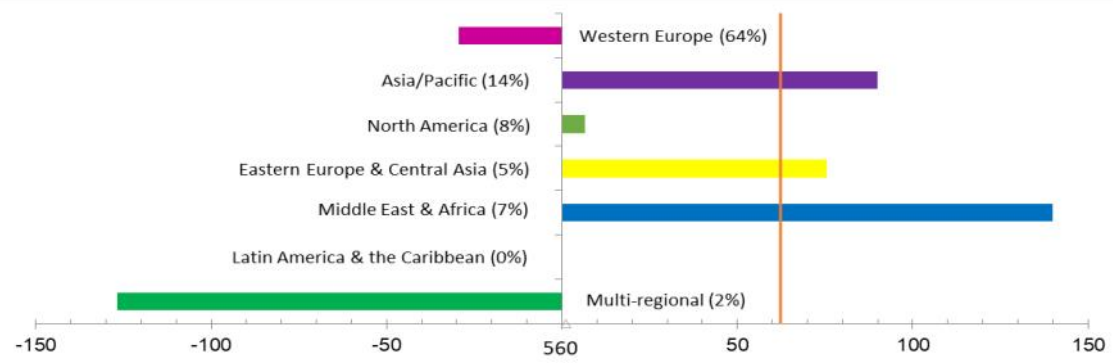


Chart 23 | Regional Assessments For London For Quality – Difference From The Mean



Latin America & The Caribbean

- Four centres now feature in the index from the Latin America and Caribbean Region with São Paulo, the British Virgin Islands, and the Cayman Islands entering the index;
- São Paulo took the leading place in the region, overtaking Mexico City, which fell in the rankings as other new entrants to the index entered in higher positions;
- Rio de Janeiro, Bermuda, and Panama were all close to receiving sufficient assessments in the survey to be included in the index;
- Home region respondents gave Latin American & Caribbean centres lower ratings than the average, as did respondents in Western Europe and North America.

Table 17 | Latin American & Caribbean Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
São Paulo	43	366	São Paulo	40	371
Mexico City	48	360	Mexico City	47=	364
British Virgin Islands	51	347	British Virgin Islands	51	353
Cayman Islands	52=	339	Cayman Islands	52	351

Chart 24 | Latin American & Caribbean Regional Assessments For Depth – Difference From The Mean

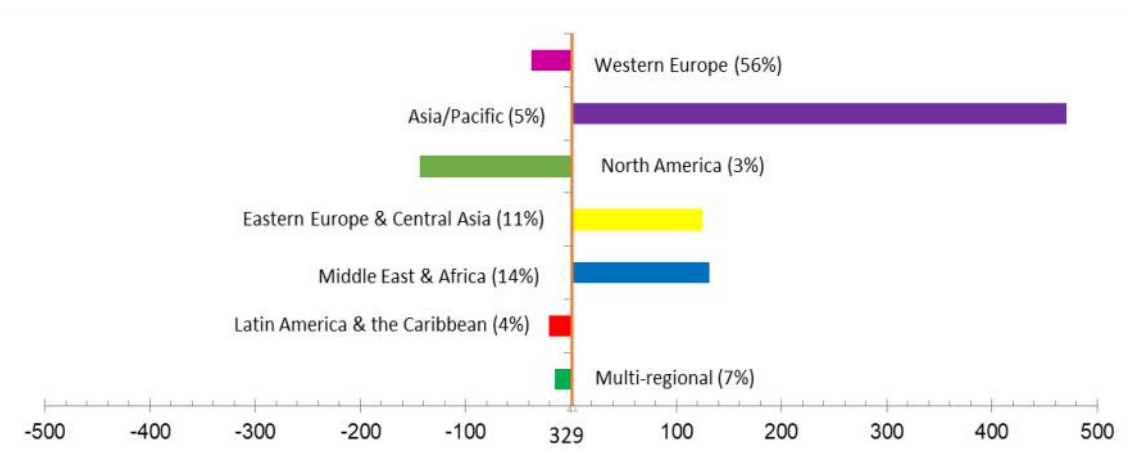


Chart 25 | Latin America & The Caribbean Regional Assessments For Quality – Difference From The Mean

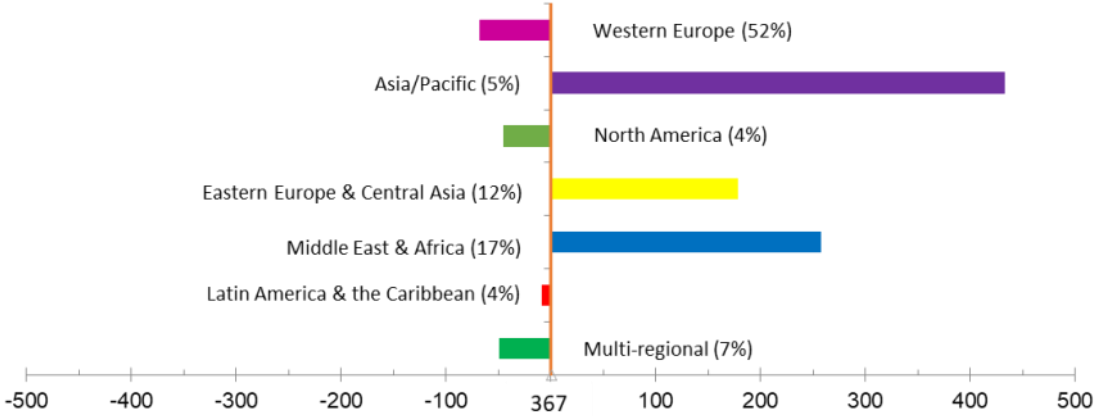


Chart 26 | Regional Assessments For São Paulo For Depth – Difference From The Mean

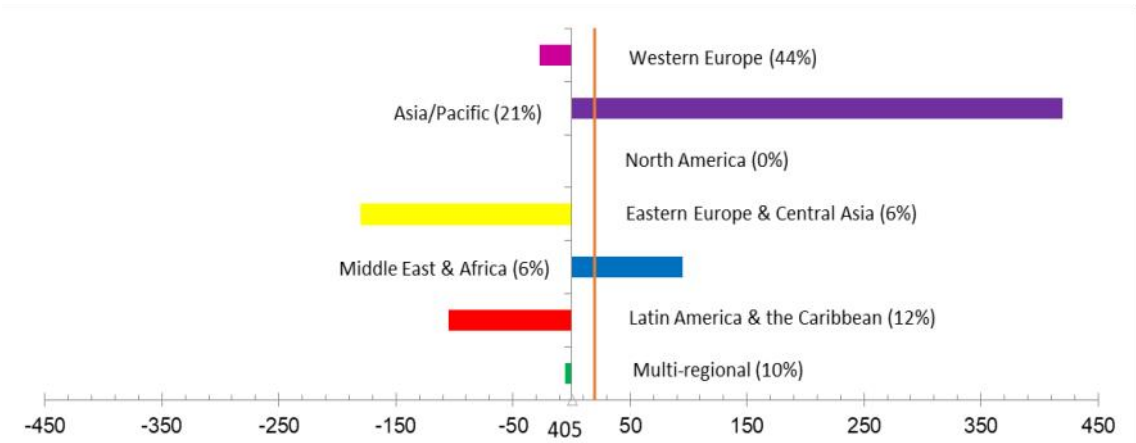
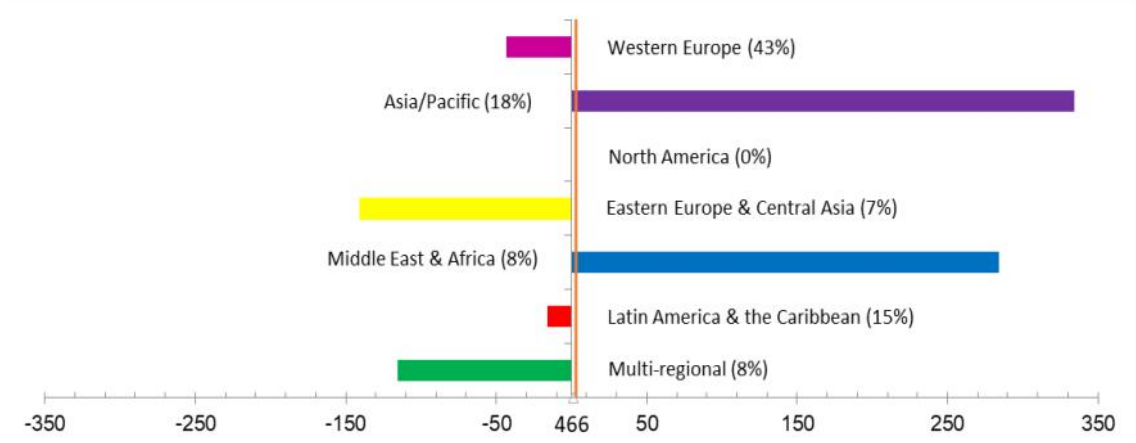


Chart 27 | Regional Assessments For São Paulo For Quality – Difference From The Mean



Asia/Pacific

- Thirteen centres from the Asia/Pacific region are included in the index;
- Shanghai consolidated its position as the top centre;
- The majority of centres in the region fell in the rankings, with particularly sharp changes for Guangzhou, Kuala Lumpur, and New Delhi. Hong Kong, Shenzhen, and Singapore also fell in the rankings;
- Melbourne, Manila, and Jakarta received just under the number of assessments required for inclusion in the index;
- Respondents from Western Europe and North America gave Asia/Pacific centres ratings that were lower than the average.

Table 18 | Asia/Pacific Top 10 Centres In GGFI 2

Centre	Depth GGFI 2		Centre	Quality GGFI 2	
	Rank	Rating		Rank	Rating
Shanghai	7	420	Shanghai	11	423
Beijing	13	409	Beijing	17	411
Seoul	14=	408	Tokyo	18=	408
Sydney	18	403	Sydney	18=	408
Shenzhen	19=	401	Singapore	23	404
Singapore	21=	398	Shenzhen	24=	402
Tokyo	29=	382	Hong Kong	39	382
Guangzhou	31	381	Guangzhou	41	370
Hong Kong	35	375	Seoul	42=	368
Mumbai	54	337	Bangkok	55=	339

“Skilled and well-trained personnel are the most important element to make green finance work well, following government policy.”

Executive Director, Wealth Management Institute, Qingdao

Chart 28 | Asia/Pacific Regional Assessments For Depth – Difference From The Mean

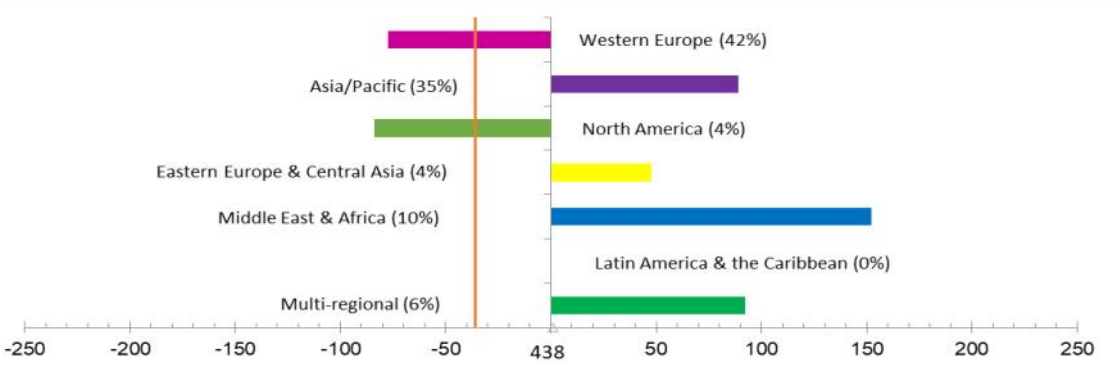


Chart 29 | Asia/Pacific Regional Assessments For Quality – Difference From The Mean

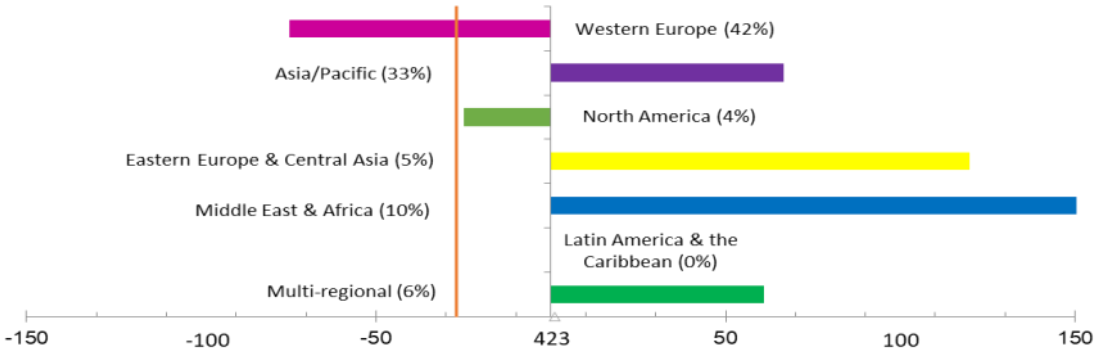


Chart 30 | Regional Assessments For Shanghai For Depth – Difference From The Mean

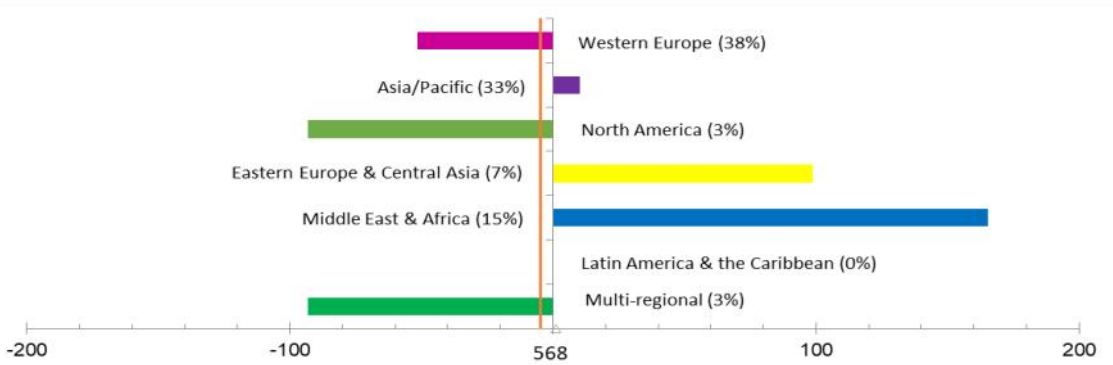
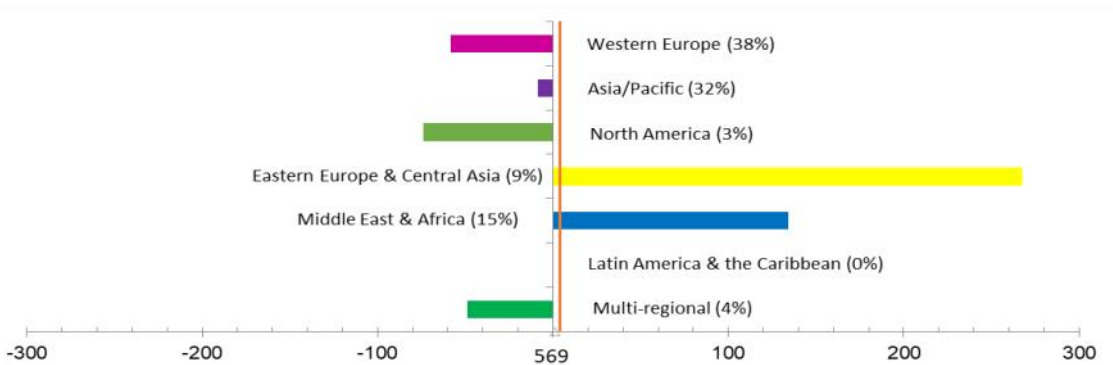


Chart 31 | Regional Assessments For Shanghai For Quality – Difference From The Mean



Organisation Size

There is variation in how the leading centres are viewed by respondents working for different sizes of organisation. Taking the six centres that appear in the top five of the rankings for both depth and quality, Charts 32 and 33 show 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 Stockholm, Amsterdam, and London for depth than those from larger organisations. Amsterdam and Brussels scored higher in relation to larger organisations. Similarly, those in smaller organisations rated Stockholm and London higher for quality. Brussels, Amsterdam, and London received higher quality scores from those in the larger organisations.

Chart 32 | Average Assessments By Respondents' Organisation Size: Depth

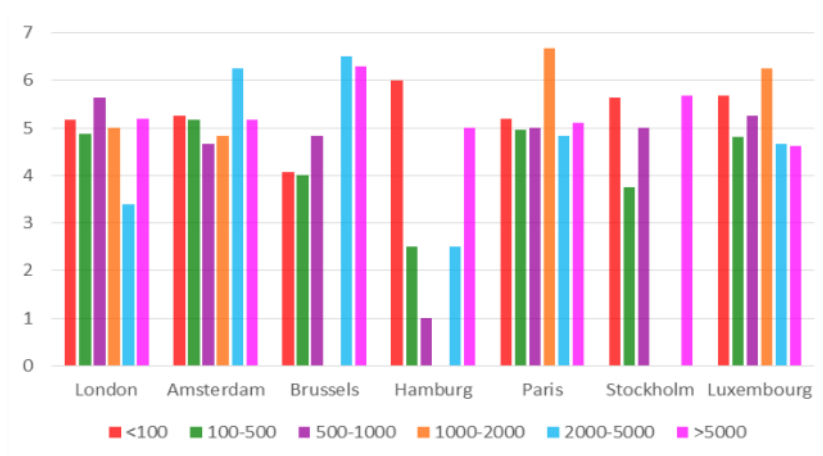
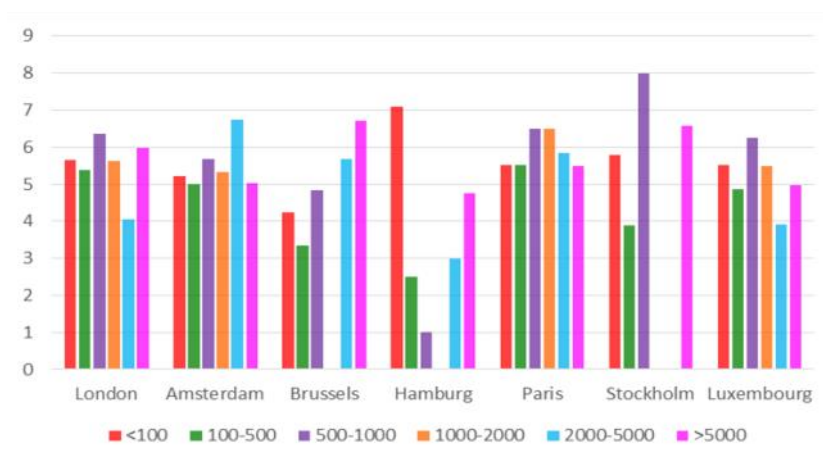


Chart 33 | Average Assessments By Respondents' Organisation Size: Quality



Stability

The GGFI model allows for an analysis of the stability of financial centres in the index, which can be useful for centres when assessing their marketing strategies. Charts 34 and 35 contrast the ‘spread’ or variance of the individual assessments given to each of the centres in GGFI 2, with the sensitivity to changes in the instrumental factors: first for depth and second for quality assessments.

The chart shows three bands of financial centres. The unpredictable centres in the top right of the chart have a higher sensitivity to changes in the instrumental factors and a higher variance of assessments. These centres have the highest potential future movement. The stable centres in the bottom left have a lower sensitivity to change and demonstrate greater consistency in their GGFI ratings.

Chart 34 | Stability In Assessments And Instrumental Factors (Depth)

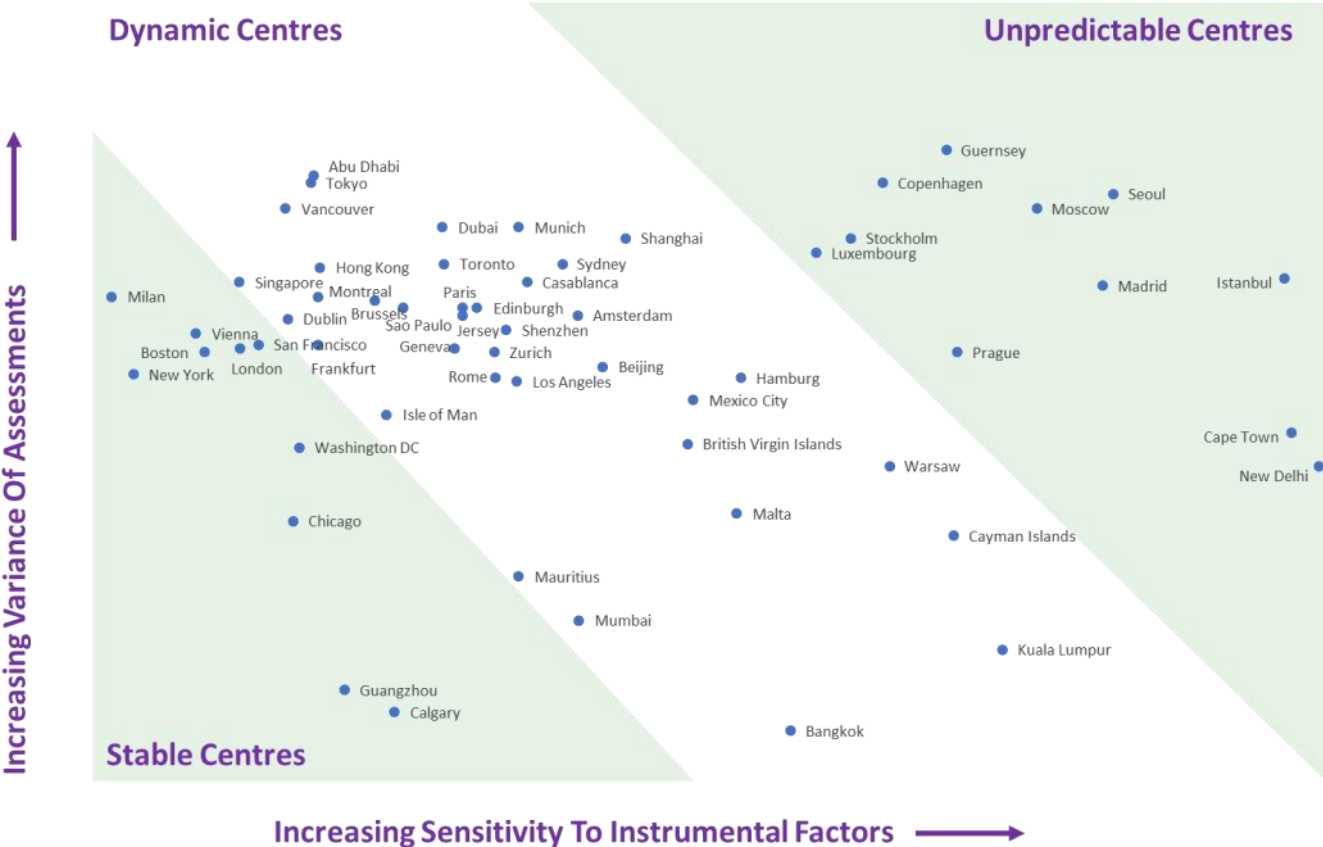
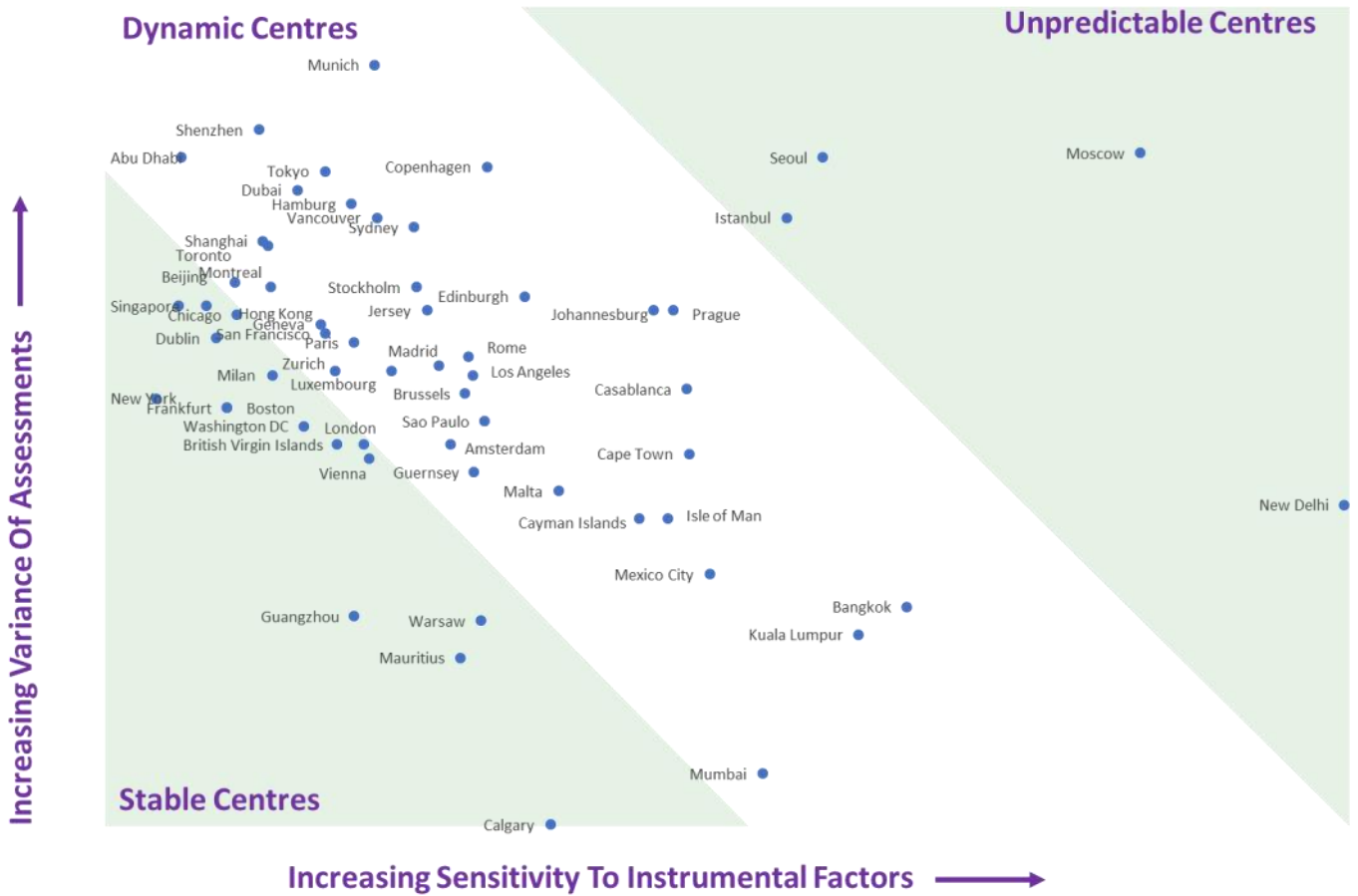


Chart 35 | Stability In Assessments And Instrumental Factors (Quality)



GGFI New Entrant - Prague

The close ties between the Prague and Vienna Stock Exchanges (both part of the CEESEG group) provide a strong platform for green bonds trading and the financing of renewables throughout eastern Europe.

Further Information:

<https://www.wienerbourse.at/en/issuers/bond-admission-listing/green-and-social-bonds/>

Reputation

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 depth are in the Asia/Pacific region. New entrants Casablanca, Montréal, and Istanbul also feature in the top 15.

On quality, a similar range of centres feature, but Hamburg, Prague, São Paulo, and Paris replace Luxembourg, Seoul, Guernsey, 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 2 rating first for depth and then for quality.

Table 19 | Top 15 Centres – Reputational Advantage For Depth In GGFI 2

Centre	Weighted Average Assessment	GGFI 2 Rating	Reputational Advantage
Casablanca	636	407	229
Shenzhen	575	401	174
Shanghai	560	420	140
Montréal	539	417	122
Beijing	518	409	109
Luxembourg	533	432	101
Istanbul	429	329	100
Stockholm	514	423	91
Copenhagen	520	433	87
San Francisco	498	411	87
Los Angeles	486	401	85
Seoul	492	408	84
Milan	467	386	81
Sydney	484	403	81
Guernsey	428	351	77

Table 20 | Top 15 Centres – Reputational Advantage For Quality In GGFI 2

Centre	Weighted Average Assessment	GGFI 2 Rating	Reputational Advantage
Casablanca	585	400	185
Hamburg	546	431	115
Shanghai	529	423	106
Stockholm	545	440	105
Prague	518	415	103
Montréal	503	401	102
Istanbul	432	341	91
Shenzhen	493	402	91
Copenhagen	527	441	86
Los Angeles	492	406	86
San Francisco	506	424	82
Beijing	493	411	82
São Paulo	450	371	79
Paris	532	454	78
Milan	465	398	67

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 Depth In GGFI 2

Centre	Weighted Average Assessment	GGFI 2 Rating	Reputational Advantage
Cape Town	354	370	-16
Vienna	367	388	-21
Toronto	372	395	-23
Kuala Lumpur	306	330	-24
Warsaw	338	362	-24
Johannesburg	300	339	-39
New Delhi	265	307	-42
Mexico City	314	360	-46
Isle of Man	318	373	-55
Cayman Islands	284	339	-55
British Virgin Islands	286	347	-61
Mumbai	258	337	-79
Bangkok	241	328	-87
Malta	239	362	-123
Calgary	230	356	-126

Table 22 | Bottom Ten Centres – Reputational Disadvantage For Quality In GGFI 2

Centre	Weighted Average Assessment	GGFI 2 Rating	Reputational Advantage
Kuala Lumpur	298	315	-17
Vienna	381	405	-24
Warsaw	362	386	-24
Isle of Man	320	354	-34
Dublin	359	394	-35
Cayman Islands	311	351	-40
Cape Town	324	367	-43
British Virgin Islands	304	353	-49
Bangkok	278	339	-61
Mexico City	302	364	-62
Guernsey	302	366	-64
New Delhi	248	329	-81
Calgary	253	360	-107
Malta	256	366	-110
Mumbai	223	339	-116

“Luxembourg is a small, well-managed country that takes sustainability very seriously and employs its considerable surplus of energy, income, and political will to drive forward the green agenda. It is fair to say that Luxembourg bats above its weight globally, in this area.”

Business Development Adviser, Luxembourg

GGFI 2 Interest, Impact, And Drivers of Green Finance

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

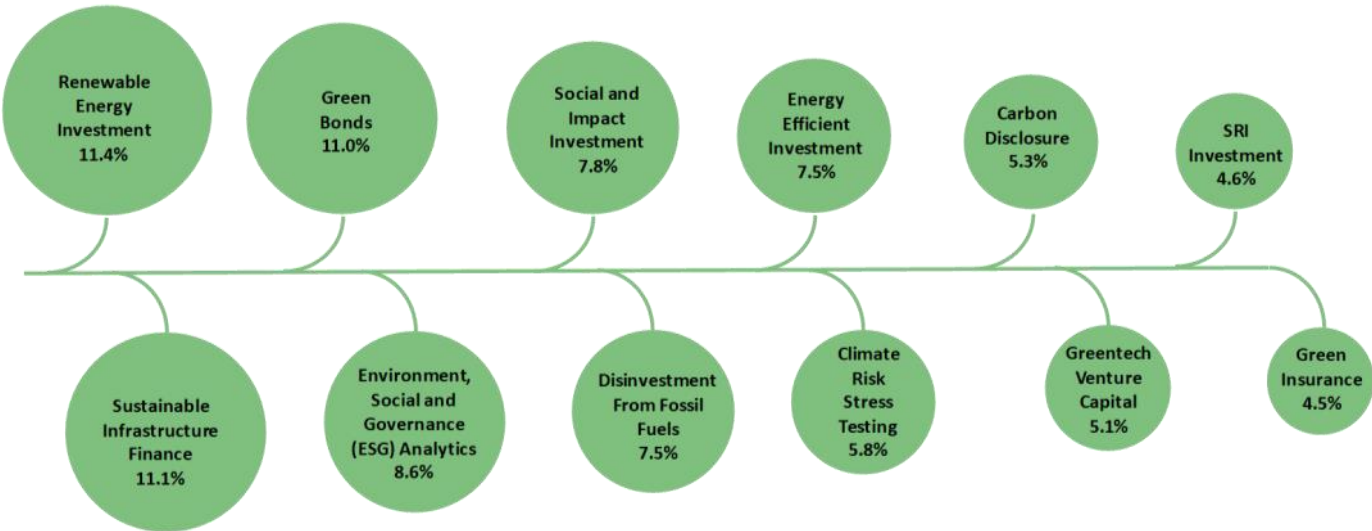
- The areas of Green Finance which were considered most interesting by respondents
- The areas of Green Finance which had most impact on sustainability; and
- The factors driving the development of Green Finance.

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 36. The top areas listed were:

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

Chart 36 | Most Interesting Areas Of Green Finance

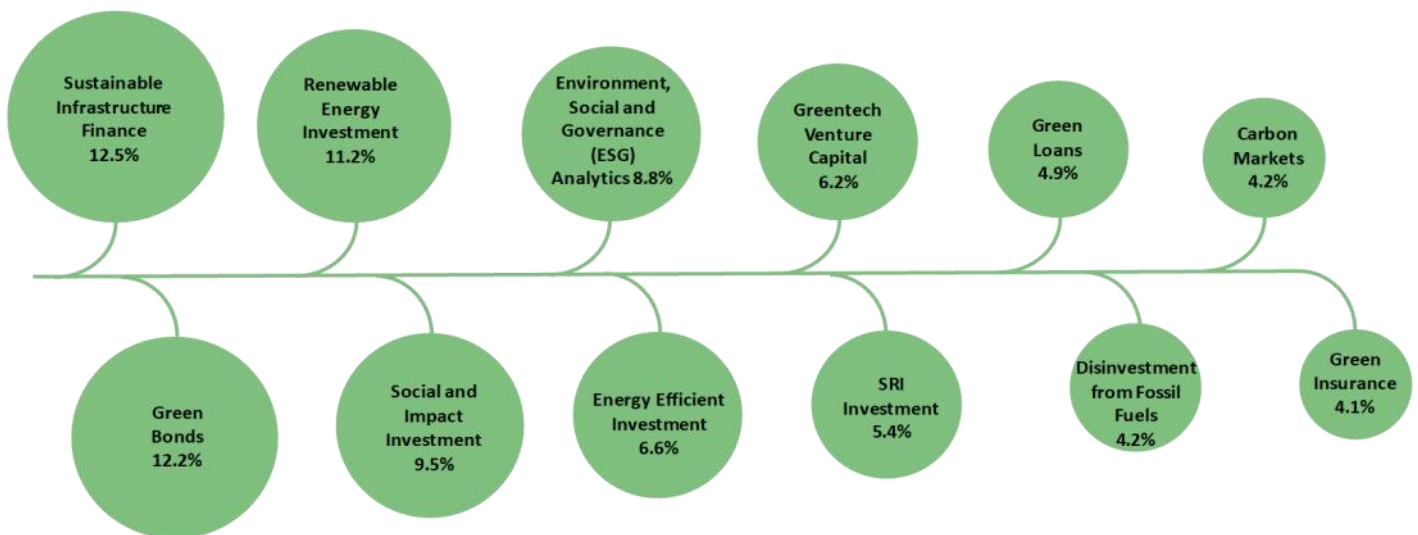


Areas Of Green Finance Impact On Sustainability

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 37 below. The top areas listed were:

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

Chart 37 | Green Finance Activities With Most Impact On Sustainability



GGFI New Entrant - Vancouver

Vancouver has invested a great deal of political capital in greening infrastructure and services. As a result, the city has an excellent reputation for quality of life and high environmental standards. The green finance sector has benefitted from increased activity, particularly within the green bonds market, which focusses both on provincial and international issuance.

Further Information:

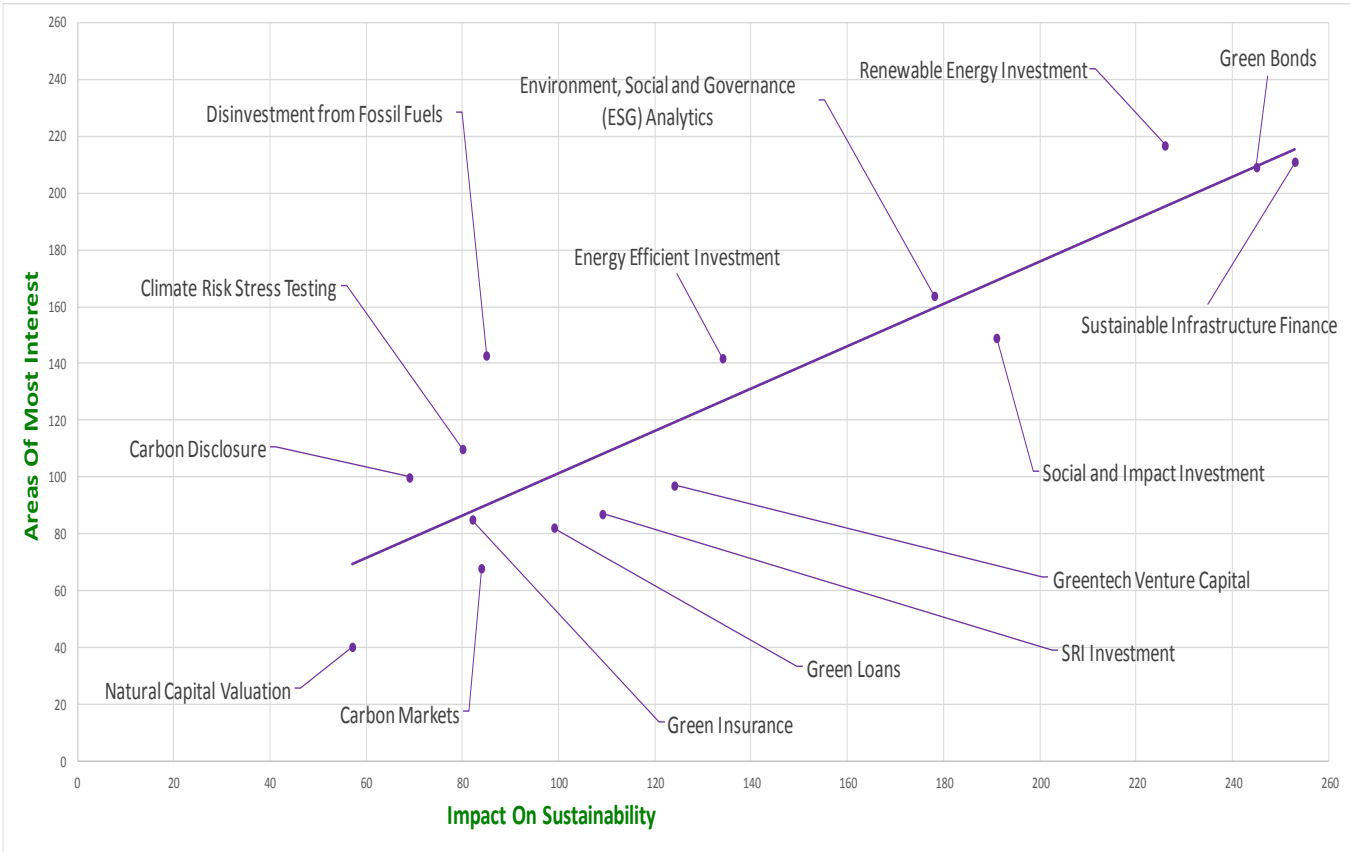
<https://iiac.ca/tag/green-bonds/>

Relationship Between Areas Of Interest And Impact

Looking at the areas of Green Finance that respondents identified as interesting and those they considered had most impact, we see a close correlation, as shown in Chart 38.

Disinvestment from Fossil Fuels stands out as further from the trendline. In our latest data, disinvestment attracts more interest as a green finance activity than the impact that it has. This reverses the position it held in GGFI 1, reflecting growing interest in disinvestment.

Chart 38 | Relationship Between Areas Of Interest And Impact



“The need to analyse and understand climate risk is paramount. No-one will be persuaded unless they feel it affects them/their company directly - and understand how to mitigate the risk. So disclosure is key.”

Senior Banker, London

Drivers Of Green Finance

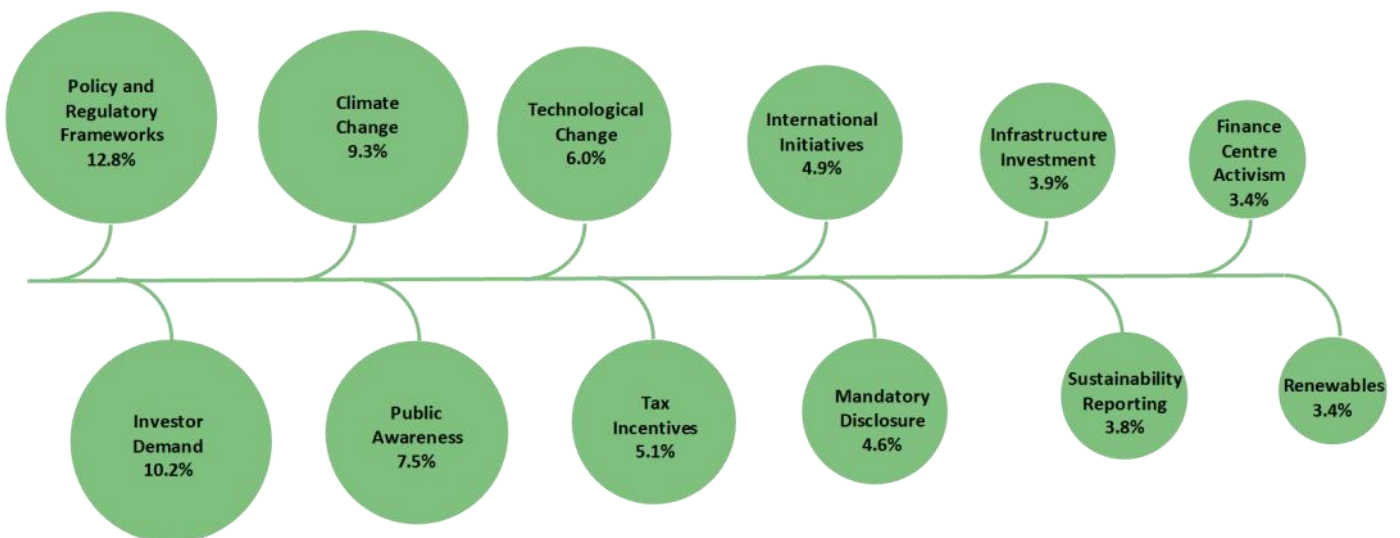
Finally, we asked respondents to identify the four areas that they considered were driving the development of Green Finance. The results are shown in Chart 39 below.

The top drivers identified were:

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

This is unchanged from GGFI 1.

Chart 39 | Leading Drivers Of Green Finance



GGFI New Entrant - Mauritius

The SEM Sustainability Index, launched by the Mauritian stock exchange, identifies companies based on strong sustainability practices using a set of internationally aligned and locally relevant economic, environmental, social, and governance criteria. Whilst Africa remains the continent with least issuances of green bonds, despite huge investment needs, as this market grows, the Stock Exchange in Mauritius is well placed to benefit.

Further information:

<http://www.stockexchangeofmauritius.com/about-semis/>

Notes

Appendix 1: Assessment Details

Table 23 | Details Of Assessments Of Green Finance Depth By Centre

Centre	GGFI 2 Rank	GGFI 2 Rating	Assessments		
			Number	Average	St. Dev
Amsterdam	1	435	70	524	255
Copenhagen	2	433	21	555	291
Luxembourg	3	432	88	523	250
London	3	432	153	504	245
Stockholm	5	423	32	539	278
Paris	5	423	122	512	256
Shanghai	7	420	50	568	278
Montreal	8	417	25	562	261
Zurich	9	415	95	496	245
Vancouver	10	412	15	423	291
San Francisco	11	411	35	523	250
Hamburg	12	410	15	507	238
Beijing	13	409	55	542	241
Seoul	14	408	14	454	215
Brussels	14	408	44	464	254
Casablanca	16	407	16	600	229
Munich	17	405	20	438	286
Sydney	18	403	30	508	269
Los Angeles	19	401	31	515	229
Shenzhen	19	401	20	570	292
Frankfurt	21	398	103	449	249
Singapore	21	398	85	459	264
Toronto	23	395	33	415	285
Geneva	24	393	67	444	241
Jersey	25	388	35	387	249
Vienna	25	388	23	385	250
Milan	27	386	38	447	252
Dublin	28	383	63	375	243
Tokyo	29	382	45	422	284
Madrid	29	382	23	452	253
Guangzhou	31	381	14	471	153
Washington DC	32	380	34	416	221
Dubai	33	377	47	405	285
Boston	34	376	40	403	245
Rome	35	375	17	403	238
Hong Kong	35	375	85	412	274
Edinburgh	37	374	30	407	263
Isle of Man	38	373	29	336	228
New York	39	372	132	403	239
Cape Town	40	370	12	354	216
Chicago	41	368	35	366	185
Mauritius	42	367	16	372	184
Sao Paulo	43	366	19	405	257
Prague	44	364	16	431	245
Abu Dhabi	44	364	30	365	293
Warsaw	46	362	15	347	214
Malta	46	362	17	247	201
Mexico City	48	360	21	329	232
Calgary	49	356	18	242	147
Guernsey	50	351	22	309	234
British Virgin Islands	51	347	17	282	224
Cayman Islands	52	339	20	293	195
Johannesburg	52	339	24	302	212
Mumbai	54	337	22	268	172
Kuala Lumpur	55	330	24	317	164
Istanbul	56	329	15	460	277
Bangkok	57	328	18	256	142
Moscow	58	324	18	317	286
New Delhi	59	307	18	283	220

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

Centre	GGFI 2 Rank	GGFI 2 Rating	Assessments		
			Number	Average	St. Dev
London	1	481	153	560	237
Paris	2	454	122	557	259
Amsterdam	3=	441	70	526	237
Copenhagen	3=	441	21	562	297
Stockholm	5	440	32	577	271
Luxembourg	6	434	88	522	253
Zürich	7	433	95	521	253
Hamburg	8	431	15	580	289
Munich	9	425	20	440	319
San Francisco	10	424	35	530	261
Shanghai	11	423	50	549	281
Brussels	12	422	44	470	248
Prague	13	415	16	531	266
Geneva	14=	414	67	481	263
Edinburgh	14=	414	30	432	269
Vancouver	16	412	15	420	286
Beijing	17	411	55	515	272
Tokyo	18=	408	45	447	296
Frankfurt	18=	408	103	457	245
Sydney	18=	408	30	482	284
Los Angeles	21	406	31	506	252
Vienna	22	405	23	400	234
Singapore	23	404	85	464	267
Shenzhen	24=	402	20	518	305
Washington DC	24=	402	34	454	241
Toronto	24=	402	33	414	280
Montréal	27	401	25	518	271
Casablanca	28	400	16	603	249
Madrid	29=	398	23	428	254
New York	29=	398	132	439	247
Milan	29=	398	38	482	252
Dublin	32	394	63	382	260
Boston	33	392	40	395	245
Jersey	34	391	35	436	266
Warsaw	35	386	15	370	199
Chicago	36=	384	35	389	265
Mauritius	36=	384	16	397	191
Dubai	38	383	47	409	292
Hong Kong	39	382	85	412	267
São Paulo	40	371	19	466	242
Guangzhou	41	370	14	400	200
Seoul	42=	368	14	407	299
Rome	42=	368	17	371	256
Cape Town	44	367	12	350	235
Guernsey	45=	366	22	318	231
Malta	45=	366	17	265	227
Johannesburg	47=	364	24	363	266
Mexico City	47=	364	21	317	209
Calgary	49	360	18	264	155
Isle of Man	50	354	29	338	221
British Virgin Islands	51	353	17	309	237
Cayman Islands	52	351	20	320	221
Abu Dhabi	53	350	30	370	299
Istanbul	54	341	15	443	286
Bangkok	55=	339	18	294	202
Mumbai	55=	339	22	232	166
Moscow	57	331	18	347	300
New Delhi	58	329	18	264	224
Kuala Lumpur	59	315	24	306	196

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
Natural Capital Valuation	40	2.1
Carbon Markets	68	3.6
Green Loans	82	4.3
Green Insurance	85	4.5
SRI Investment	87	4.6
Greentech Venture Capital	97	5.1
Carbon Disclosure	100	5.3
Climate Risk Stress Testing	110	5.8
Energy Efficient Investment	142	7.5
Disinvestment from Fossil Fuels	143	7.5
Social and Impact Investment	149	7.8
Environment, Social and Governance (ESG) Analytics	164	8.6
Green Bonds	209	11.0
Sustainable Infrastructure Finance	211	11.1
Renewable Energy Investment	217	11.4
Totals	1,904	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	57	2.8
Carbon Disclosure	69	3.4
Climate Risk Stress Testing	80	4.0
Green Insurance	82	4.1
Carbon Markets	84	4.2
Disinvestment from Fossil Fuels	85	4.2
Green Loans	99	4.9
SRI Investment	109	5.4
Greentech Venture Capital	124	6.2
Energy Efficient Investment	134	6.6
Environment, Social and Governance (ESG) Analytics	178	8.8
Social and Impact Investment	191	9.5
Renewable Energy Investment	226	11.2
Green Bonds	245	12.2
Sustainable Infrastructure Finance	253	12.5
Totals	2,016	100.0

Table 27 | Drivers Of Green Finance

Driver	Number Of Mentions	Percentage Of Total Mentions
Loss of Biodiversity	12	0.6
Food Security	13	0.7
Water Quality	22	1.1
Insurance Industry Research	27	1.4
Voluntary Standards	32	1.6
Air Quality	41	2.1
Academic Research	47	2.4
Industry Activism	55	2.8
Non-financial Reporting	56	2.9
Energy Efficiency	56	2.9
Risk Management Frameworks	64	3.3
NGO Activism	64	3.3
Renewables	65	3.4
Finance Centre Activism	65	3.4
Sustainability Reporting	74	3.8
Infrastructure Investment	75	3.9
Mandatory Disclosure	89	4.6
International Initiatives	96	4.9
Tax Incentives	98	5.1
Technological Change	117	6.0
Public Awareness	145	7.5
Climate Change	181	9.3
Investor Demand	197	10.2
Policy And Regulatory Frameworks	249	12.8
Totals	1,940	100.0

Appendix 3: Respondents' Details

Table 28 | Respondents By Industry Sector

Industry Sector	Number Of Respondents
Banking	65
Debt Capital Market	35
Equity Capital Markets	21
Insurance	8
Investment	62
Knowledge	98
Local Green Initiatives	15
Other	39
Policy and Public Finance	47
Professional Services	139
Trading	6
Total	535

Table 29 | Respondents By Region

Region	Number Of Respondents
Western Europe	357
Asia Pacific	50
North America	39
Middle East and Africa	31
Eastern Europe and Central Asia	29
Latin America and the Caribbean	8
Other	21
Total	535

Table 30 | Respondents By Engagement In Green Finance

a. All Respondents

Engagement In Green Finance	Number Of Respondents
Working on Green Finance (All)	273
Interested in Green Finance	222
Other/Not Given	40
Total	535

b. Recent Respondents (where we asked for respondents to identify whether full- or part-time)

Engagement In Green Finance	Number Of Respondents
Working Full-time On	23
Working Part-time On	53
Interested in Green	45
Other/not given	18
Total	139

Table 31 | Respondents By Size Of Organisation

Size Of Organisation	Number Of Respondents
<100	268
100-500	73
500-1000	18
1000-2000	23
2000-5000	32
>5000	91
Other/Not Given	30
Total	535

Table 33 | Respondents By Age

Age Band	Number Of Respondents
18-30	94
30-45	184
45-60	175
60+	58
Other/Not Given	24
Total	535

Table 32 | Respondents By Gender

Gender	Number Of Respondents
Female	185
Male	323
Other	1
Prefer Not To Say/Not Given	26
Total	535

Appendix 4: Methodology

The GGFI provides ratings for the depth and quality of the green finance offering of financial centres. The process involves taking two sets of ratings – one from survey respondents and one generated by a statistical model – and combining them into a single ranking.

For the first set of ratings, the **financial centre assessments**, respondents use an online questionnaire to rate the depth and quality of each financial centre's green finance offering, using a ten point scale ranging from little depth/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.

For the second set of ratings, a support vector engine uses a database of indicators, or **Instrumental Factors**, that contains quantitative data about each financial centre, to predict how each respondent would have rated the financial centres they do not know. These instrumental factors draw on data from 126 different sources covering sustainability, comprising green finance activities as well as the physical attributes of a centre, such as air quality and local carbon emissions; business, including legal and policy factors and statistics on economic performance; human capital, reflecting educational development and social factors; and infrastructure, including telecommunications and public transport. A full list of the instrumental factors used in the model is in Appendix 5.

The respondents' actual ratings as well as their predicted ratings for the centres they did not rate, are then combined into a single table to produce the ranking.

Factors Affecting The Inclusion Of Centres In The GGFI

The questionnaire lists a total of 110 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.

We 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 fifteen in GGFI 2. This means that not all 110 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. Other interested parties can complete the questionnaire by following the link given in GGFI publications.

In calculating the the GGFI:

- The score given by a respondent to their home centre, and scores from respondents who do not specify a home centre, are excluded from the model – this is designed to prevent home bias;
- Financial centre assessments are included in the GGFI model for 24 months after they have been received – we consider that this is a period during which assessments maintain their validity; 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 40 – this recognises that older ratings, while still valid, are less likely to be up-to-date.

Chart 40 | 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;
- If an index is at a regional level, the most relevant allocation of scores to each centre is made (and the method for judging relevance is noted);
- If an index does not contain a value for a particular financial centre, a blank is entered against that centre (no average or mean is used).

Factor Assessment

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

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

- Be familiar with only a limited number of centres - probably no more than 10 or 15 centres ;
- Rate a different group of centres making it difficult to compare data sets;
- Consider different aspects of centres' performance in their ratings.

The instrumental factors are based on a range of different models. 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?

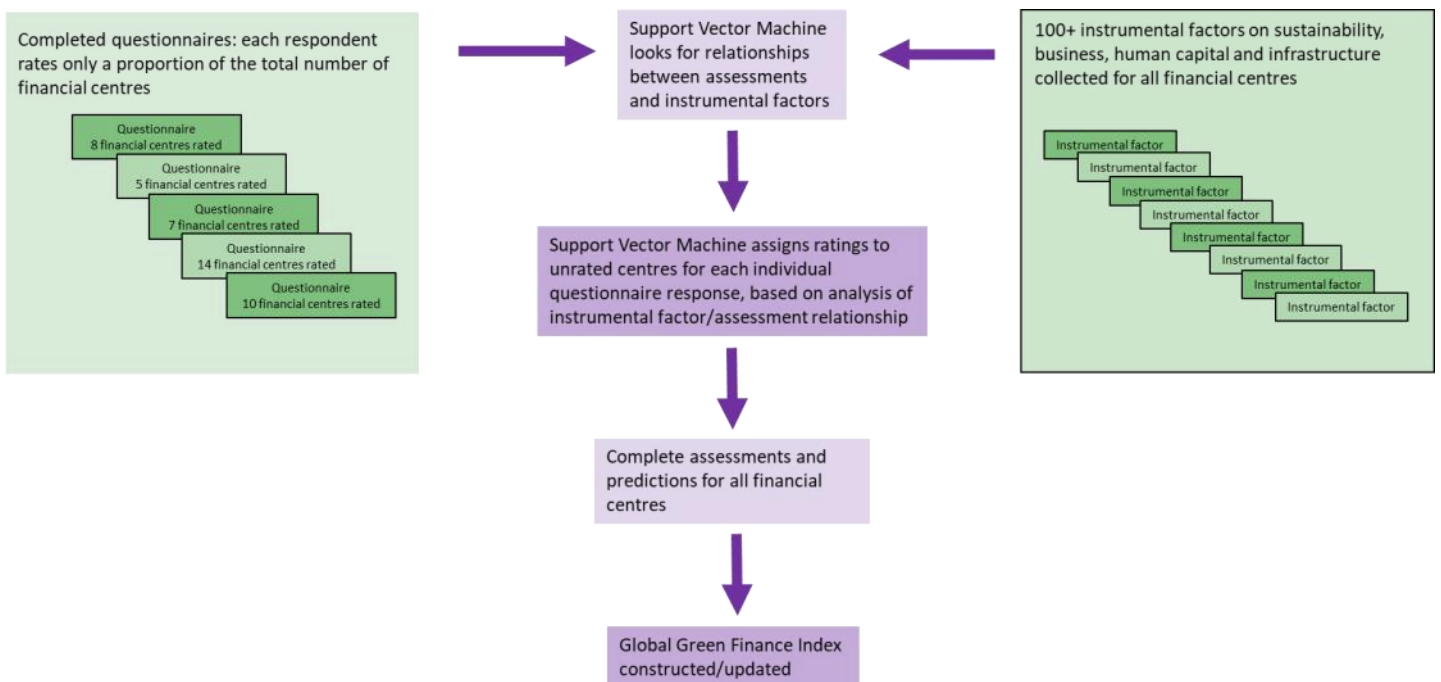
Or

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

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 41 below.

Chart 41 | The GGFI Process



Appendix 5: Instrumental Factors

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

Instrumental Factors	R-squared
Sustainable Cities Index	0.436
IESE Cities In Motion Index	0.427
Quality Of Living City Rankings	0.386
Environmental Performance Index	0.376
Water Quality	0.358
Sustainable Economic Development	0.342
Global Sustainable Competitiveness Index	0.324
Energy Sustainability Index	0.233
Air Quality Data	0.219
Quality Of Life Index	0.214
Financial Institutions Clean Revenue To Fossil-Related	0.179
Shares Of Wind And Solar In Electricity Production	0.167
Sustainable Stock Exchanges (Y/N)	0.126
City Commitment To Carbon Reduction (Cooperative Actions)	0.100
City Commitment To Carbon Reduction (Individual Actions)	0.099

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

Instrumental Factors	R-squared
Quality of Living City Rankings	0.294
Sustainable Cities Index	0.277
IESE Cities In Motion Index	0.253
Environmental Performance Index	0.219
Sustainable Economic Development	0.206
Energy Sustainability Index	0.197
Global Sustainable Competitiveness Index	0.193
Water Quality	0.129
Quality Of Life Index	0.128
Air Quality Data	0.128
Shares Of Wind And Solar In Electricity Production	0.123
Financial Institutions Clean Revenue To Fossil-Related	0.115
Financial Institutions Conventional To New Energy Data	0.095
Energy Intensity Of GDP	0.094
Sustainable Stock Exchanges (Y/N)	0.092

Table 36 | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Air Quality Data	WHO	http://www.who.int/airpollution/data/cities/en/	Yes
Average Precipitation In Depth (Mm Per Year)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	No
Buildings Energy Efficiency Policies Database (Y/N)	IEA	https://www.iea.org/beep/	No
City Commitment To Carbon Reduction (Cooperative Actions)	UNFCCC	http://climateaction.unfccc.int/cities	No
City Commitment To Carbon Reduction (Individual Actions)	UNFCCC	http://climateaction.unfccc.int/cities	No
Climate -Aligned Bonds Outstanding By Country Of Issuer	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Certified Climate Bond Issued To July 2018, % Of Centre Total	CBI	https://www.finance-watch.org/ggfi-global-green-finance-index/	New
Co2 Emissions Per Capita	World Bank	https://data.worldbank.org/indicator/EN.ATM.CO2E.PC	No
Energy Intensity Of GDP	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	No
Energy Sustainability Index	World Energy Council	https://trilemma.worldenergy.org/	No
Environmental Performance Index	Yale University	https://epi.envirocenter.yale.edu/	Yes
Externally Reviewed (Excl CCB) Labelled Green Bonds Issued To July 2018, % Of Centre Total	CBI	https://www.finance-watch.org/ggfi-global-green-finance-index/	New
Financial Centre Carbon Intensity	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Financial Centre Sustainability Disclosure	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Financial Institutions Clean Revenue To Fossil-Related	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Financial Institutions Conventional To New Energy Data	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Financial System Green Alignment	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Forestry Area	World Bank	http://databank.worldbank.org/data/reports.aspx?	No
Global Sustainable Competitiveness Index	Solability	http://solability.com/the-global-sustainable-competitiveness	No
Green Bonds Issued By Country Of Issuer	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
Stock Exchanges With A Green Bond Segment (Y/N)	CBI	https://www.climatebonds.net/green-bond-segments-stock-exchanges	New
GRESB Energy Intensities KWH/M2	Corporate Knights	https://www.finance-watch.org/ggfi-global-green-finance-index/	No
IESE Cities In Motion Index	IESE	http://citiesinmotion.iese.edu/indicecim/?lang=en	Yes
Not-Externally-Reviewed Labelled Green Bonds Issued To July 2018, % Of Centre Total	CBI	https://www.finance-watch.org/ggfi-global-green-finance-index/	New
Protected Land Area % Of Land Area	The World Bank	http://databank.worldbank.org/data/reports.aspx?	No

Table 36 (continued) | Sustainability Factors

Instrumental Factor	Source	Website	Updated
Quality Of Life Index	Numbeo	http://www.numbeo.com/quality-of-life/rankings.jsp	Yes
Quality Of Living City Rankings	Mercer	https://www.mercer.com/newsroom/2017-quality-of-living-	Yes
Share Of Renewables In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	No
Shares Of Wind And Solar In Electricity Production	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	No
Sustainable Cities Index	Arcadis	https://www.arcadis.com/en/global/our-perspectives/	No
Sustainable Economic Development	Boston Consulting Group	https://www.bcg.com/en-gb/publications/2017/economic-development-public-sector-challenge-of-converting-wealth-	No
Sustainable Stock Exchanges (Y/N)	UN Sustainable Stock	http://www.sseinitiative.org/sse-partner-exchanges/list-of-partner-exchanges/	No
Total Issuance Of Labelled Green Bonds To July 2018, Usdm	CBI	https://www.finance-watch.org/ggfi-global-green-finance-index/	New
Total Number Of Labelled Green Bonds Issued	CBI	https://www.finance-watch.org/ggfi-global-green-finance-index/	New
Water Quality	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New

Table 37 | Infrastructure Factors

Instrumental Factor	Source	Website	Updated
Crude Oil Input To Refineries	Enerdata Statistical Yearbook	https://yearbook.enerdata.net/download/	No
Global Competitiveness Index	World Economic Forum	http://reports.weforum.org/global-competitiveness-index-2017-2018/competitiveness-rankings/	No
INRIX Traffic Scorecard	INRIX	http://inrix.com/scorecard/	New
JLL Real Estate Transparency Index	Jones Lang LaSalle	http://www.jll.com/greti/Pages/Rankings.aspx	Yes
Liner Shipping Connectivity Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	No
Logistics Performance Index	The World Bank	http://lpi.worldbank.org/international/global	No
Metro Network Length	Metro Bits	http://mic-ro.com/metro/table.html	Yes
Networked Readiness Index	World Economic Forum	http://reports.weforum.org/global-information-technology-report-2016/	No
Networked Society City Index	Ericsson	https://www.ericsson.com/res/docs/2016/2016-networked-society-city-index.pdf	No
Quality Of Domestic Transport Network	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017	No
Quality Of Roads	World Economic Forum	https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2017	No
Railways Per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2121rank.html	No
Roadways Per Land Area	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html	No
Telecommunication Infrastructure Index	United Nations	http://unpan3.un.org/egovkb/Data-Center	No
Tomtom Traffic Index	TomTom	https://www.tomtom.com/en_gb/trafficindex/	No

Table 38 | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Citizens Domestic Purchasing Power	UBS	https://www.ubs.com/microsites/prices-earnings/en/intro/	Yes
Corruption Perception Index	Transparency International	https://www.transparency.org/news/feature/corruption_perceptions_index_2017	Yes
Cost Of Living City Rankings	Mercer	https://mobilityexchange.mercer.com/Insights/cost-of-living-rankings	Yes
Crime Index	Numbeo	http://www.numbeo.com/crime/rankings.jsp#	Yes
Education Attainment	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New
Employees Working Very Long Hours	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New
GDP Per Person Employed	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	No
Global Cities Index	AT Kearney	https://www.atkearney.com/2018-global-cities-report	Yes
Global Innovation Index	INSEAD	https://www.globalinnovationindex.org/Home	No
Global Intellectual Property Index	Taylor Wessing	https://united-kingdom.taylorwessing.com/global-ip-index/executive_summary	No
Global Peace Index	Institute for Economics & Peace	http://www.visionofhumanity.org/	Yes
Global Skills Index	Hays	http://www.hays-index.com/	No
Global Terrorism Index	Institute for Economics & Peace	http://www.visionofhumanity.org/	No
Good Country Index	Good Country Party	https://www.goodcountryindex.org/	No
Government Effectiveness	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	No
Graduates In Social Science, Business And Law (As % Of Total Graduates)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics	No
Gross Tertiary Graduation Ratio	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=Education%20Statistics	No
Health Care Index	Numbeo	http://www.numbeo.com/health-care/rankings.jsp	Yes
Homicide Rates	UN Office of Drugs & Crime	https://data.unodc.org/	No
Household Net Adjusted Disposable Income	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New
Household Net Financial Wealth	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New
Human Development Index	UN Development Programme	http://hdr.undp.org/en/2016-report	No
Human Freedom Index	Cato Institute	https://www.cato.org/human-freedom-index	Yes
ICT Development Index	United Nations	http://www.itu.int/net4/ITU-D/idi/2017/index.html	No
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	Yes
Innovation Cities Global Index	ZThinkNow Innovation Cities	http://www.innovation-cities.com/innovation-cities-index-2016-2017-global/9774	No

Table 38 (continued) | Human Capital Factors

Instrumental Factor	Source	Website	Updated
Legatum Prosperity Index	Legatum Institute	http://www.prosperity.com/#1/ranking	No
Life Expectancy	OECD	https://stats.oecd.org/Index.aspx?DataSetCode=BLI	New
Linguistic Diversity	Ethnologue	http://www.ethnologue.com/statistics/country	Yes
Lloyd's City Risk Index 2015-2025	Lloyd's	https://cityriskindex.lloyds.com/explore/	No
Number Of High Net Worth Individuals	Capgemini	https://www.worldwealthreport.com/	Yes
Number Of International Association Meetings	World Economic Forum	http://reports.weforum.org/travel-and-tourism-competitiveness-report-2017/	No
OECD Country Risk Classification	OECD	http://www.oecd.org/tad/xcred/crc.htm	Yes
Open Data Barometer	World Wide Web	http://opendatabarometer.org/?_year=2016&indicator=ODB	No
Open Government	World Justice Project	http://worldjusticeproject.org/rule-of-law-index	Yes
Personal Tax Rates	OECD	http://www.oecd.org/tax/tax-policy/tax-database.htm	Yes
Political Stability And Absence Of Violence/ Terrorism	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	No
Press Freedom Index	Reporters Without Borders	http://en.rsf.org/	Yes
Prime International Residential Index	Knight Frank	http://www.knightfrank.com/wealthreport	Yes
Regulatory Quality	The World Bank	http://info.worldbank.org/governance/wgi/index.aspx#home	No
Tax As Percentage Of GDP	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Yes
Top Tourism Destinations	Euromonitor	http://blog.euromonitor.com/2017/01/top-100-city-destination-ranking-2017.html	No
Visa Restrictions Index	Henley Partners	https://www.henleyglobal.com/henley-passport-index/	Yes
Wage Comparison Index	UBS	https://www.ubs.com/microsites/prices-earnings/en/	Yes
World Talent Rankings	IMD	http://www.imd.org/wcc/news-talent-report/	No

Table 39 | Business Factors

Instrumental Factor	Source	Website	Updated
Business Environment Rankings	EIU	http://www.eiu.com/public/thankyou_download.aspx?activity=download&campaignid=bizenviro2014	No
Best Countries For Business	Forbes	http://www.forbes.com/best-countries-for-business/list/#tab:overall	No
Bilateral Tax Information Exchange Agreements	OECD	http://www.oecd.org/ctp/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm	No
Broad Stock Index Levels	The World Federation of	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Yes
Business Process Outsourcing Location Index	Cushman & Wakefield	http://www.cushmanwakefield.com/en/research-and-insight/2016/business-process-outsourcing-location-index-2016/	No
Capitalisation Of Stock Exchanges	The World Federation of	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Yes
City GDP Composition (Business/Finance)	The Brookings Institution	https://www.brookings.edu/research/global-metro-monitor/	No
Common Law Countries	CIA	https://www.cia.gov/library/publications/the-world-factbook/fields/2100.html	No
Corporate Tax Rates	PWC	http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/	Yes
Domestic Credit Provided By Banking Sector (%)	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Yes
Ease Of Doing Business Index	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=doing-business	Yes
External Positions Of Central Banks As A Share	The Bank for International Settlements	http://www.bis.org/statistics/annex_map.htm	Yes
FDI Confidence Index	AT Kearney	https://www.atkearney.com/foreign-direct-investment-confidence-index	Yes
FDI Inward Stock (In Million Dollars)	UNCTAD	http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740	Yes
Financial Secrecy Index	Tax Justice Network	http://www.financialsecrecyindex.com/	Yes
Foreign Direct Investment Inflows	UNCTAD	http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740	No
Global Connectedness Index	DHL	http://www.dhl.com/en/about_us/logistics_insights/studies_research/global_connectedness_index/global_connectedness_index.html	No
Global Enabling Trade Report	World Economic Forum	http://reports.weforum.org/global-enabling-trade-report-2016/	No
Global Services Location	AT Kearney	https://www.atkearney.com/digital-transformation/gqli	No
Government Debt As % Of GDP	CIA	https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html	Yes
Net External Positions Of Banks	The Bank for International	http://www.bis.org/statistics/annex_map.htm	Yes
Office Occupancy Cost	CBRE Research	http://www.cbre.com/research-and-reports?PUBID=3bea3691-f8eb-4382-9c6f-fe723728f87a	Yes
Open Budget Survey	International Budget	http://survey.internationalbudget.org/#download	New

Table 39 (continued) | Business Factors

Instrumental Factor	Source	Website	Updated
Operational Risk Rating	EIU	http://www.viewswire.com/index.asp?layout=homePubTypeRK	Yes
Percentage Of Firms Using Banks To Finance	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	Yes
Real Interest Rate	The World Bank	http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators	No
Total Net Assets Of Regulated Open-End Funds	Investment Company	http://www.icifactbook.org/	Yes
Value Of Bond Trading	The World Federation of	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Yes
Value Of Share Trading	The World Federation of	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Yes
Volume Of Share Trading	The World Federation of	http://www.world-exchanges.org/home/index.php/statistics/monthly-reports	Yes
World Competitiveness Scoreboard	IMD	https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2018/	yes

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